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Tariff Information Series—No. 33

CENSUS OF DYES
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OTHER SYNTHETIC ORGANIC
CHEMICALS



1924



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CHEMICALS



1924



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INTRODUCTION

This report is a survey of the domestic dye and synthetic organic chemical industry in 1924. It presents the results of a special investigation made by the United States Tariff Commission as to the production in the United States of coal-tar dyes and synthetic organic chemicals, both of coal-tar and of noncoal-tar origin. It includes a detailed census of dye imports and official statistics for the imports and exports of coal-tar dyes by the large consuming and producing nations of the world. There is also included the tariff rates imposed on dyes by 26 of the principal dye-consuming and producing countries.

The survey is divided into six parts, as shown in Table of Contents (pp. III to VIII).

In the preparation of this report the Tariff Commission had the services of Warren N. Watson, Frank Talbot, and C. R. De Long, of the chemical division of the commission's staff, and of others.

PART I

SUMMARY OF THE CENSUS OF DYES AND OTHER
SYNTHETIC ORGANIC CHEMICALS, 1924

PART I

SUMMARY OF THE CENSUS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1924

INTRODUCTION

The United States Tariff Commission has reported annually, beginning with 1917, the progress of the American dye and coal-tar chemical industry. In 1921 the annual census was extended to include synthetic organic chemicals other than those derived from coal tar.

In addition to production figures for the domestic industry the present report contains a detailed census of dye imports; a discussion of the international dye trade; developments in the foreign dye-producing countries, especially Germany, France, Poland, and Japan; and official statistics of exports and imports of the more important dye-consuming and producing countries of the world in post-war years. A new feature of the report is a compilation of tariff rates for 26 of the world's chief dye-producing and consuming countries, together with information concerning the license import control of dyes in Great Britain, Germany, Australia, Japan, and Persia.

The general grouping of coal-tar chemicals adopted in the present report follows that of the tariff act of 1922, which conforms in general, although not in every detail, with common practice. Crudes, paragraph 1549, free, are contained in and separated from crude coal tar; intermediates, dutiable under paragraph 27 at 40 per cent and 7 cents per pound, are produced from the crudes by chemical processes; with certain exceptions, they are used only for the manufacture of dyes and other finished products by further chemical treatment; dyes and other finished products are dutiable under paragraph 28 at 45 per cent and 7 cents per pound. The term "other finished products" includes color lakes, photographic chemicals, medicinals, flavors, perfume materials, synthetic resins, and synthetic tanning materials. Explosives, derived from coal-tar materials, although dutiable under paragraph 28, are not included in this census,

A summary of the production of coal-tar products in 1924 according to the classes given above, is contained in Table 1. The figures are compiled from the returns of 193 companies, and are believed to form a complete record of the manufacture of such products in that year. The quantity and value of each product are given in as great detail as is possible without revealing the operations of individual manufacturers. It has been the policy of the commission not to publish either production or sales figures unless at least three firms report a given product and then only when production, or sales, is well distributed among the different firms. In many instances neither production nor sales figures are published, even where there are more than three producers, because of the fact that one firm either produced or sold a large part of the total output.

Other reports prepared by the Tariff Commission relating to conditions in the dye industry include: (1) Costs of Production in the Dye Industry, 1918 and 1919, and (2) Dyes and Other Coal-Tar Chemicals, December 12, 1918.

SUMMARY OF DOMESTIC PRODUCTION, 1924

CRUDES

The total production of coke in 1924 as reported by the United States Geological Survey was 43,451,000 short tons. Of this total 33,983,000 tons (77.8 per cent) were from by-product ovens and 9,668,000 tons (22.2 per cent) from beehive ovens. In 1913 only 27.5 per cent of the total was produced by by-product ovens and 72.5 per cent by beehive. The increase in the production of by-product coke has resulted in (1) an increased yield of valuable by-products, including ammonium compounds for fertilizer and other uses, (2) a supply of gas used for industrial heating and municipal lighting, and (3) a production of coal tar far in excess of the needs of the domestic coal-tar chemical industry. The tar is converted by distillation into crudes, which serve as the basic materials for the domestic coal-tar chemical industry.

The production of coal tar in 1924 was 470,000,000 gallons. For the first time, the Tariff Commission this year obtained returns from coal-tar distillers who reported 193,000,000 gallons distilled, or about 42 per cent of the total coal-tar produced in 1924. Only a part of the 193,000,000 gallons, however, was distilled into refined products, because of the large demand for partly refined products, such as motor fuel, solvents, and pitches. The production of benzene, toluene and solvent naphtha, increased in 1924 and that of "motor benzol" and naphthalene decreased.

INTERMEDIATES

Intermediates are prepared from the coal-tar crudes by chemical treatment. They are further converted by complex chemical processes into finished coal-tar products, such as dyes, medicinals, perfumes, flavors, photographic chemicals, synthetic resins, and tanning materials. Intermediates are also used as accelerators in the vulcanization of rubber, as camphor substitutes, insecticides, germicides, and in the flotation process for concentrating ores.

The total production of intermediates by 94 firms was 186,596,562 in 1924 compared with 231,393,871 pounds by 103 firms in 1923. Sales in 1924 totaled 76,897,521 pounds, with a value of \$18,164,334. In general, there were marked declines in the output of intermediates normally consumed in large amounts. In the production of intermediates used for fast and specialty dyes there were, however, only small decreases and in many cases notable increases. Intermediates used as rubber accelerators showed conspicuous increases. The consumption by the rubber industry of intermediates is a development of importance to the chemical manufacturer, as it furnishes him an auxiliary market for his products. The use of these accelerators has resulted in great economy in the time required for vulcanization of rubber manufactures. It has been estimated that a saving

of about \$80,000,000 capital investment has been effected in the rubber industry by the use of organic accelerators.¹

Among individual intermediates showing conspicuous increases in production in 1924 is phthalic anhydride, with a record output of 2,787,308 pounds. This intermediate, made by the catalytic oxidation of naphthalene, is used in the preparation of synthetic anthraquinone, which in turn is used in alizarin and certain vat dyes. Phthalic anhydride is also directly used in the preparation of such dyes as fluorescein, the rhodamines, and the eosine group. The decline in the price of this product in recent years is one of the most phenomenal in the entire field of intermediates. From \$4.23 per pound in 1917 the price dropped to 24 cents in 1924 and to 18 cents in April, 1925. The average sales price of 24 cents in 1924 is less than the pre-war selling price, when the total consumption was imported.

Anthraquinone, the production of which amounted to 638,755 pounds in 1924, was made largely by the synthetic process, three-fourths of the output being synthetic as compared with about one-fourth of the output in 1923. This product is used in certain vat dyes and also in certain alizarin derivatives, and in consequence is a key intermediate. In 1919 one of the principal problems of the domestic dye industry was how to obtain an adequate supply of anthracene from coal tar. The difficulty was not the natural lack of anthracene in the tar, but the fact that the removal of anthracene oil leaves a hard pitch, which has only a limited market in this country. The extensive development of synthetic anthraquinone, which has an advantage in being of greater purity than anthraquinone produced from anthracene, has solved the problem.

Another intermediate showing increased production in 1924 is phenol, the output of which was 10,521,944 pounds, an increase of more than 200 per cent over that in 1923. Phenol may be classified according to source and method of manufacture as: (1) Natural phenol, obtained directly from coal tar by extraction and purification, and (2) synthetic phenol, made by the chemical processing of benzene. The increased output in 1924 occurred largely in the manufacture of the synthetic product. With a continuation of the growing demand for phenolic resins in the manufacture of automobile and radio parts, synthetic phenol should be a factor of increasing importance in supplying the requirements of this country.

Of the 312 intermediates reported in 1924, over 60 were new products not reported in previous years, and most of these were manufactured for the first time in this country. These new intermediates were used largely in the manufacture of dyes produced for the first time in 1924 as accelerators for the vulcanization of rubber, in synthetic medicinals, and in other finished coal-tar products.

DYES

Production declines 27 per cent from peak year of 1923.—The production of coal-tar dyes by 78 firms was 68,679,000 pounds compared with the peak of 93,667,524 pounds by 88 firms in 1923. Sales in 1924 totaled 64,961,433 pounds, valued at \$35,012,400. The pre-

¹ *Industrial and Engineering Chemistry*, vol. 17, No. 4, April, 1925, p. 396. *History of Organic Accelerators in the Rubber Industry*, W. C. Geer and C. W. Bedford.

war output in 1914 by seven firms was 6,619,729 pounds, valued at \$2,470,096.

The principal reason for the 1924 decline in output was the reduced activity of the textile industry. Other contributing factors were (1) stocks carried over from 1923, (2) increased imports following the 15 per cent reduction in the tariff effective September 22, 1922, and (3) a reduction in exports amounting to 2,210,772 pounds.

Dye prices record further reduction.—The average selling price of dyes sold in 1924 was \$0.54 per pound, nearly 2 per cent below that of the previous year. The average sales price in 1922 was \$0.60, in 1920, \$1.08, and in 1917, \$1.26.

Indigo, the dye produced in largest quantity in 1924, averaged \$0.22 per pound. The price in April, 1925, was \$0.14, a figure below that of 1913, when our entire requirements were imported. From available foreign price data it appears that the domestic price in the early part of 1925 was the lowest in the world.

New dyes.—Over 60 dyes for which no production was reported in 1923 were manufactured in 1924. Most of these had not heretofore been made on a commercial scale in the United States. Among them were a number of dyes previously imported in largest quantity. That the industry made marked progress in 1924 is attested by production of many complex types, such as dyes of high fastness for cotton, wool, and silk, and special dyes required in smaller amounts but nevertheless of great value to the textile industry. Work now under way may be expected to yield results which will give a more complete line of dyes of American origin.

Relation of production to consumption.—Imports of dyes in 1923 were 4.4 per cent of the total production by quantity, and 7.8 per cent by value. They were 5.4 per cent by quantity of the apparent consumption, assuming the latter to equal production plus imports minus exports. The domestic industry supplied the remaining 94.6 per cent of the apparent consumption and had an exportable surplus of certain dyes, chiefly Indigo and Sulphur black, amounting to 16,000,000 pounds.

Expenditures for research.—Over \$2,000,000 was expended for research in coal-tar products in 1924. When the total value of the finished coal-tar products sold in the same year—\$56,000,000—is considered, it is probable that expenditures for investigation in this industry have been greater than in any other industrial field. The total research costs reported to the Tariff Commission have exceeded \$25,000,000 for the period 1917 to 1924. The remarkable accomplishments of the domestic dye and coal-tar chemical industry in these years must be attributed in no small part to the large expenditures for research.

Record output of vat dyes.—The production of vat dyes other than indigo was 1,821,319 pounds in 1924, as compared with 1,766,383 pounds in 1923. Because of their exceptional fastness, these dyes are in increasing demand for cotton goods which are subjected to the severe treatment of the modern laundry. That they were among the last dyes to be developed in this country may be explained by the fact that they are exceedingly complex, difficult and costly to manufacture, and that the patents were largely in the hands of the Germans. Intensive research has resulted in conspicuous increased production since 1920. Although a considerable part of our consumption is still

imported, the domestic industry now supplies about 55 per cent of the total requirements.

Production of dyes by classes.—The 1924 output of dyes, grouped by classes according to the method of application, was as follows: Acid dyes, 9,187,256 pounds, or 13.38 per cent of the total output; basic dyes, 3,676,999 pounds, or 5.35 per cent; direct dyes, 14,662,577 pounds, or 21.35 per cent; lake and spirit-soluble dyes, 967,550 pounds, or 1.41 per cent; mordant and chrome dyes, 2,953,987 pounds, or 4.3 per cent; sulphur dyes, 14,561,257 pounds, or 21.2 per cent; vat dyes, including Indigo, 21,818,022 pounds, or 31.77 per cent; indigo, 19,996,703 pounds, or 29.12 per cent; other vat dyes, 1,821,319 pounds, or 2.65 per cent; unclassified and special dyes, 851,354 pounds, or 1.24 per cent.

Effect of tariff reduction on dye imports.—Under the provisions of the tariff act of 1922, the ad valorem rate on coal-tar dyes and products covered by paragraph 28 was reduced from 60 to 45 per cent on September 22, 1924, and the ad valorem rate on intermediates, paragraph 27, from 55 to 40 per cent. The specific duty remained at 7 cents per pound.

A rapid increase in the monthly imports after the reduction in duty indicates increased competition from foreign-made dyes. The imported dyes are almost entirely of German and Swiss manufacture and consist largely of the higher-cost products. The average monthly imports of dyes from October, 1924, to April, 1925, inclusive, was 452,403 pounds. This is an increase of 152 per cent over the monthly average of the first nine months of 1924 preceding the tariff reduction on dyes.

Dye imports.—The total imports of coal-tar dyes in 1924 were 3,022,539 pounds, valued at \$2,908,778, which was slightly less than the previous year's imports of 3,098,193 pounds, valued at \$3,151,363. Imports in the first five months of 1925 were 2,126,483 pounds, valued at \$1,987,190, a conspicuous increase over the corresponding period of 1924 when they amounted to 1,062,940 pounds, valued at \$1,087,027.

Of the total dye imports in 1924, 50 per cent came from Germany, 30 per cent from Switzerland, 5 per cent from Italy, 3 per cent from France, 4 per cent from England, and 8 per cent from all other countries.

Dye imports in 1924, classified by method of application, were acid dyes, 324,538 pounds; basic dyes, 249,068 pounds; direct dyes, 421,538 pounds; lake and spirit-soluble dyes, 17,334 pounds; mordant and chrome, 413,902 pounds; sulphur dyes, 87,764 pounds; vat dyes, 1,499,322 pounds; unclassified and special dyes, 9,073 pounds. Vat dyes represented 49.6 per cent of all dyes imported.

Dye exports.—Dye exports in 1924 declined 12 per cent by quantity as compared with 1923, but the value remained practically the same. Total exports were 15,713,428 pounds, a decrease of 2,210,772 pounds from the previous year. The value of exports was \$5,636,244, an increase of \$70,977 over 1923. The decline in quantity in the face of a slight increase in value is probably due to larger exports of indigo in the form of powder instead of paste. Otherwise exports show little change from the previous year.

In recent years our export trade in dyes has consisted very largely of Indigo and Sulphur black shipped mostly to the markets of the Far East. Other dyes have comprised a relatively small part of the total. But since the disappearance of the effect of the occupation of the Ruhr, American manufacturers have encountered keen competition in the world's markets from the Germans and the Swiss, particularly the former.

OTHER FINISHED COAL-TAR PRODUCTS

Color lakes.—The total output of this class of pigments in 1924 was 9,343,147 pounds, as compared with 13,079,115 pounds in 1923. Sales of color lakes in 1924 amounted to 9,281,673 pounds, valued at \$4,045,799.

Photographic chemicals.—The 1924 production of coal-tar chemicals used as photographic developers totaled 316,183 pounds, as compared with 343,289 pounds in 1923. Sales in 1924 amounted to 321,865 pounds, valued at \$461,379.

Medicinals.—This class of coal-tar products may be considered essential to the national welfare. The highest technical skill and the most exhaustive research are required in their development and commercial production. The total output in 1924 was 2,967,944 pounds, with sales amounting to 2,688,329 pounds, valued at \$5,178,099. Production in 1923 amounted to 3,273,085 pounds, with sales of 2,995,448 pounds, valued at \$4,720,253.

Perfumes and flavors.—These coal-tar products are closely related, certain members of the class being used both as flavors and as perfumes. The total output of flavors in 1924 was 1,750,555 pounds, as compared with 1,458,024 pounds in 1923. Sales in 1924 amounted to 1,691,863 pounds, valued at \$1,471,089. The production of perfumes in 1924 was 1,895,267 pounds, as compared with 1,365,449 pounds in 1923. Sales in 1924 amounted to 1,945,488 pounds, valued at \$945,773.

Synthetic phenolic resins.—These products are used for automobile and radio parts, as substitutes for amber in making pipe stems, for electrical insulators, varnishes, and lacquers, and for a great variety of other articles. The 1922 production was 5,944,133 pounds; the figures for 1923 and 1924 can not be published without revealing the output of individual companies.

Synthetic tanning materials.—The output of this group amounted to 1,910,519 pounds in 1922, but here again, and for the same reason, the 1923 and 1924 production figures must be withheld.

The combined output of synthetic phenolic resins and synthetic tanning materials in 1924 was 12,778,115 pounds, as compared with 9,763,685 pounds in 1923. The total sales of the two products in 1924 amounted to 12,745,458 pounds, valued at \$8,818,041, as compared with 10,068,431 pounds in 1923, valued at \$5,816,590.

STATISTICS OF PRODUCTION

TABLE I.—Summary of the production of dyes and coal-tar chemicals, 1918-1924

	1918			1919		
	Number of manufacturers	Production		Number of manufacturers	Production	
		Pounds	Value		Pounds	Value
Group II—Intermediates	128	357,662,251	\$124,382,892	116	177,362,426	\$63,210,079
Group III—Finished products		76,802,959	83,815,746	155	82,532,390	84,585,544
Dyes	78	58,464,446	62,026,390	90	63,402,194	67,598,855
Color lakes	29	9,590,537	5,020,023	34	7,569,921	4,179,964
Photographic chemicals	6	316,749	823,915	10	335,509	1,059,340
Medicinals	31	3,623,352	7,792,984	31	6,777,988	7,883,071
Flavors	7	458,256	4,925,627	9	610,825	1,318,654
Perfumes	6	116,263	584,695	6	41,419	164,302
Tanning materials	1	4,233,356	2,642,120	1	3,794,534	2,381,358
Synthetic phenolic resins	5			5		

	1920			1921				
	Number of manufacturers	Production		Number of manufacturers	Production	Sales		
		Pounds	Value		Pounds	Pounds	Value	
Group II—Intermediates	119	257,726,911	\$93,291,686	108	70,899,912	33,637,326	\$8,483,463	
Group III—Finished products		161	112,942,227	112,731,547	147	51,457,565	60,434,009	47,996,514
Dyes	82	88,263,776	95,613,749	74	39,008,690	47,513,762	39,283,956	
Color lakes	43	10,983,538	5,871,820	43	6,152,187	6,424,612	2,863,189	
Photographic chemicals	8	440,759	1,015,848	5	183,798	170,221	248,041	
Medicinals	35	5,184,989	5,726,776	34	1,545,917	1,876,246	2,930,324	
Flavors	15	166,884	527,493	17	901,245	933,662	1,002,018	
Perfumes	12	99,740	332,008	15	119,335	119,691	175,815	
Tanning materials	4	3,142,861	233,674	4	1,902,597	1,721,359	141,005	
Synthetic phenolic resins	4	4,659,680	3,410,179	3	1,643,796	1,674,456	1,352,166	

	1922			
	Number of manufacturers	Production	Sales	
		Pounds	Pounds	Value
Group II—Intermediates	106	165,048,155	58,004,435	\$12,910,486
Group III—Finished products	164	88,368,131	93,370,065	57,067,326
Dyes	87	64,632,187	69,107,105	41,463,790
Color lakes	43	10,578,664	10,366,676	4,551,572
Photographic chemicals	7	345,798	347,647	483,269
Medicinals	35	2,946,347	3,092,915	4,233,443
Flavors	20	1,215,668	1,278,857	1,260,588
Perfumes	17	793,148	778,696	643,436
Tanning materials	4	1,910,519	1,981,588	103,598
Synthetic phenolic resins	5	5,944,133	6,415,931	4,315,196
Research chemicals	4	1,607	650	12,434

TABLE 1.—*Summary of the production of dyes and coal-tar chemicals, 1918-1924—Continued*

	1923			
	Number of manufactures	Production	Sales	
		Pounds	Pounds	Value
Group II—Intermediates.....	103	231,393,871	83,582,808	\$18,916,058
Group III—Finished products.....	164	122,950,171	115,297,586	65,898,177
Dyes.....	88	93,667,524	86,567,446	47,223,161
Color lakes.....	43	13,079,115	12,627,359	5,124,732
Photographic chemicals.....	5	343,289	321,083	443,697
Medicinals.....	32	3,273,085	2,995,448	4,720,253
Flavors.....	16	1,458,024	1,442,387	1,780,313
Perfumes.....	20	1,365,449	1,275,432	789,431
Tanning materials.....	3	9,763,685	10,068,431	5,816,590
Synthetic phenolic resins.....	2			
	1924			
	Number of manufactures	Production	Sales	
		Pounds	Pounds	Value
Group II—Intermediates.....	94	186,596,562	76,897,521	\$18,164,334
Group III—Finished products.....	153	97,730,211	93,636,109	55,932,550
Dyes.....	78	68,679,000	64,961,433	35,012,400
Color lakes.....	46	9,343,147	9,281,673	4,045,799
Photographic chemicals.....	5	316,183	321,865	461,379
Medicinals.....	29	2,967,944	2,688,329	5,178,099
Flavors.....	16	1,750,555	1,691,863	1,471,089
Perfumes.....	19	1,895,267	1,945,488	945,773
Tanning materials.....	3	12,778,115	12,745,458	8,818,041
Synthetic phenolic resins.....	2			

INTERNATIONAL DYE TRADE

Prior to the war Germany almost completely dominated the world's dye trade, but since the war has come a realignment of producers. Since 1914 the manufacture of intermediates and dyes has been established on a large scale in the United States, Great Britain, and France, and to a smaller extent in Italy and Japan, while in Switzerland the industry has expanded. This has resulted in nearly doubling the world's capacity to produce dyes. In consequence of this enlarged capacity an era of competition has set in which may eliminate many of the existing plants.

These new dye industries have greatly affected Germany's export trade, which in 1924 had dropped to 25 per cent by quantity and 60 per cent by value of the 1913 trade. But there is little doubt of Germany's determination to recover as large a portion as possible of her lost markets, even at a high cost and over a long period of time. The large dye-consuming markets of the Far East, including China and Japan, as well as India, South America, and Russia, are again largely dominated by German products. In consuming countries which have no dye industries, Germany, consequently, has a large part of the world's trade. The new producing countries have, however, adopted protective measures for the purpose of stimulating dye production. These measures have been partly responsible for Germany's effort to establish branch plants or to affiliate with estab-

lished producers. Although German manufacturers have been less successful than the Swiss in establishing branch plants, they have firmly intrenched themselves in Italy and the I. G.² has discussed negotiations with British dye producers, although no agreement has yet been announced. It appears possible that affiliations, if not already effected, may be made in the near future, affecting one or more individual firms in the United States.

One development of significance by the German I. G. in 1924 is the reported consolidation of interests for the purpose of reducing personnel and eliminating the duplication of production, selling, and purchasing forces. It is hoped thereby to reduce costs of manufacture. Amalgamation of the selling agencies of the German dye plants in Japan is only one of the results of such a movement. As the German export trade constituted nearly nine-tenths of the total trade before the war, the dye industry has been, almost from its inception, organized on an international basis.

The German dye industry possesses several advantages over the industries of other countries, among which are (1) cumulative experience, (2) lower manufacturing costs in plants built before the war and paid for by pre-war profits, (3) the established reputation of its products among consumers, (4) a highly developed selling organization in all of the world markets, (5) availability of raw materials, (6) a unified front effected by the I. G. for meeting competition, and (7) the wide diversity of products manufactured. The struggle for the international market promises to be a long and severe one and in the end must result in the elimination, from an export basis, of those dyes which can not be produced at a cost sufficiently low to compete with German and Swiss products.

Switzerland ranks second to Germany in the international dye trade. They produce largely the higher cost types. Indigo, the one exception, is produced in quantity and exported by a single Swiss firm. Based on the 1913 figures for each country, the post-war export trade of Switzerland shows a smaller decline than that of Germany. This is probably due to the fact that the new producing countries have made the higher cost colors only after manufacturing the bulk types. Great Britain and the United States are, however, each year making more of the high cost dyes. In the long run it is probable that the Swiss will find their lack of raw materials an increasing handicap in maintaining their industry on an international basis. They operate branch plants in the United States, Great Britain, France, and Italy, and consequently share the trade of those markets beyond the extent indicated by their actual exports.

In the event that German firms do not establish branch plants in Great Britain and the United States, two methods are open for their pursuance of commercial warfare against the dye industry of these two countries, (1) an attack on their export trade and (2) a direct attack by price cutting in the world markets on certain lines of key products. Both methods of procedure are reported to have been employed in 1925. Evidence of the effectiveness of such procedure has been manifest in the United States since the tariff reduction of

² The Interessen Gemeinschaft is universally known as "I. G.," and will be so referred to throughout the remainder of this report.

15 per cent ad valorem on September 22, 1924, resulting in a sharp increase in the imports of the higher price dyes.

In addition to the special measures which Great Britain, the United States, France, Italy, Japan, and Spain have adopted to encourage and stimulate dye production, Great Britain and Japan have rendered financial aid to their dye industries, and Great Britain, Japan, and Germany have put in force a license system of dye-import control. Protective measures will play an important part in the maintenance and development of the dye industries in the new producing countries within the next five to ten years. In the long run, however, such fundamentals as (1) cost of production, (2) availability of raw materials, (3) cost and efficiency of labor and the maintenance of technical staffs, (4) efficiency of selling organization, (5) sufficient capital without excessive capitalization, and (6) ability to give prompt and efficient technical service to consumers, will become decisive factors in determining what countries will survive this competitive era. The German and the Swiss have an advantage in a consolidation of companies not possessed by any other country. Such a consolidation in the United States would be in violation of antitrust laws. In sharp contrast to the close cooperation in Germany between dye firms is the sharp competition between the different firms in some of the new dye-producing countries, particularly in the United States.

Among the world's dye producers there is manifest a distinct trend toward (1) the production of dyes of superior fastness, (2) the manufacture of dyes adapted to special purposes, (3) the development of dyes of lower application costs, (4) increase in the number of identical dyes produced by different firms, and (5) elimination of many types either in small demand or for which satisfactory substitutes are available.

The manufacturers of Germany, Switzerland, and Great Britain made many new dyes in 1924. Two conspicuous advances in Great Britain were the development of dyes adapted to artificial silk, particularly acetate silk, and the manufacture of stable water-soluble derivatives of vat dyes. The first water-soluble vat dye was Indigol, manufactured by a Swiss firm and later by a German company. The second one was Soledon jade green, a derivative of Caledon jade green produced by the Scottish Dyes (Ltd.), of Great Britain. These new vat dyes have the advantage of being simple to apply and of being suitable for animal fibers as well as vegetable fibers. Their extensive substitution for the original vat dyes will probably depend upon their cost.

The maintenance of research for the development of new dyes and allied products and for the improvement of existing methods of manufacture are important factors not to be overlooked by any nation striving to retain its international position in the dye trade. Marked advantages will result to those firms able to produce new dyes of exceptional fastness adapted to special use, and economical to apply.

SYNTHETIC ORGANIC CHEMICALS NOT DERIVED FROM COAL TAR

The Tariff Commission in 1921 compiled for the first time a census of organic chemicals other than those derived from coal tar or obtained directly from natural sources. These included acids, alcohols, esters, ketones, aldehydes, derivatives of alkaloids, carbocyclic compounds, etc., used as perfume and flavoring ingredients, solvents, medicinals, and also in industrial and other processes.

The production of organic chemicals of noncoal-tar origin in the United States has developed rapidly during the past few years. Statistics of production and sales for this whole group of products are available only for 1921 and subsequent years.

TABLE 2.—*Production and sales of synthetic organic chemicals of noncoal-tar origin, 1921-1924*

Year	Production	Sales	
	Pounds	Pounds	Value
1921.....	21, 545, 186	16, 761, 096	\$7, 226, 068
1922.....	79, 202, 155	60, 494, 494	11, 964, 074
1923.....	90, 597, 712	67, 727, 067	13, 875, 521
1924.....	115, 817, 865	85, 933, 461	20, 604, 717

Development in this field of organic chemistry has been due in part to the increased production of solvents such as ethyl acetate, butanol, butyl acetate, and amyl acetate, used in the new nitrocellulose plastic and varnish industries. Likewise the increase in the production of phenolic resins has caused a larger output of formaldehyde, a synthetic made in great quantity. Carbon tetrachloride used in fire extinguishers and as a solvent, chloroform used largely as an anesthetic, ethyl ether, oxalic acid, and tetraethyl lead are also among the synthetics of large production.

Part IV of this report contains a detailed census of this group of organic chemicals, in so far as figures may be published without disclosing the operations of individual manufacturers.

PART II

PRODUCTION OF DYES AND COAL-TAR
CHEMICALS, 1924

PART II

PRODUCTION OF DYES AND COAL-TAR CHEMICALS, 1924

COAL-TAR CRUDES

Output of by-product coke exceeds 33,000,000 tons.—Preliminary figures for the domestic production of coke in 1924, as reported by the United States Geological Survey, show a total of 43,451,000 short tons. This is 23 per cent less than the 1923 production, a decline largely due to the depression in the iron and steel industry. By-product coke declined 10 per cent while beehive coke declined about 50 per cent.

The significant feature of the 1924 production is the high percentage of the total output obtained from by-product ovens—77.8 per cent as compared with 27.5 per cent in 1913. The beehive coke industry of to-day may be looked upon largely as an auxiliary source of coke when the output of the by-product ovens is insufficient to meet the demand.

The following table shows the production of by-product and beehive coke from 1913 to 1924, inclusive. The figures for 1924 are not final; those for by-product coke are taken from preliminary reports and those for beehive coke are estimates based upon the statements of producers as to the number of cars loaded for shipment by the railroads.

TABLE 3.—*Production of by-product and beehive coke in the United States, 1913–1924*

Year	Net tons produced			Per cent of total output	
	By-product	Beehive	Total	By-product	Beehive
1913.....	12,714,700	33,584,830	46,299,530	27.5	72.5
1915.....	14,072,895	27,508,255	41,581,150	33.8	66.2
1917.....	22,439,280	33,167,548	55,606,828	40.4	59.6
1918.....	25,997,580	30,480,792	56,478,372	46.0	54.0
1919.....	25,137,621	19,042,936	44,180,557	56.9	43.1
1920.....	30,833,951	20,511,092	51,345,043	60.0	40.0
1921.....	19,749,580	5,538,042	25,287,622	78.1	21.9
1922.....	28,550,545	8,573,467	37,124,012	76.9	23.1
1923.....	37,597,664	19,379,870	56,977,534	66.0	34.0
1924 ¹	33,983,000	9,668,000	43,451,000	77.8	22.2

¹ Preliminary figures.

In the conservation of national resources, the replacement of beehive ovens by the by-product variety, which recover the tar, ammonia, and gas products entirely wasted by the old beehive type, is of great economic significance for the following reasons: (1) The by-product ovens increase production of ammonia for fertilizer and other use; (2) the gas produced in these ovens is used for municipal lighting and industrial heating; and (3) the output of tar insures an abundant supply of coal tar for the preparation of crudes which serve as a basis of the domestic coal-tar dye and chemical industry.

Production of tars.—The total output of coal tar in 1924 was about 470,000,000 gallons, as compared with 488,900,000 gallons in 1923. According to preliminary figures, sales of coal tar in 1924 were about 253,000,000 gallons, valued at \$11,810,000. The domestic supply of tar is far in excess of the requirements of the domestic coal-tar chemical industry. Of the total production in 1924, 54 per cent was sold to other plants. Total sales as reported to the Tariff Commission by firms not primarily engaged in the operation of coke ovens indicate that approximately 184,000,000 gallons were distilled in 1924. It is estimated that in addition to this amount about 9,000,000 gallons were distilled, making a total of about 193,000,000 gallons. Including about 60,000,000 gallons of coal tar sold but not distilled, approximately 58 per cent of the total production of coal tar in 1924 was used for fuel.

Table 4 shows the production and sales of coke-oven, coal-gas, water-gas, and oil-gas tar in the United States from 1918 to 1924, inclusive. Table 5 shows the production and disposition of coke-oven tar in the same period.

In times of fuel shortage the value of tar as a fuel is enhanced; in any event the tar distiller must pay somewhat more than fuel value of the tar. Of the total tar sold by the coke-oven operator, only part is distilled into refined phenol, cresylic acid, naphthalene, and anthracene.

This is accounted for by the demand for such partly refined products as solvents and soft pitches. A similar condition exists in light oil obtained from coke-oven gas, as only a portion is separated into benzene, toluene, and xylene, owing to the demand for such partly refined products as motor fuel and solvents.

TABLE 4.—*Production and sales of coke-oven, coal-gas, water-gas, and oil-gas tar in the United States, 1918-1924*

[Compiled by the United States Geological Survey from reports of producers. The difference between production and sales is accounted for by tar used by the producer and by changes in stock.]

	Coke-oven tar	Coal-gas tar	Total coal tar	Water and oil gas tar
Production (gallons):				
1918.....	263, 299, 470	52, 694, 826	315, 994, 296	100, 985, 156
1919.....	288, 901, 739	(¹)	340, 900, 000	(²)
1920.....	360, 664, 124	51, 264, 956	411, 929, 080	116, 073, 907
1921.....	253, 051, 649	(¹)	303, 000, 000	(²)
1922.....	327, 779, 734	48, 082, 228	375, 861, 962	104, 555, 028
1923 ³	440, 907, 109	(¹)	488, 900, 000	(²)
1924 ⁴	422, 074, 000	(¹)	470, 000, 000	(²)
Sales (gallons):				
1918.....	200, 233, 002	47, 727, 839	247, 960, 841	55, 283, 484
1919.....	217, 707, 157	(¹)	264, 900, 000	(²)
1920.....	174, 363, 696	46, 604, 133	220, 967, 829	59, 238, 730
1921.....	133, 293, 047	(¹)	179, 200, 000	(²)
1922.....	162, 204, 417	41, 266, 074	203, 470, 491	47, 338, 489
1923 ³	211, 739, 469	(¹)	254, 700, 000	⁵ 49, 990, 840
1924 ⁴	209, 980, 000	(¹)	253, 000, 000	(²)
Value of sales:				
1918.....	\$6, 364, 972	\$1, 863, 580	\$8, 228, 552	\$1, 895, 865
1919.....	6, 918, 549	(¹)	8, 800, 000	(²)
1920.....	6, 378, 040	2, 010, 186	8, 388, 226	2, 109, 388
1921.....	5, 645, 309	(¹)	7, 760, 000	(²)
1922.....	6, 419, 743	1, 955, 950	8, 375, 693	1, 879, 490
1923 ³	9, 250, 552	(¹)	11, 400, 000	⁵ 2, 001, 363
1924 ⁴	9, 662, 000	(¹)	11, 810, 000	(²)

¹ No report. Estimate included in total.

² No report.

³ Revised since last report.

⁴ Preliminary figures.

⁵ As reported by Census of Manufactures.

TABLE 5.—*Production and disposition of coke-oven tar in the United States, 1918-1924*

[Compiled by United States Geological Survey from reports of operators]

Year	Coke-oven tar		
	Gallons produced	Per cent sold ¹	Per cent used ¹
1918	263, 299, 470	76.0	24.0
1919	288, 901, 739	75.4	24.6
1920	360, 664, 124	48.3	51.7
1921	253, 051, 649	53.5	46.5
1922	327, 779, 734	49.5	50.5
1923 ²	440, 907, 109	48.0	52.0
1924 ³	422, 074, 000	49.6	50.4

¹ No account is taken of changes in stocks.² Revised since last report.³ Preliminary figures.

Total production of crudes.—The data on domestic production of crudes are collected either by the Tariff Commission or by the Geological Survey, according to the producer. Crudes distilled from tar at the by-product coke-oven plants are reported to the Geological Survey, while the output by firms primarily engaged in the distillation of tar is reported to the Tariff Commission.

Table 6 gives the production of by-products obtained from coke-oven operations in the years 1922 to 1924, together with the quantity and value of the sales.

Table 7 (p. 20) shows production of crudes by firms engaged primarily in the distillation of coal tar. Increases in the 1924 production by firms primarily engaged in tar distillation are shown for benzene, solvent naphtha, and dead oil; decreases are shown for naphthalene, pitch, and refined tars.

Table 8 (p. 21) gives total commercial production from 1918 to 1924 of benzene, "motor benzol," toluene, solvent naphtha, and naphthalene from all sources. Benzene, toluene, and solvent naphtha were made in larger quantities in 1924 than in 1923, while motor benzol and naphthalene were produced in smaller amounts.

TABLE 6.—By-products obtained from coke-oven operations, 1922-1924

[United States Geological Survey]

Product	Production	Sales		
		Quantity	Value	
			Total	Average
1922				
Tar.....gallons.....	327, 779, 734	162, 204, 417	\$6, 419, 743	\$0. 0396
Ammonia:				
Sulphate.....pounds.....	695, 543, 349	714, 752, 882	17, 818, 236	. 0249
Ammonia liquor (NH ₃ content).....do.....	50, 036, 646	48, 523, 937	4, 559, 535	. 0940
Other forms (NH ₃ content).....do.....	693, 782	192, 549	12, 041	. 0625
Sulphate equivalent of all forms.....do.....	898, 465, 061	909, 618, 826	22, 389, 812	-----
Gas:				
Used under boilers, etc.....M cubic feet.....	1442, 671, 114	19, 123, 814	1, 251, 325	. 0654
Used in steel or affiliated plants.....do.....		144, 976, 030	15, 942, 446	. 1100
Distributed through city mains.....do.....		56, 930, 253	20, 326, 648	. 3570
Sold for industrial use.....do.....		10, 352, 921	1, 104, 096	. 1066
		231, 383, 018	38, 624, 515	. 1669
Light oil and derivatives:				
Crude light oil.....gallons.....	7 101, 437, 555	5, 138, 095	630, 768	. 1223
Benzol—				
Crude.....do.....	2, 666, 177	2, 665, 889	698, 437	. 2620
Refined.....do.....	10, 419, 504	9, 590, 459	2, 736, 944	. 2554
Motor benzol.....do.....	57, 025, 699	54, 930, 203	10, 491, 309	. 1910
Toluol—				
Crude.....do.....	38, 159	3, 938	652	. 1656
Refined.....do.....	1, 955, 119	1, 906, 122	556, 363	. 2919
Solvent naphtha.....do.....	2, 983, 858	2, 861, 482	538, 512	. 1882
Other light oil products.....do.....	580, 058	212, 712	14, 949	. 0703
	75, 668, 574	77, 308, 900	15, 667, 934	. 2027
Naphthalene:				
Crude.....pounds.....	6, 107, 742	3, 298, 851	52, 103	. 0158
Refined.....do.....	1, 810, 972	1, 589, 084	79, 149	. 0498
	7, 918, 714	4, 887, 935	131, 252	. 0269
Other products.....			154, 507	-----
Value of all by-products sold.....			83, 387, 763	-----
1923				
Tar.....gallons.....	440, 907, 109	211, 739, 469	9, 250, 552	. 044
Ammonia:				
Sulphate.....pounds.....	915, 926, 762	884, 952, 912	25, 954, 413	. 029
Ammonia liquor (NH ₃ content) ¹.....do.....	58, 699, 902	57, 859, 699	5, 754, 463	. 099
Sulphate equivalent of all forms.....do.....	1, 150, 726, 370	1, 116, 391, 708	31, 708, 876	-----
Gas:				
Used under boilers, etc.....M cubic feet.....	1601, 155, 293	33, 740, 758	1, 820, 808	. 054
Used in steel or affiliated plants.....do.....		200, 099, 200	22, 646, 134	. 113
Distributed through city mains.....do.....		65, 143, 515	23, 116, 578	. 355
Sold for industrial use.....do.....		19, 458, 781	4, 025, 700	. 207
		318, 442, 254	51, 609, 220	. 162

¹ Includes gas wasted and gas used for heating retorts.² 98,432,100 gallons, including 4,200,000 gallons of purchased oil, was refined on the premises to make the derived products listed.³ Includes an unknown amount of sulphate sold on the basis of pounds of NH₃ content.

TABLE 6.—By-products obtained from coke-oven operations, 1922-1924—Con.

Product	Production	Sales		
		Quantity	Value	
			Total	Average
Light oil and derivatives:				
Crude light oil.....gallons..	135,647,175	6,539,368	\$683,545	\$0.105
Benzol—				
Crude.....do.....	4,503,423	4,348,400	768,486	.177
Refined.....do.....	12,364,043	12,375,782	3,070,751	.248
Motor benzol.....do.....	80,467,883	80,480,326	13,145,833	.163
Toluol—				
Crude.....do.....	37,777	6,097	978	.160
Refined.....do.....	2,847,517	2,628,686	765,052	.291
Solvent naphtha.....do.....	4,162,178	3,399,904	608,084	.179
Other light oil products.....do.....	439,253	198,098	10,605	.054
	104,822,079	109,976,661	19,053,334	.173
Naphthalene:				
Crude.....pounds.....	11,872,007	10,047,427	174,216	.017
Refined.....do.....	1,139,922	1,193,206	65,493	.055
	13,011,929	11,245,633	239,709	.021
Other products.....			214,264	
Value of all by-products sold.....			\$ 112,075,955	
Tar.....gallons.....	422,074,326	209,979,999	9,661,563	.046
Ammonia:				
Sulphate.....pounds.....	893,127,071	931,329,570	22,522,248	.024
Ammonia liquor (NH ₃ content).....do.....	49,029,524	47,665,811	4,656,428	.098
			27,178,676	
Sulphate equivalent of all forms.....do.....	1,089,245,167	1,121,992,814		
1924				
Gas:				
Used under boilers, etc.....M cubic feet.....	1541,101,050	29,794,046	1,729,013	.058
Used in steel or affiliated plants.....do.....		187,171,883	21,007,607	.112
Distributed through city mains.....do.....		65,676,867	23,486,416	.358
Sold for industrial use.....do.....		18,561,057	3,561,911	.192
		301,203,853	49,784,947	.165
Light oil and derivatives:				
Crude light oil.....gallons.....	128,956,955	7,840,582	652,467	.083
Benzol, crude and refined ¹.....do.....	20,429,515	20,024,902	4,071,221	.203
Motor benzol ².....do.....	71,474,321	70,636,930	10,732,087	.152
Toluol—				
Crude.....do.....	234,244	245,079	51,041	.208
Refined.....do.....	2,951,187	2,986,423	718,641	.241
Solvent naphtha.....do.....	4,474,220	3,884,585	724,874	.187
Other light oil products.....do.....	1,364,528	1,077,842	78,934	.073
	100,928,015	106,696,343	17,029,265	.160
Naphthalene:				
Crude.....pounds.....	8,378,666	7,891,116	116,305	.015
Refined.....do.....	13,302	327,957	11,903	.036
	8,391,968	8,219,073	128,208	.016
Other products.....			57,891	
Value of all by-products sold.....			\$ 103,840,550	

¹ Includes gas wasted and gas used for heating retorts.

² Refined on the premises to make the derived products shown, 132,517,389 gallons.

³ Exclusive of the value of coke breeze produced, which in 1923 amounted to \$9,048,000.

⁴ Refined on the premises to make the derived products shown, 125,580,743 gallons.

⁵ Included under refined benzol are the sales of two plants amounting to 2,284,000 gallons, with a value of \$301,565, that were reported as "refined benzol," but were probably used as motor benzol.

⁶ Total gallons of derived products.

⁷ Exclusive of the value of coke breeze produced, which in 1924 amounted to \$6,179,000.

TABLE 7.—Production of coal-tar crudes, 1924, by firms not primarily engaged in the operation of coke-oven plants and gas houses

[The numbers in the second column refer to the numbered alphabetical list of manufacturers given on page 211. An X indicates that the corresponding product was made by a manufacturer who did not consent to the publication of his name in connection therewith. A blank in the third and fourth columns indicates that there was actual production of the corresponding article, but that the figures can not be published without revealing the output of individual firms].

Name	Manufacturers' identification numbers according to list on page 211	1924		
		Quantity	Value	Unit value
Total crudes.....			\$17,353,541	
Anthracene (crude, less than 30 per cent).....pounds.....	157.....			
Anthracene oil.....gallons.....	148, 157, X.....	693, 518	116, 289	\$0.17
Benzene.....do.....	16, 23, 47, 142, X.....	629, 934	155, 973	.25
Carbazole (crude).....pounds.....	171.....			
Carbolic or middle oil.....gallons.....	36, 50.....			
Cresol or cresylic acid (crude).....gallons.....	16, 47, 104, X.....			
Cumene.....do.....	16.....			
Dead or creosote oil.....do.....	16, 23, 36, 42, 47, 50, 104, 127, 148, 157, 168, 187, X, X, X.....	41, 041, 278	4, 789, 590	.12
Light oil.....do.....	36, 50, 127, X, X.....	83, 754	13, 461	.16
Motor fuel.....do.....	47, 142, X.....			
Naphthalene (crude).....pounds.....	14, 16, 36, 47, 50, 104, 127, 157, 168, X, X, X.....	34, 683, 803	441, 333	.01
Other distillates.....gallons.....	16, 36, 42, 47, 104, 148, 168, X, X, X.....	9, 648, 282	1, 388, 331	.14
Pitch of tar.....tons.....	16, 23, 36, 42, 47, 50, 104, 127, 148, 157, 168, X, X, X, X.....	421, 580	6, 439, 161	15.27
Pyridine.....gallons.....	16, 123.....			
Refined tars.....barrels.....	16, 23, 36, 50, 104, 127, 157, 168, X, X, X, X, X.....	625, 792	2, 785, 460	4.45
Solvent naphtha.....gallons.....	16, 47, 157, X, X.....	770, 491	130, 903	.17
Toluene.....do.....	16.....			
Xylene.....do.....	16.....			

The instructions sent to manufacturers were as follows: Include under dead or creosote oil only products which may be used for creosoting. Include under "other distillates" shingle stain oils, disinfectant oils, and flotation oils which do not contain over 5 per cent of phenol. Include under refined tars those tars which are used for road treatment, saturating felt, and for protective coatings. Phenol and all distillates which, on being subjected to distillation, yield in the portion distilling below 190° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate, or which, on being subjected to distillation, yield in the portion distilling below 215° C. a quantity of tar acids equal to or more than 75 per cent of the original distillate are not to be included here but are to be placed under intermediates.

TABLE 8.—Total commercial production of benzene, toluene, solvent naphtha, and naphthalene from all sources in the United States, 1918–1924

[Data for coke ovens and gas works from reports to United States Geological Survey; for tar refineries and others to United States Tariff Commission]

	By-product coke plants (sales) ¹	Gas works (sales) ¹	Tar refineries and all other establishments (production)	Total commercial production ²
Benzene (all grades except motor benzol):				
Gallons—				
1918.....	43,441,980	2,177,168	3,015,848	48,634,996
1919.....	³ 63,077,463	(⁴)	1,826,373	⁵ 65,403,836
1920.....	17,230,776	(⁴)	875,561	18,141,337
1921.....	6,839,021	(⁴)	2,171,631	9,045,642
1922.....	12,256,348	(⁴)	⁶ 774,940	13,071,288
1923.....	⁶ 16,724,182	(⁴)	394,906	17,154,088
1924.....	⁷ ⁸ 20,024,902	(⁴)	629,934	20,701,836
Value—				
1918.....	\$11,966,367	\$572,950	\$994,161	\$13,533,478
1919.....	³ 11,643,645	(⁴)	560,547	12,296,192
1920.....	4,497,823	(⁴)	287,586	4,794,409
1921.....	1,611,721	(⁴)	463,205	2,082,926
1922.....	3,435,381	(⁴)	⁶ 215,136	3,664,517
1923.....	⁶ 3,839,237	(⁴)	118,505	3,968,742
1924.....	⁷ ⁸ 4,071,221	(⁴)	155,973	4,236,194
Motor benzol:				
Gallons—				
1918.....			(⁹)	(⁹)
1919 (included under benzene above).....			(⁹)	(⁹)
1920.....	¹⁰ 55,764,265	467,126	(⁹)	(⁹)
1921.....	50,022,573	¹¹ 350,000	(¹²)	(⁹)
1922.....	54,930,203	(¹²)	(¹²)	55,622,482
1923.....	⁶ 80,480,326	(⁴)	(¹²)	83,664,846
1924.....	⁷ ⁸ 70,636,930	(⁴)	(¹²)	73,788,457
Value—				
1918.....			(⁹)	(⁹)
1919 (included under benzene above).....			(⁹)	(⁹)
1920.....	¹⁰ \$12,644,931	\$112,849	(⁹)	(⁹)
1921.....	8,966,686	¹¹ 70,000	(⁹)	(⁹)
1922.....	10,491,309	(¹²)	(¹²)	\$10,657,074
1923.....	⁶ 13,145,833	(⁴)	(¹²)	13,851,704
1924.....	⁷ ⁸ 10,732,087	(⁴)	(¹²)	11,344,100
Toluene, all grades:				
Gallons—				
1918.....	8,541,366	3,965,518	1,596,353	14,103,237
1919.....	1,353,827	(⁴)	510,957	1,884,784
1920.....	2,470,364	¹¹ 2,000	(¹³)	(¹³)
1921.....	835,493	¹¹ 1,000	(¹³)	(¹³)
1922.....	1,910,060	(¹³)	(¹³)	(¹³)
1923.....	⁶ 2,634,783	¹¹ 2,000	(¹³)	(¹³)
1924.....	⁷ 3,231,502	¹¹ 2,000	(¹³)	(¹³)
Value—				
1918.....	\$12,249,702	\$5,597,353	\$8,044,890	\$20,891,945
1919.....	355,990	(⁴)	235,321	596,511
1920.....	740,722	¹¹ 300	(¹³)	(¹³)
1921.....	233,378	¹¹ 270	(¹³)	(¹³)
1922.....	557,015	(¹³)	(¹³)	(¹³)
1923.....	⁶ 766,030	¹¹ 570	(¹³)	(¹³)
1924.....	⁷ 769,682	¹¹ 500	(¹³)	(¹³)

¹Sales instead of production are here given to avoid double counting between production of crude and pure grades, and because such of the product as used in the coke plant or gas works is not available for commercial use.

²Totals include estimates for firms not reporting, or actual figures for items that can not be shown separately without disclosing individual returns.

³Includes motor benzol and 13,000 gallons of gasoline used in blending.

⁴Reports incomplete. Estimate included in total.

⁵Revised figure, to eliminate duplication through certain plants reporting both to the Tariff Commission and to the Geological Survey.

⁶Final figures, revised since last report.

⁷Subject to slight revision.

⁸Included under refined benzol are the sales of two plants, amounting to 2,284,000 gallons, with a value of \$301,565, that were reported as "refined benzol" but were probably used as motor benzol.

⁹Data not collected from tar refiners prior to 1922.

¹⁰Includes 1,333,000 gallons of gasoline used in blending.

¹¹Estimate.

¹²Included in total, but can not be shown separately without disclosing individual returns.

¹³A certain quantity of toluene was produced both at gas works and at tar refineries, but the figures can not be given without disclosing individual returns.

TABLE 8.—Total commercial production of benzene, toluene, solvent naphtha, and naphthalene from all sources in the United States, 1918–1924—Continued

	By-product coke plants (sales)	Gas works (sales)	Tar refineries and all other establishments (production)	Total commercial production
Solvent naphtha, crude and refined, including xylene:				
Gallons—				
1918.....	¹⁴ 3, 284, 037	1, 442, 267	¹⁵ 965, 458	5, 691, 762
1919.....	¹⁶ 3, 649, 066	(¹)	(¹²)	4, 128, 747
1920.....	4, 695, 464	(¹)	(¹²)	5, 384, 560
1921.....	2, 881, 656	(¹)	(¹²)	3, 627, 488
1922.....	2, 861, 482	(¹²)	(⁵) (¹²)	3, 680, 811
1923.....	⁶ 3, 399, 904	(¹)	(¹²)	4, 041, 497
1924.....	⁷ 3, 884, 585	(¹)	812, 378	4, 781, 963
Value—				
1918.....	¹⁴ \$458, 689	\$191, 475	¹⁵ \$232, 003	\$882, 167
1919.....	¹⁶ 557, 416	(¹)	(¹²)	672, 685
1920.....	851, 048	(¹)	(¹²)	994, 205
1921.....	510, 509	(¹)	(¹²)	644, 548
1922.....	538, 512	(¹²)	(⁵) (¹²)	773, 336
1923.....	⁶ 608, 084	(¹)	(¹²)	800, 698
1924.....	⁷ 724, 874	(¹)	153, 941	896, 815
Naphthalene, all grades:				
Pounds—				
1918.....	15, 890, 447	896, 080	40, 138, 092	56, 924, 619
1919.....	6, 702, 040	(¹)	12, 612, 203	20, 114, 243
1920.....	14, 448, 762	1, 760, 293	26, 393, 411	42, 602, 466
1921.....	1, 983, 523	(¹)	16, 949, 464	19, 432, 987
1922.....	4, 887, 935	(¹)	19, 323, 393	25, 411, 328
1923.....	⁶ 11, 245, 633	¹⁷ 1, 452, 463	41, 453, 002	54, 151, 098
1924.....	⁷ 8, 219, 073	(¹)	34, 683, 803	44, 102, 876
Value—				
1918.....	\$650, 229	\$14, 282	\$1, 281, 440	\$1, 945, 951
1919.....	191, 364	(¹)	327, 201	542, 565
1920.....	487, 974	63, 449	791, 403	1, 342, 826
1921.....	59, 335	(¹)	380, 167	462, 502
1922.....	131, 252	(¹)	352, 957	536, 209
1923.....	⁶ 239, 709	¹⁷ 45, 981	652, 148	937, 838
1924.....	⁷ 128, 208	(¹)	441, 333	602, 541

⁴ Reports incomplete. Estimate included in total.

⁵ Revised figure, to eliminate duplication through certain plants reporting both to the Tariff Commission and to the Geological Survey.

⁶ Final figures, revised since last report.

⁷ Subject to slight revision.

¹⁴ Includes 52,847 gallons of xylene, valued at \$9,937, and 107,375 gallons of crude heavy solvent, valued at \$8,769.

¹⁵ Includes 192,969 gallons of xylene, valued at \$67,935.

¹⁶ Includes 23,088 gallons of xylene, valued at \$4,563.

¹⁷ Census of Manufactures, 1923.

Creosote oil.—Creosote (or dead) oil is used in treating railway ties, and other timbers. In 1923 about 127,000,000 gallons were used in the wood-treating plants of the United States, of which 51 per cent was domestic oil.¹ Imports of creosote oil increased rapidly from 1919 to 1924, inclusive, amounting in 1924 to 89,687,784 gallons, valued at \$13,463,689. Great Britain is the chief source of imports. It is estimated that Great Britain exports about 90 per cent of her total production of creosote oil and ships nine-tenths of her exports to the United States. As the economic advantages of creosoted wood are becoming better known, the demand for creosote oil is increasing each year.

Other crudes.—Import data for other coal-tar crudes will be found in Part VI.

¹ Quantity of Wood Treated and Preservatives Used in the United States in 1923. Forest Service, Dept. of Agriculture.

Exports of crudes.—Exports of benzene in 1924 were 57,882,171 pounds, valued at \$1,734,837. This is a decrease of nearly 50 per cent from 1923 (a year of large production) when 111,336,768 pounds, valued at \$3,647,660 were exported. Exports of crude tar and pitch in 1924 were 269,015 barrels, valued at \$1,076,203, about 50 per cent of the exports in 1923. Shipments of other crude distillates amounted to 14,555,160 pounds, valued at \$454,386, or about 5½ million pounds more than in 1923.

COAL-TAR INTERMEDIATES

DESCRIPTION

Intermediates do not occur as such in coal tar, but are prepared from the crudes (benzene, toluene, naphthalene, and anthracene) by chemical treatment with sulphuric acid, nitric acid, alkalies, chlorine, or other chemicals. From fewer than 10 coal-tar crudes, 200 to 300 intermediates are prepared for use in the production of hundreds of dyes. The various chemical stages in the conversion of crudes to intermediates are (1) nitration, (2) reduction, (3) sulphonation, (4) caustic fusion, (5) chlorination, (6) alkylation, (7) liming, (8) condensation, (9) carboxylation, (10) oxidation, and (11) diazotization.

Intermediates are in turn the raw materials which are converted by complex chemical processes into dyes, medicinals, perfumes, flavors, photographic chemicals, synthetic resins, and tanning materials. They are also used as accelerators in the vulcanization of rubber, as camphor substitutes, insecticides, germicides, in the flotation process for concentrating ores and for other uses. Certain intermediates are used in the direct production of dyes on the fiber and for increasing the fastness of dyes on the fiber. When used for the latter purpose, they are known as "developers." After purification many intermediates are used directly as drugs, perfumes, and flavors.

The relation between the heavy chemical industry and the intermediate and dye industry is an intimate one, as the latter industry is an important consumer of heavy chemicals and other products. The manufacture of intermediates and dyes requires large quantities of acids, alkalies, and other heavy chemicals, such as sodium nitrite and sulphide, salt, chlorine, bromine, sulphur, and in addition noncoal-tar organic compounds, such as methanol, formaldehyde, and acetic anhydride.

The coal-tar chemical industry plays a conspicuous part in the industrial life of the Nation, (1) as consumer of raw materials in the chemical industry (2) as a producer of essential products for textile, leather, paper, and paint factories, and as a producer of medicinals, synthetic tanning materials, and a wide variety of other products.

PRODUCTION

The production of intermediates in the United States is given in Table 11, page 29, in as great detail as is possible without disclosing the output of individual manufacturers. The total production in 1924 was 186,596,562 pounds, as compared with 231,393,871 pounds in 1923. Sales in 1924 totaled 76,897,521 pounds, valued at \$18,164,334. In

general there were marked declines in the output of those intermediates normally consumed in large amounts in dye manufacture. There were, however, notable increases in the output of phenol, in intermediates used in the production of the fast and specialty dyes and in those used for rubber accelerators.

Rubber accelerators.—The increased consumption in recent years of intermediates as accelerators in the vulcanization of rubber is a development of importance to both the intermediate and the rubber manufacturer. To the former it furnishes an auxiliary market for his products, and for the latter it effects great economy in time.

As certain rubber accelerators serve also as intermediates in dye manufacture, production and sales figures do not accurately reflect consumption by the rubber industry.

Among the accelerators showing increased production are thio-carbanilide, the output of which was 3,397,397 pounds in 1924, as compared with 3,309,414 pounds in 1923. Sales in 1924 were 2,739,404 pounds, valued at \$642,626. Others showing increases are triphenyl guanidine with a total output of 429,808 pounds for 1924; diphenyl guanidine which increased from 867,019 pounds in 1923 to 1,034,099 pounds in 1924; o-ditolylguanidine, ethylidine aniline, and methylene dianilide. The output of formanilide was 88,736 pounds in 1924, a decrease from the previous year.

The production of other accelerators was reported but no figures can be published without revealing the confidential operations of the individual manufacturer. Accelerators of noncoal-tar origin will be found in Part IV, page 127.

Large increase in output of phenol.—The production of phenol in 1924 was 10,521,944 pounds, an increase of more than 200 per cent over 1923, when the output was 3,310,911 pounds. In three years production has increased to eight times the 1922 output of 1,285,978 pounds. The largest use of phenol is in the manufacture of synthetic phenolic resins for electrical insulators and in the making of molded parts for automobiles and radios. It is also used in intermediates, dyes, and pharmaceuticals.

Phenol may be classified according to source and method of manufacture as (1) natural phenol, obtained from coal tar by extraction and purification, (2) synthetic phenol, made by treating benzene with sulphuric acid and converting the resulting benzene sulfonate into phenol by fusion with caustic soda.

The present consumption of phenol is estimated at about 11,000,000 pounds per year. The trend is toward an increased consumption. A continued expansion of the demand for phenolic-resin products will further increase the consumption of either phenol or cresylic acid. The establishment of the manufacture of hexahydrophenol will result in a further increase in the domestic consumption of phenol.

Synthetic phenol entails a higher manufacturing cost than natural phenol. Except during the war, when large quantities of synthetic phenol were made for the manufacture of explosives, production was in large part formerly of the natural product. But the marked increase occurring in 1924 was largely in synthetic phenol, and it is probable that this form will continue to be a factor of increasing importance in supplying domestic requirements.

Aniline and its derivatives.—Among the important intermediates aniline ranked first in quantity; in value it was second only to phenol.

Aniline is used in the preparation of dyes of almost every class, whether the classification is based on the method of application or on chemical constitution. Three of the domestic dyes produced in largest quantity, namely, Indigo, Direct deep black EW and Agalma black 10 B, require aniline in their manufacture. Indigo is the leading dye exported from the United States. A variety of other products, including medicinals and rubber accelerators, also require aniline.

The production of aniline oil in 1924, as reported by 9 firms, was 22,257,354 pounds, a decline of nearly 17 per cent from 1923. The total sales of aniline in 1924 were 12,522,044 pounds, valued at \$1,995,440. The average sales price was therefore 16 cents per pound.

Aniline salt (aniline hydrochloride) is used in the direct production of "aniline black" on cotton and is consequently a raw material for the textile industry as well as for the dye manufacturer. Production in 1924 amounted to 846,898 pounds.

Dimethyl aniline (prepared from aniline and methanol), one of the leading intermediates derived from aniline, is used in the production of such important basic dyes as Methyl violet, Methylene blue B, Malachite green. The output in 1924 was 2,830,798 pounds, an increase over the previous year when production was 2,681,751 pounds. The price receded from 38 cents per pound in 1923 to 34 cents in 1924.

p-Nitroaniline shows decreased production in 1924, the output being 964,344 pounds, as compared with 2,008,003 pounds in 1923. Sales in 1924 amounted to 722,943 pounds, with a value of \$459,936, or 64 cents per pound as compared with 69 cents in 1923. This intermediate is of importance in the preparation of Para red on the fiber and in making color lakes, Diamine green B, and G, Alizarin yellow R, and certain sulphur dyes.

Sodium benzoate.—This product is used largely as a food preservative. Production in 1924 was 860,810 pounds, as compared with 749,885 pounds in the previous year. Sales were 754,462 pounds, valued at \$464,480. The average sales price per pound was 63 cents, an increase of 3 cents over 1923.

Naphthalene intermediates.—The leading intermediate derived from naphthalene, measured quantitatively, is b-naphthol. It is consumed in large amounts in the manufacture of other intermediates, dyes, color lakes, and also in conjunction with p-nitroaniline in the direct production of Para red on the cotton fiber. The production of b-naphthol in 1924 was 3,745,690 pounds as compared with 5,741,355 pounds in 1923. Sales in 1924 amounted to 2,961,514 pounds, with a value of \$656,830. The unit price of 22 cents per pound was the same as in the previous year.

H-acid (1-amino-8-naphthol-3 : 6-disulfonic acid) ranked second among the naphthalene intermediates in quantity of output with a total of 2,219,858 pounds. This is a reduction of 1,242,806 pounds from the previous year.

Gamma acid, used in the manufacture of direct cotton dyes, including Diamine black B, Diamine brown M, and Diamine fast red F, showed a total production of 338,811 pounds, as compared with 306,605 pounds in 1923.

Record production of phthalic anhydride.—Phthalic anhydride is an intermediate of great importance because it serves as a basic raw material for other intermediates used in vat dyes. It is made by the catalytic oxidation of naphthalene and is one of the raw materials of synthetic anthraquinone, which in 1924 made up about three-quarters of the total output of anthraquinone. Anthraquinone is used for the production of certain vat dyes, including the indanthrene and most of the algal dyes, alizarin and alizarin derivatives, and the fluoresceins, cosines, and rhodamines.

The production of phthalic anhydride in 1924 was 2,787,308 pounds, as compared with 2,343,802 pounds in 1923. Sales in 1924 amounted to 2,277,073 pounds, valued at \$556,265. The average sales value per pound, 24 cents, represents a decline of 5 cents from 1923.

The price recession of phthalic anhydride since 1917, one of the most marked in the entire field of intermediates, is shown in the following table:

TABLE 9.—*Domestic prices of phthalic anhydride, 1917–May, 1925*

Year	Average price per pound	Year	Average price per pound
1917.....	\$4. 23	1922.....	\$0. 35
1918.....	2. 85	1923.....	. 29
1919.....	. 99	1924.....	. 24
1920.....	. 46	1925 (Jan.–May).....	. 18
1921.....	. 39		

The average price in 1924 of 24 cents per pound is below that of 1914, when the domestic supply was imported; the invoice price of 24 cents in 1914 did not include the importers' profit and certain other costs. The current price (May, 1925) is 18 cents.

Domestic phthalic anhydride has been exported in significant quantities to European countries, which indicates that this intermediate is being produced on an international basis in the United States. It is one of the few coal-tar intermediates or finished products selling below the 1914 price; among the other products in the same class are indigo and salvarsan (arsphenamine).

Anthraquinone.—This intermediate is of increasing interest because of the trend toward greater consumption of vat dyes, largely used on cotton, and certain alizarin derivatives, including the acid alizarins used in wool dyeing. The 1924 British production of new anthraquinone dyes for celanese silk indicates that this intermediate will occupy a position of greater importance in the world trade of dyes than heretofore.

Anthraquinone is produced in the United States by two methods: (1) By the oxidation of anthracene obtained directly from coal tar. This oxidation was the method first used for the preparation of anthraquinone and is the principal commercial method used in Germany and Great Britain. (2) Synthetically from phthalic anhydride and benzene (with aluminum chloride). Phthalic anhydride is made by the catalytic oxidation of naphthalene.

The output of anthraquinone in 1924 was 638,755 pounds, as compared with 857,190 pounds in 1923, the peak year of production.

A feature of the 1924 output was the increased percentage of the total made up by the synthetic product, the proportion increasing from about 50 per cent in 1923 to more than 75 per cent in 1924. The manufacture of anthraquinone by the synthetic process promises to supply the entire domestic requirements. It is of interest to recall that in 1919 the problem was to obtain an ample supply of anthracene for the manufacture of anthraquinone and vat dyes. There is no inherent lack of anthracene in domestic coal tar, nor are there technical difficulties in its recovery, but in recovering anthracene oil there is left a hard pitch which has only a limited market in this country. The extensive development of synthetic anthraquinone, which has an advantage of greater purity than that made from anthracene, has solved the problem confronting manufacturers in 1919. In other words, the vat dyes which formerly required anthracene are now being made from naphthalene, the supply of which is abundant, as it constitutes from 5 to 10 per cent of coal tar.

Closely related to anthraquinone is the intermediate methyl anthraquinone, used in the manufacture of several valuable yellow and orange vat dyes and in Cyananthrol R and G. As only small amounts are available from coal tar, it is made synthetically from toluene, phthalic anhydride, and aluminum chloride. An increased output of methyl anthraquinone in 1924 is reflected in the production of dyes derived from this intermediate.

New intermediates.—Of the 312 intermediates reported in 1924, more than 60 were not reported in the previous year and most of them were manufactured for the first time in this country. They were for the most part used in the manufacture of new dyes, first reported in 1924, as accelerators for the vulcanization of rubber, and in medicinals and other finished coal-tar products.

Hydrogenated naphthalenes and phenols were first produced on a commercial scale in Germany. The production of certain of these derivatives—hexahydrophenol and tetrahydronaphthalene—in the United States has been announced in 1925. Their development is of importance because of the variety of ways in which they may be applied.

Hexahydrophenol (cyclohexanol) known in the trade as "Hexalin" is made by the catalytic reduction of phenol with hydrogen. It is a high-boiling solvent (160°C) for fats, oils, waxes, rubber, and other products. Although insoluble in water it readily dissolves in aqueous soap solutions. These colloidal solutions possess powerful emulsifying and detergent properties and hence are of value for removing oils and fats from textiles. Hexalin also finds use in the preparation of polishes for furniture and lacquers, especially those derived from nitrocellulose. In the manufacture of plastics and in certain other uses the esters of hexahydrophenol are said to possess special advantages. The cresols, by reduction, yield similar products. Tetrahydronaphthol, known as "Tetralol," is used as a disinfectant in soaps.

Tetrahydronaphthalene, known as "Tetralin," made by the hydrogenation of naphthalene, is another high-boiling solvent. It evaporates slowly, is said to be nontoxic, and has promise as a solvent for the oil, paint, and varnish industry. With hexalin it is added to soaps. Decahydronaphthalene, known as "Dekalin," is similar in some of its properties to tetrahydronaphthalene.

Prices of intermediates.—The weighted average selling price of intermediates marketed in 1924 was 24 cents per pound, as compared with 23 cents in 1923. The average price for the period 1921 to 1924 ranged between 22 and 25 cents per pound.¹ However, the average sales figure is not the average for all intermediates manufactured, as only a portion of the total production is sold. Dyes, however, taking the figures quantitatively, show a relatively small spread between production and sales. The sales of intermediates in 1924 amounted to 41 per cent of production, by quantity; in 1923, 36 per cent; and in 1922, 35 per cent. These comprised a wide variety of products, from aniline oil at 16 cents a pound to specialties selling at over \$3 per pound. To the smaller dye manufacturer, producing only a part or none of his intermediate requirements, the availability of intermediates is a matter of great importance. The larger dye producers buy their entire requirements of certain intermediates from firms specializing exclusively in the manufacture of these products. In general, a wide variety of intermediates is available under competitive conditions to the consumer.

In comparing the annual average price of intermediates, two trends should be noted: (1) The trend toward increased production of the higher-priced intermediates and toward a greater variety of the high-priced specialty dyes, and (2) the trend toward lower prices of individual intermediates as production costs are reduced. This latter is especially conspicuous on the bulk products which are produced in large quantities and sold by many firms.

Table 10 gives the domestic sales prices of 20 intermediates from 1917 to 1924, and with the invoice prices of the same intermediates imported in the fiscal year 1914. The invoice prices are not directly comparable with the domestic sales prices in the same year for the reason that the former do not include the importer's profit, nor, in most transactions, the cost of containers, charges for packing, freight, or insurance.

¹See chart, p. 40.

TABLE 10.—Domestic sales, price per pound of coal-tar intermediates, 1917–1924,¹ and invoice price of same intermediates imported, 1914

Name of intermediate	Invoice price	Domestic sales price							
	1914	1917	1918	1919	1920	1921	1922	1923	1924
Acetanilide, technical.....	² \$0.15	\$0.46	\$0.53	\$0.41	\$0.42	\$0.23	\$0.21	\$0.26	\$0.23
1-Amino-8-naphthol-3:6-disulfonic acid (H acid).....	² .23				1.23	.95	.73	.68	.65
2-Amino-8-naphthol-6-sulfonic acid (gamma acid).....					3.10	2.10	1.72	1.51	1.18
p-Aminophenol and hydrochloride.....	² .16				1.81	1.39	1.10	1.13	1.11
Aniline oil.....	² .08	.23	.27	.24	.28	.22	.15	.16	.16
Anthraquinone.....	² .19			1.86	1.66	1.59	1.34	.95	.95
Benzidine.....	² .31 ³ .55	1.65	1.01	1.26	1.15	.85	.83	.80	.74
Chlorobenzene (mono).....	² .09	.20	.18	.15	.10	.08	.07	.07	.06
Dianisidine.....	² .40	15.09		4.54				3.69	3.34
p-Dichlorobenzene.....	³ .09			.07	.09	.16	.16	.15	.16
Diethylaniline.....		3.20	2.55	.88	1.36	.97		.48	.40
Dimethylaniline.....	³ .15	.59	.57	.55	.71	.54	.32	.38	.34
Naphthalene, solidifying 79° or above (refined, flake).....	³ .018	.07	.08	.07	.08	.06	.06	.06	.05
b-Naphthol, technical.....	² .07 ² .09	.67	.59	.49	.47	.39	.24	.22	.22
1-Naphthol-4-sulfonic acid (Neville & Winter's).....				1.83	1.41	1.22	.96		1.00
1-Naphthylamine-4-sulfonic acid (naphthionic acid).....				.62	.42	.44	.39	.40	.43
p-Nitroaniline.....	² .13 ² .14				1.17	.85	.68	.69	.64
Phenol.....	.06	.37	.35	.10		.14	.21	.27	.30
p-Phenylenediamine.....	³ .31 ² .44	2.81	3.68	2.43		1.70	1.39	1.32	1.27
Phthalic acid and anhydride.....	² .25	4.23	2.85	.99	.46	.39	.35	.29	.24
Sulfanilic acid.....	² .06 ² .16	.30	.29	.24	.36	.24	.19	.17	.17
Thiocarbanilide.....			.47	.35	.41	.42	.27	.25	.23
o-Toluidine.....	² .09 ² .10	.96	.96	.50	.29	.25	.18	.13	.13
m-Tolylenediamine.....	² .19	1.39	1.41	1.15	1.20	1.14	.94	.93	.86
Xylidine and salt.....	³ .12	.65	.54	.54	.47	.49	.33	.43	.39

¹ For the years 1917 to 1920 the value represents the weighted average of the total production; and for the years 1920–1924 the weighted average of the total sales.

² Artificial Dyestuffs Used in the United States, Special Agents Series 121, Department of Commerce.

³ Chemicals and Allied Products Used in the United States, Miscellaneous Series No. 82, Department of Commerce.

TABLE 11.—Production and sales of coal-tar intermediates, 1924

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on p. 211. An X signifies that the manufacturer did not consent to the publication of his identification number in connection with the designated product. A blank in the third and fourth columns indicates that sales figures can not be published without revealing information in regard to the output of individual firms. A blank in the sixth column indicates that the production of the corresponding product in the United States can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the total]

Product	Manufacturers' identification numbers according to list on p. 211	Sales			Total production
		Quantity	Value	Average price per pound	
Total intermediates.....		<i>Pounds</i> 76,897,521	\$18,164,334	\$0.24	<i>Pounds</i> 186,596,562
Acetaldehyde aniline.....	X				
Acetanilide, tech.....	9, 60, 114, 156, 157	61,820	13,925	.23	
Acetyl-p-phenylenediamine (p-amino-acetanilide).....	8, 60, 81, 124, 157				52,747
Acetyl-p-toluidine.....	39, 60, 157				226,785
Acetyl-m-tolylenediamine.....	X				
Allyl aniline.....	195				
b-Amino anthraquinone.....	28, 60, 129				
Aminoazobenzene.....	9, 34, 61, 81, 84, 124, 157				86,882
Aminoazobenzene sulfonic acid.....	60, 126				
Aminoazobenzene disulfonic acid.....	124				
Aminoazotoluene.....	8, 19, 34, 60, 61, 81, 84, 124, 126, 145, X	8,104	6,909	.85	77,178
Aminoazoxylene.....	124				
p-Aminobenzoic acid.....	60, 118, 156, X	4,376	8,469	1.94	13,325
Aminobenzoyl J acid.....	60				

TABLE 11.—Production and sales of coal-tar intermediates, 1924—Continued

Product	Manufacturers' identification numbers according to list on p. 211	Sales			Total production Pounds
		Quantity Pounds	Value	Average price per pound	
o-Amino-m-cresol	181				
m-Aminocresol methyl ether	39				
p-Aminodimethylaniline	79				
1-Amino-2-naphthol-4-sulfonic acid.	8, 9, 19, 34, 39, 60, 81, 124, 126, 157, X.	3, 877	\$2, 249	\$0. 58	505, 741
1-Amino-8-naphthol-4-sulfonic acid.	39, 124, 129.				54, 296
1-Amino-8-naphthol-2:4-disulfonic acid (Chicago acid).	39, 60, 124, 129.				87, 156
1-Amino-8-naphthol-3:6-disulfonic acid (H-acid).	60, 117, 124, 129.				2, 219, 858
2-Amino-5-naphthol-7-sulfonic acid (J acid).	39, 60, 124, 129, X				141, 228
2-Amino-8-naphthol-6-sulfonic acid (gamma acid).	39, 60, 124, 129, X				338, 811
2-Amino-8-naphthol-3:6-disulfonic acid.	129, X				
o-Aminophenol	10, 77, 85, 181, 188	9, 007	20, 639	2. 29	8, 240
p-Aminophenol and hydrochloride.	10, 54, 60, 66, 77, 181, 188, 194.	91, 018	101, 135	1. 11	153, 892
o-Aminophenol-p-sulfonic acid	9, 60, 81, 124, 188.				13, 904
o-Aminophenol-4:6-disulfonic acid.	126				
p-Aminophenyl-p-tolylamine sulfonic acid.	39.				
Aminosalicyclic acid	8, 9, 39, 60, 81, 124				69, 024
p-Aminosalicyclic acid	129				
Anhydroformaldehyde aniline	60				
Anhydroformaldehyde - p - toluidine.	60				
Aniline-3:6-disulfonic acid	124				
Aniline hydrochloride	29, 80, 84, 124				846, 898
Aniline oil	26, 29, 60, 80, 114, 116, 124, 125, X.	12, 522, 044	1, 995, 440	. 16	22, 257, 354
Aniline sulfate	84, 124, 141				
o-Anisidine	60, 129, 188.	4, 780	12, 504	2. 62	7, 736
Anthracene, refined (av. content 86 per cent).	60, 171				
Anthranilic acid (o-aminobenzoic acid).	59, 60, X.	49, 282	44, 160	. 90	
Anthraquinone (100 per cent)	18, 60, 99, 124, 171.				638, 755
Anthraquinone - 1:5 - disulfonic acid.	81, 124				
Anthraquinone - 2 - sodium sulfonate (silver salt).	18, 60, 124, 129.				375, 350
Anthrarufin	124				
Benzaldehyde	43, 73, 114, 132, 155, X.	215, 078	140, 598	. 65	363, 298
Benzanthrone	9, 60, 114, 129.				
Benzidine base and salt	3, 4, 8, 34, 39, 60, 73, 124, 129, X.	236, 704	176, 038	. 74	1, 351, 814
Benzidine disulfonic acid	75				
Benzoate of soda	43, 60, 73, 88, 132, 156, X.	754, 462	464, 480	. 63	860, 810
Benzoic acid, tech.	73, 114, 156.				
Benzoic acid, U. S. P.	43, 60, 88, 156, X, X	77, 615	49, 889	. 64	148, 467
Benzotrichloride.	132				
Benzoyl benzoic acid	99, 124				
Benzoyl chloride	17, 88.				
Benzyl chloride	114, 132, 155	304, 117	87, 728	. 29	607, 701
Benzyl cyanide	74				
Benzylamine	125				
Broenner's acid. (See 2-naphthylamine-6-sulfonic acid).					
Carbazole, refined (100 per cent)	60				
Chloroacetophenone	66				
p-Chloroaminophenol	188				
Chloroanthraquinone	X				
o-Chlorobenzaldehyde	124				
Chlorobenzanthrone	60				
Chlorobenzene (mono)	59, 88, 155	5, 367, 275	319, 283	. 06	8, 288, 459
Chlorobenzoylbenzoic acid.	X				
Chlorometanilic acid	X				
o-Chlorometanilic acid	124, 126.				
p-Chlorometanilic acid	126				
1-Chloro-2-methyl anthraquinone	X				

TABLE 11.—Production and sales of coal-tar intermediates, 1924—Continued

Product	Manufacturers' identification numbers according to list on p. 211	Sales			Total production Pounds
		Quantity Pounds	Value	Average price per pound	
6-Chloro-4-methoxy-3-hydroxy thionaphthalene.	X				
Chromotropic acid. (See 1:8-dihydroxy naphthalene-3:6-disulfonic acid).					
Chloro-p-nitroaniline	X				
o-Chloro-p-nitroaniline	60				
Chlorophenol	45				
Chlorophenylhydrazine sulfonic acid.	60				
Chloro-m-phenylenediamine	126				
Chloropyrazolone-p-sulfonic acid	60				
o-Chlorotoluene	124				
2-Chloro-5-toluidine-4-sulfonic acid.	60, 113, 159				
Cresotinic acid	87				
Cresylic acid, refined (distillates yielding below 215° C. tar acids equal to or more than 75 per cent of the original distillate)	16				
Cumidine	9, 124, X				
Dehydrothio-p-toluidine	129				
Dehydrothio-p-toluidine sulfonic acid.	19, 67, 75, 129				27, 670
Dehydrothio-m-xylydine	129				
Diaminochlorobenzene sulfonic acid.	126				
Diaminodimethyl acridine	141				
Diaminostilbene disulfonic acid	60, 67, 124, 129				141, 274
Dianisidine	39, 60, 129				60, 180
Dianisidine hydrochloride	129				
1-Diazo-2-naphthol-4-sulfonic acid	8, 34, 39, 60, 126, X				98, 468
Dibenzanthrone	129				
Dibenzylaniline	60				
Dichloroaniline	39, 181, 188	35, 595	\$25, 796	\$0.72	52, 951
Dichloroaniline sulfonic acid	126, 141				
o-Dichlorobenzene	99, 155				
p-Dichlorobenzene	4, 59, 60, 88, 99, 130, 155	1, 481, 890	231, 971	.16	1, 038, 812
Dichlorophenylhydrazine sulfonic acid.	141				
Dichlorophthalic anhydride	53				
Dichlorosulfofenylpyrazolone	39				
Dichlorosulfofenylmethylpyrazolone.	141				
Diethylamine	1, 192, X				3, 773
b-Diethylaminoethyl alcohol	192, X				
Diethyl-m-aminophenol	53, 60				
Diethylaniline	192, X				
Diethylaniline-m-sulfonic acid	60				
Diethyl-o-toluidine	192				
Diformyl-m-tolylenediamine	39				
1:5-Dihydroxyanthraquinone	81				
Dihydroxyanthraquinone sulfonic acid.	X				
5:5-Dihydroxy-7:7-disulfonic-2:2-dinaphthylamine (Rhoduline acid).	60				
5:5-Dihydroxy-7:7-disulfonic-2:2-dinaphthyl urea (J acid urea).	60, 124, 129				
1:5-Dihydroxynaphthalene	60				
1:8-Dihydroxynaphthalene-3:6-disulfonic acid (Chromotropic acid).	8, 60, 117, 124, 129				63, 391
Dimethylamine	192				
Dimethylaniline	9, 29, 60, 79, 80, 124	1, 396, 984	470, 366	.34	2, 830, 798
2:2-Dimethyl-1:1-dianthraquinonyl	60, 129				
Dimethylphenazine (tolazine)	124				
2:2-Dinaphthylamino-5:5-dihydroxy-7:7-disulfonic acid.	124				
2:4-Dinitroaniline	113				
Dinitroanthraquinone	124				
Dinitrobenzene	29, 60, 124, 181				1, 465, 566
m-Dinitrobenzene	4, 81				
Dinitrochlorobenzene	4, 60, 81, 99, 124	1, 199, 629	177, 189	.15	6, 024, 092
Dinitrohydroxydiphenylamine	39, 81				

TABLE 11.—Production and sales of coal-tar intermediates, 1924—Continued

Product	Manufacturers' identification numbers according to list on p. 211	Sales			Total production <i>Pounds</i>
		Quantity <i>Pounds</i>	Value	Average price per pound	
Dinitrophenol, and sodium salt	4, 81, 99				62, 581
p-Dinitrostilbene disulfonic acid	75				
Dinitrotoluene	4, 60, 61, 76, 84, 124	1, 720, 458	\$199, 053	\$0. 12	2, 461, 565
Dinitrotoluene sulfonic acid	39				
Diphenylamine	60				
Diphenylguanidine	58, 60, 150, X	1, 018, 609	1, 056, 911	1. 04	1, 034, 099
Diphenylmethane sulfonate	124				
Dimethylphenylbenzylammonium disulfonic acid calcium salt (Leukotrope W).	X				
Distilbenediphenol	124				
o-Ditolylguanidine	60				
Ditolylmethane	124				
o-Ditolythiourea	60, 79				
6-Ethoxy-3-hydroxy thionaphthalene.	X				
m-Ethoxyphenyl-p-toluidine	X				
Ethyl acetanilide	124				
Ethyl-p-aminoacetanilide	124				
Ethyl-p-amino benzoate	118				
Ethylaniline (mono)	37, 60, 124, 192				71, 137
Ethylbenzylaniline	37, 60, 124, 192, X				109, 353
Ethylbenzylaniline disulfonic acid.	60				
Ethylbenzylaniline sulfonic acid.	37, 39, 124				76, 618
Ethyl ester of p-toluene sulfonic acid.	181				
Ethylidene aniline	125				
Fluorescein	9, 53, 84, X				58, 076
Formaldehyde-p-amino aniline	79				
Formanilide (anhydroformaldehyde aniline).	60, 125, 150, 157, X	65, 186	26, 891	. 41	88, 736
Fumaric acid	124				
Gamna acid. (See 2-amino-8-naphthol-6-sulfonic acid.)					
Gamma acid urea	39				
H acid. (See 1-amino-8-naphthol-3:6-disulfonic acid.)					
Heptylidene aniline	125				
b-Hydroxy naphthoic acid	39, 60, 81				
b-Hydroxy naphthoic anilide (naphthol AS).	60, 81, 124				
p-Hydroxy phenyl arsonic acid and sodium salt.	112				
m-Hydroxyphenyl-o-toluidine	X				
Indophenol	8				
Lead dithiobenzoate	125				
J acid. (See 2-amino-5-naphthol-7-sulfonic acid.)					
Laurent's acid. (See 1-naphthylamine-5-sulfonic acid)					
Maleic acid	124				
dl-Malic acid	124				
Mercapto-benzo-thiazol.	X				
Metanilic acid	60, 81, 84, 124, 126				294, 838
Methylaminoanthraquinone	81				
Methyl aniline sulfonic acid	75				
m-Methylaniline sulfonic acid	X				
Methyl anthraquinone	99				
Methyl pyridine	195				
Methylene diamide	60				
Methylene-p-toluidine	129				
Michler's hydrol. (See tetramethyldiaminobenzhydrol.)					
Michler's ketone. (See tetramethyldiaminobenzophenone.)					
Naphthalene, solidifying 79° C. or above (refined, flake).	16, 29, 60, 104, 129, 155, 187.	11, 961, 480	602, 580	. 05	15, 323, 577
1:5 Naphthalene disulfonic acid	60, 124				
2:7-Naphthalene disulfonic acid	60, 157				
1:3:6-Naphthalene trisulfonic acid	157				
a-Naphthol	34, 39, 84, 129, 170, X				119, 796
b-Naphthol, tech	29, 34, 39, 84, 157	2, 961, 514	656, 830	. 22	3, 745, 690
1-Naphthol-4-sulfonic acid (Neville & Winther's acid).	3, 9, 34, 39, 60, 124, 129	19, 038	18, 975	1. 00	230, 077

TABLE 11.—Production and sales of coal-tar intermediates, 1924—Continued

Product	Manufacturers' identification numbers according to list on p. 211	Sales			Total production <i>Pounds</i>
		Quantity	Value	Average price per pound	
1-Naphthol-5-sulfonic acid	8, 39, 60, 81, 117, 124, 126, 129.	<i>Pounds</i>			<i>Pounds</i> 106, 696
1-Naphthol-3:6-disulfonic acid	157				
1-Naphthol-8-chloro-3:6-disulfonic acid (chloro H acid)	124				
1-Naphthol-3:8-disulfonic acid	60				
1-Naphthol-3:6:8-trisulfonic acid	34, 124, 129				
2-Naphthol-1-sulfonic acid	60				
2-Naphthol-6-sulfonic acid (Schaeffer's acid)	8, 9, 39, 60, 61, 81, 124, 157				83, 161
2-Naphthol-7-sulfonic acid	39, 60, 157				27, 876
2-Naphthol-8-sulfonic acid	39, X				
2-Naphthol-3:6-disulfonic acid	3, 29, 34, 39, 60, 81, 124, 126, 157, 176, 184, X	148, 192	\$70, 349	\$0.47	537, 786
2-Naphthol-6:8-disulfonic acid	29, 34, 39, 60, 124, X	8, 276	3, 529	.43	339, 579
Naphtho-1:8-sultam-2:4-disulfonic acid.	60				
Naphtho-1:3-sulton-8-sulfonic acid.	39				
a-Naphthylamine	16, 129				441, 895
b-Naphthylamine	39, 60, 124, 129				1, 311, 795
1-Naphthylamine-4-sulfonic acid (naphthionic acid)	9, 34, 39, 49, 60, 84, 124, 129, X.				
1-Naphthylamine-5-sulfonic acid (Laurent's acid)	9, 34, 60, 81, 124, 126, 129.				110, 874
1-Naphthylamine-6-sulfonic acid	X				
1-Naphthylamine-7-sulfonic acid	X				
1-Naphthylamine-6- and 7-sulfonic acid (Cleve's acids)	39, 60, 124, 129	346	346	1.00	100, 029
1-Naphthylamine-8-sulfonic acid	8, 60, 81, 124, 126				236, 490
1-Naphthylamine-3:6-disulfonic acid (Freund's acid)	81				
1-Naphthylamine-3:8-disulfonic acid	39, 129				
1-Naphthylamine-4:8-disulfonic acid	39, 60, 124, 129				259, 968
1-Naphthylamine-3:6:8-trisulfonic acid	60, 117, 124, 129				2, 840, 135
2-Naphthylamine-1-sulfonic acid	8, 30, 39, 60, 63, 157	164, 736	147, 707	.90	306, 159
2-Naphthylamine-6-sulfonic acid (Broenner's acid)	8, 39, 60, 124				16, 321
2-Naphthylamine-4:8-disulfonic acid	39, 129				
2-Naphthylamine-5:7-disulfonic acid	39, 60, 124, 129				269, 063
2-Naphthylamine-6:8-disulfonic acid	39, 60, 124, 129, X				590, 462
2-Naphthylamine-3:6:8-trisulfonic acid	129, X				
Nevile & Winters acid. (See 1-naphthol-4-sulfonic acid.)					
p-Nitroacetamide	157				
Nitroaminophenol	39, 61, 81, 126, 188				16, 033
4-Nitro-2-aminophenol-6-sulfonic acid.	188				
m-Nitroaniline	9, 60, 181				44, 831
p-Nitroaniline	9, 60, 156, 157, X	722, 943	459, 936	.64	964, 344
p-Nitroaniline-o-sulfonic acid	8, 60, 75, 157, 188	4, 626	6, 184	1.34	7, 086
o-Nitroanisole	39, 60, 129				178, 243
p-Nitro-o-anisidine	60				
Nitroarsanilic acid	118				
Nitrobenzene (oil of mirbane)	29, 60, 80, 124, 125, 129	4, 357, 239	396, 237	.09	40, 012, 976
m-Nitrobenzoic acid	60				
p-Nitrobenzoic acid	1, 60, 156, X				40, 379
Nitrobenzene sulfonic acid	75				
o-Nitrochlorobenzene	60, X				
o-Nitrochlorobenzene sulfonic acid.	124				
o-Nitrochlorobenzene-p-sulfonic acid.	126				
p-Nitrochlorobenzene	60, X				
p-Nitrochlorobenzene-o-sulfonic acid.	39, 75				
m-Nitro-p-cresol	39				
o-Nitro-p-cresol	181				
8-Nitro-1-diazo-2-naphthol-4-sulfonic acid.	34, 39, 60, 81				

TABLE 11.—Production and sales of coal-tar intermediates, 1924—Continued

Product	Manufacturer's identification numbers according to list on p. 211	Sales			Total production Pounds
		Quantity Pounds	Value	Average price per pound	
3-Nitro-4-hydroxyphenyl arsonic acid.	112, 118				
Nitronaphthalene	16, 129				
o-Nitrophenol	85, 181, 188				
p-Nitrophenol	45, 60, 129, 181, X	31, 936	\$14, 728	\$0. 46	
Nitrosalicylic acid	126				
Nitrosobetanaphthol	X				
o-Nitroso-m-cresol	181				
Nitrosodimethylaniline	29, 45, 60, 81, 99, 124, 129, 192				138, 819
Nitrosophenol	8, 10, 18, 19, 39, 66, 81, 99, X				165, 262
Nitrosolanthrarufln	124				
Nitrotoluene	60, 61, 76, 84, 124, 129				5, 151, 589
o-Nitrotoluene sulfonic acid	39				
o-Nitrotoluene	4, 60, 80, 124, 129				2, 056, 361
m-Nitrotoluene	60, 129				
m-Nitrotoluene sulfonic acid	75				
p-Nitrotoluene	4, 60, 76, 124, 129				1, 351, 631
p-Nitrotoluene sulfonic acid	75				
p-Nitrotoluene-o-sulfonic acid	39, 60, 75, 124, 129, 188				722, 654
m-Nitro-p-toluidine	39, 60, 157, 176	165, 762	328, 222	1. 98	194, 644
p-Nitro-o-toluidine	39, 60, 124				
Nitroxylene	60, 124, 129				684, 056
Oxalylarsanilic acid	118				
Oxalyl-m-phenylenediamine	60				
Oxalyl-p-phenylenediamine	60				
Phenol	15, 16, 59, 108, 139, 160, X	8, 273, 598	2, 505, 533	. 30	10, 521, 944
Phenyl-2-amino-5-naphthol-7-sulfonic acid (phenyl J acid).	60, 124				
Phenyl-a-naphthylamine	60				
Phenyl-1-naphthylamine-8-sulfonic acid.	8, 60, 81, 124, 126				181, 558
m-Phenylenediamine	29, 34, 39, 49, 60, 81, 84, 124, 126, 129, 181, X	20, 761	18, 781	. 90	744, 752
m-Phenylenediamine sulfonic acid.	39, 60				
p-Phenylenediamine	77, 109, 157, X	302, 158	382, 642	1. 27	301, 280
Phenyglycine, sodium salt	59, 60, 124				
Phenylhydrazine	141				
Phenyl hydrazine-p-sulfonic acid	29, 60, 75, 141				120, 721
Phenylmethylpyrazolone	75, 141				
Phenylmethylpyrazolone p-sulfonic acid.	60				
Phenyl pyrazolone	126				
Phthalic acid and anhydride	60, 124, X, X	2, 277, 073	556, 265	. 24	2, 787, 308
Picramic acid	29, 124				
Primuline, base	19, 75, 124, 138				162, 019
Pyrazolone	126				
Quinaldine	124				
Quinazarin	9, X				
Resorcinol, tech	139, X				
Resorcinol, U. S. P	139, X				
Rosaniline	84				
Salicylic acid, tech	59, 87, 116				1, 757, 581
Salicylic acid, U. S. P	59, 87, 116, 155, X	1, 104, 512	353, 058	. 32	2, 196, 292
Sulfanilic acid	9, 29, 34, 39, 60, 84, 108, 124, 141, 181	147, 517	25, 504	. 17	1, 385, 441
o-Sulfo-benzoic acid	90				
o-Sulfo-benzoic acid, chloride	90				
o-Sulfo-benzoic acid, ammonium salt.	90				
Tetraaminoditolylmethane	60, 141				
Tetrachlorophthalic anhydride	53				
Tetramethyl-diaminobenzhydrol (Michler's hydrol).	60				
Tetramethyl-diaminobenzophenone (Michler's ketone).	40, 60				
Tetramethyl-diaminodiphenylmethane.	40, 60, 81, 124				
Tetramethylthiouramsulfide	125				
Tetramethylthiouramsulfide	125				
Thioaniline	8				
Thiocarbaniide	60, 79, 124, 125, 129, 150, X	2, 739, 404	642, 626	. 23	3, 397, 397

TABLE 11.—Production and sales of coal-tar intermediates, 1924—Continued

Product	Manufacturer's identification numbers according to list on p. 211	Sales			Total production Pounds
		Quantity	Value	Average price per pound	
Tolidine and salts	39, 60, 124, 129	Pounds			Pounds 153, 793
Tolidine disulfonic acid	X				
o-Toluene sulfamide	X				
p-Toluene sulfamide	X				
p-Toluene sulfochloride	X				
p-Toluenesulfonyl ethyl ester	124				
Toluidine	39, 76, 80, 124	112, 250	\$23, 899	\$0. 20	
m-Toluidine	60				
o-Toluidine	4, 60, 76, 124, 129	1, 135, 819	150, 907	.13	1, 184, 550
p-Toluidine	4, 60, 76, 124, 129	118, 754	86, 639	.73	566, 528
p-Toluidine-m-sulfonic acid	60				
o-Toluidine sulfonic acid	84				
p-Toluidine-o-sulfonic acid	39, 126				
m-Tolylenediamine	4, 8, 9, 34, 39, 49, 60, 61, 81, 84, 124, 129, X.	184, 253	157, 580	.86	870, 794
m-Tolylenediamine sulfate	124				
p-Tolylenediamine	4, 61				
Tolylenediamine sulfonic acid	9				
m-Tolylenediamine sulfonic acid	39, 61, 124				
Tolyl-1-naphthylamine-8-sulfonic acid (tolyl-peri acid)	124				
Tricresyl phosphate	33				
Triphenylguanidine	60, 124, 125, 150, X	340, 829	237, 842	.70	429, 808
Xylidine and salt	29, 60, 124, 129	222, 932	87, 318	.39	372, 411
Zinc dimethyl dithiocarbamate	125				

TABLE 12.—Production of intermediates, by groups, according to unit values, 1921-1924

Group	1924		1923		1922		1921	
	Pounds	Percent of total	Pounds	Percent of total	Pounds	Percent of total	Pounds	Percent of total
0-15 cents	88, 160, 641	47. 247	104, 419, 258	45. 127	94, 688, 278	57. 372	28, 682, 310	40. 455
16-25 cents	37, 359, 904	20. 022	60, 233, 638	21, 709	26, 233, 604	15. 894	10, 986, 701	23. 959
26-50 cents	37, 179, 993	19. 925	42, 556, 640	18. 391	24, 399, 085	14. 783	11, 457, 741	16. 160
51-75 cents	10, 588, 270	5. 674	16, 486, 159	7. 125	8, 289, 387	5. 022	4, 329, 047	6. 106
\$0.76-\$1	6, 246, 565	3. 348	9, 664, 153	4. 176	5, 918, 904	3. 586	4, 689, 343	6. 614
\$1.01-\$1.50	4, 112, 585	2. 204	5, 587, 436	2. 415	3, 957, 355	2. 398	2, 517, 764	3. 551
\$1.51-\$2	968, 676	. 519	914, 837	. 395	568, 339	. 344	1, 204, 584	1. 699
\$2.01-\$3	1, 407, 047	. 754	951, 521	. 411	721, 637	. 437	731, 758	1. 032
\$3.01-\$4	303, 938	. 163	136, 302	. 059	197, 071	. 119	110, 316	. 156
Over \$4	268, 943	. 144	443, 927	. 192	74, 495	. 045	190, 348	. 268
Total	186, 596, 562	100	231, 393, 871	100	165, 048, 155	100	70, 899, 912	100

DYES AND OTHER FINISHED COAL-TAR PRODUCTS

INTRODUCTION

Finished coal-tar products may be divided into eight classes as follows: (1) Dyes, (2) color lakes, (3) photographic chemicals (developers), (4) medicinals, (5) flavors, (6) perfume materials, (7) synthetic phenolic resins, (8) synthetic tanning materials. In previous reports the Tariff Commission has emphasized the close relationship existing between the manufacture of explosives, poisonous gases, and dyes. This was clearly demonstrated in Germany where during the war the dye plants supplied the army with poisonous

gases and explosives. In the United States many plants, formerly manufacturing explosives, have since the signing of the armistice been converted into dye factories. The dye industry is now considered a key industry by the industrial nations of the world. Closely connected also with dyes is the manufacture of flavors, perfume materials, photographic chemicals, medicinals, and other coal-tar products, which, although produced in smaller quantities, use as raw materials many of the by-products obtained in the manufacture of coal-tar dyes.

The total production of dyes and other finished coal-tar products in 1924 by 153 firms was 97,730,211 pounds, as compared with 122,950,171 pounds by 164 firms in 1923. Sales in 1924 amounted to 93,636,109 pounds, valued at \$55,932,580, a decrease from the previous year when they totaled 115,297,586 pounds with a value of \$65,898,177.

Table 12 shows the 1924 production of dyes and other finished products in as great detail as is possible without revealing the output of individual manufacturers.

SUMMARY OF PRODUCTION OF DYES

DECLINE IN PRODUCTION

The output of coal-tar dyes in 1924 by 78 firms was 68,679,000 pounds. This is a 27 per cent decline from 1923, the peak year, when production totaled 93,667,524 pounds. Sales in 1924 totaled 64,961,433 pounds, valued at \$35,012,400. Sales in 1923 totaled 86,567,446 pounds, with a value of \$47,223,161. The decline in dye production may be explained largely by the reduced activity of the textile industry. Other factors contributing were (1) stocks carried over from 1923, when production exceeded sales by over 7,000,000 pounds; (2) increased imports, following the 15 per cent reduction in the tariff effective September 22, 1924; (3) a reduction in exports amounting to 2,210,772 pounds. The following table shows the production of dyes in 1914 and from 1917 to 1924, inclusive:

TABLE 13.—Domestic production and sales of coal-tar dyes, 1914, and 1917–1924

Year	Production	Sales	
		Pounds	Value
	<i>Pounds</i>		
1924	68,679,000	64,961,433	\$35,012,400
1923	93,667,524	86,567,446	47,223,161
1922	64,632,187	69,107,105	41,463,790
1921	39,008,690	47,513,762	39,283,956
1920	88,263,776		¹ 95,613,749
1919	63,402,194		¹ 67,598,855
1918	58,464,446		¹ 62,026,390
1917	45,977,246		¹ 57,796,228
1914	6,619,729		¹ 2,470,096

¹ For the years 1914 and 1917 to 1920, value of production is given.

Stocks on hand.—The Tariff Commission has for the first time compiled data concerning the total stocks on hand of domestic dyes. The following table gives the total stocks of all dyes on hand and the

same information for a selected list of leading dyes produced in the United States:

TABLE 14.—Stocks of domestic dyes on hand January 1, 1924 and 1925

Schultz No.	Name of dye	January 1, 1924	January 1, 1925
	Total all dyes.....	Pounds 26, 834, 625	Pounds 30, 337, 484
23	Tartrazine.....	170, 581	176, 370
145	Orange II.....	399, 786	338, 101
333	Oxamine black BHN.....	155, 972	238, 128
181	Salicine black U.....	341, 053	201, 015
217	Agalma black 10B.....	456, 159	549, 370
337	Benzo blue 2B.....	344, 944	355, 421
476	Benzamine brown 3GO.....	295, 605	289, 144
515	Methyl violet.....	133, 908	138, 387
462	Direct deep black EW.....	1, 238, 433	1, 755, 310
700	Nigrosine (water soluble).....	436, 074	434, 746
874	Indigo (20 per cent paste).....	8, 421, 414	10, 440, 997.
	Sulphur black.....	3, 592, 506	4, 130, 851
	Sulphur brown.....	822, 777	815, 219
	Total of 13 dyes listed.....	16, 809, 212	19, 863, 059

DECLINE IN PRICE

The weighted average price of all domestic dyes sold in 1924 was nearly 2 per cent less than the average of those sold in 1923. The following tabulation shows the trend of price in recent years:

TABLE 15.—Weighted average sales prices of domestic dyes, 1917-1924

Year	Weighted average sales price of domestic dyes	Year	Weighted average sales price of domestic dyes
1924.....	\$0. 54	1921.....	\$0. 83
1923.....	. 55	1920.....	1. 08
1922.....	. 60	1917.....	¹ 1. 26

¹ Unit value of production.

Indigo, the leading dye from the standpoint of quantity production, showed an average sales price of 22 cents per pound in 1924 as compared with 23 cents in 1923. In April, 1925, it sold for 14 cents per pound or below the price in 1913, when our entire supply was imported from Germany and Switzerland. The average sales price of Direct deep black EW was 38 cents in 1924, as compared with 43 cents in 1923. Agalma black 10B averaged 64 cents in 1924, a decline of 7 cents from the previous year. Benzamine brown 3GO declined 15 cents per pound. Recessions were recorded in the average price of many of the higher cost dyes.

Table 16 affords a comparison of the domestic sales prices of 100 dyes for the period 1917 to 1924, inclusive, with the invoice prices of the same dyes imported in 1914. The colors for which statistics are given in this table represent about 90 per cent of the domestic production. It should be noted that the domestic sales price is not

directly comparable with the invoice price in 1914. Invoice prices do not represent the cost to the consumer, as they do not include the importer's profit, or, in most cases, "charges for containers and packing, freight, and insurance to seaport, consular certification, minor shipping charges at point of departure and at seaport."

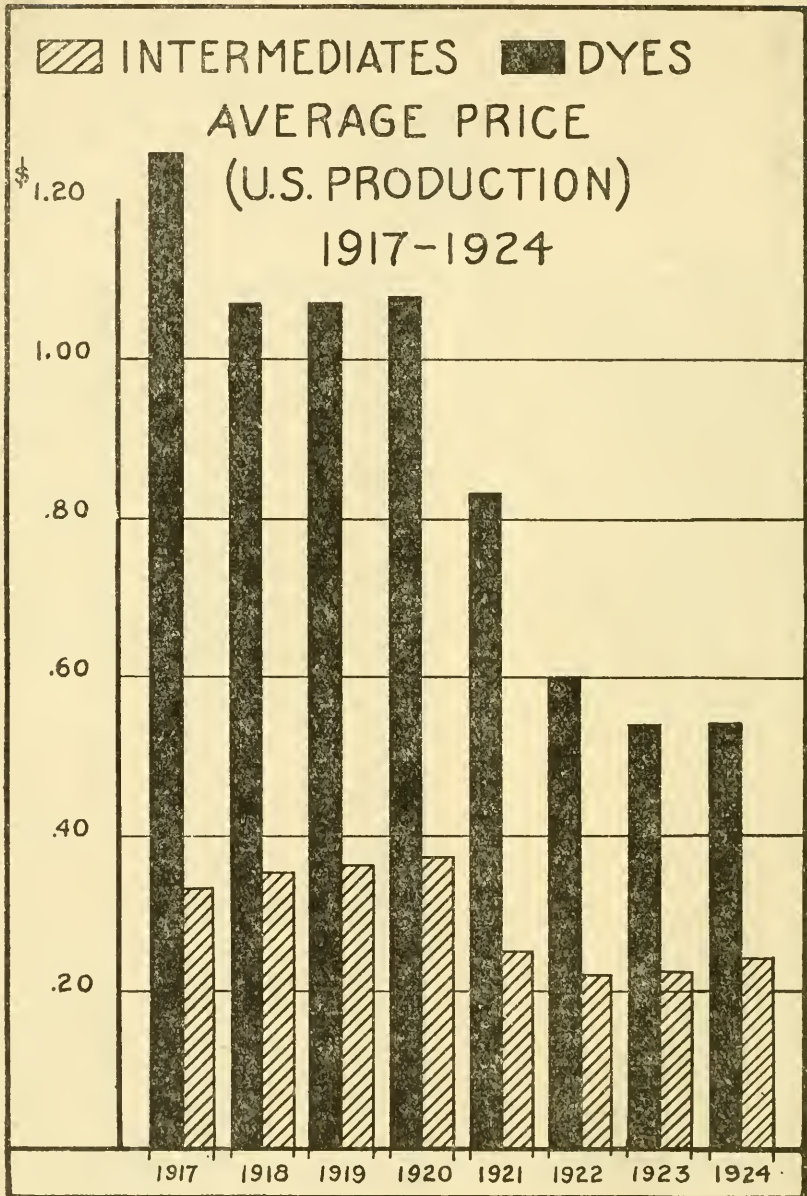
The Schultz number as indicated in column 1 is that of "Farbstoff-Tabellen" (Dyestuff Tables), by Gustav Schultz, 1914 edition. Column 2 gives the common name of the dye as adopted by the Tariff Commission for designating all dyes reported under a given Schultz number (column 1). The invoice price (1914), shown in column 3, represents the weighted average of all dyes classified under a given Schultz number in "Artificial Dyestuffs Used in the United States," Department of Commerce, Special Agents' Series No. 121. This weighted average price for all types is frequently higher than the invoice price per pound of the bulk of dyes imported under a given Schultz number. The individual dyes imported under given Schultz numbers in the Norton census show a wide variation in price, frequently amounting to several hundred per cent. This is due chiefly to the great divergence in concentration of the different dyes and also to the variation in prices of special and pure brands which are more costly than the ordinary brands. The figures of column 4, the domestic sales price as reported to the Tariff Commission, represent the weighted average price of all dyes reported under a given Schultz number.

TABLE 16.—Domestic sales prices of 100 dyes, 1917-1924, compared with invoice values of the same dyes imported, 1914

Schultz No.	Name	1914 invoice value imported dyes (weighted average of all types)	Average price per pound							
			1917	1918	1919	1920	1921	1922	1923	1924
9	Direct yellow R.....	\$0.178	\$2.55	\$2.61	\$1.74	\$1.49	\$1.07	\$0.88	\$0.81	\$0.66
10	Stilbene yellow.....	.162				1.53	1.22		1.00	
11	Chloramine orange G.....	.239	3.32	2.86	1.99	1.88	1.60	1.32	1.22	1.07
23	Tartrazine.....	.200	1.50	1.91	2.04	1.86	1.80	1.08	.87	.76
33	Chrysoidine Y.....	.136	1.09	.77	1.04	.87	.77	.63	.58	.49
34	Chrysoidine R.....	.165	1.22	1.22	1.12	.79	.78	.63	.57	.50
37	Croceine orange.....	.133	1.13	.89	.88	1.04	.86	.77	.58	
38	Orange G.....	.148	1.25	.92	1.04	1.22	.96	.58	.59	.55
42	Amido naphthol red G.....	.150	3.04	1.16	.97	1.78	1.46	.83	.71	.57
48	Alizarin yellow G.....	.077	.59	.68	.72	.63	.53	.50	.52	.49
58	Alizarin yellow R.....	.154	.83	.91	.84	.86	.69	.61	.61	.54
66	Amido naphthol red 6 B.....	.604		.88	.81	1.51	1.25	.66	.78	.70
82	Ponceau 2 R.....	.095	1.15	.79	.80	.80	.73	.61	.58	.55
112	Bordeaux B.....	.159	1.46	1.02	.91	.93	.84	.75	.73	.62
119	Diamine rose.....	.411		5.50	5.15	5.33	3.89	3.01	2.46	
134	Metanil yellow.....	.164	2.24	1.61	1.65	1.64	1.20	.92	.80	.72
137	Acid yellow G.....	.176	1.32	.85		.43	1.04	1.03	.87	
141	Azo yellow.....	.249	2.04	2.02	1.95	2.08	1.85	1.30	1.06	.96
145	Orange II.....	.081	.98	.68	.63	.62	.51	.38	.37	.33
154	Palatine chrome brown.....	.256	1.90	2.00	1.68	1.55	1.53	1.34	1.09	1.11
157	Diamond black P V.....	.130				1.65	1.25			.77
161	Fast red A.....	.118	1.19	1.03	1.05	1.04	.96	.83	.78	.71
163	Azo rubine.....	.198	2.71	1.51	1.43	1.43	1.26	.92	.85	.79
164	Fast red V R.....	.188	2.25	1.25	2.20	2.28	1.96	1.50	1.27	1.17
168	Amaranth.....	.138	1.31	.88	2.98	2.11	3.23	.86	.71	.49
169	Cochineal red.....	.127	1.44	1.16	1.32	1.26	.99	.76	.73	
173	Lithol red R.....	.083	1.25	2.38	.39	1.52	1.63	1.25	1.15	.91
177	Mordant yellow.....	.149	.74	1.35	1.89	.81	.98	.76	.65	.54
181	Salicine black U.....	.156	2.92	1.62	1.25	1.10	.75	.55	.53	.48
188	Sulphon acid blue R.....	.252	2.25	2.25	2.02	1.95	1.67	.91	.85	.76
217	Agalona black 10 B.....	.134	1.08	1.26	1.47	1.29	1.09	.79	.71	.46

TABLE 16.—Domestic sales prices of 100 dyes, 1917–1924, compared with invoice values of the same dyes imported, 1914—Continued

Schultz No.	Name	1914 invoice value imported dyes (weighted average of all types)	Average price per pound								
			1917	1918	1919	1920	1921	1922	1923	1924	
227	Brilliant croceine.....	\$0.165	\$1.35	\$1.92	\$2.41	\$2.23	\$1.56	\$1.09			
236	Wool red B.....	.143	2.50	2.10	2.67	2.64	1.41	1.02	\$1.16		\$1.06
257	Sulphon cyanine G.....	.166	2.25	2.25	2.21	2.26	1.74	1.21	.91		.89
265	Sulphon cyanine black.....	.110	2.25	2.10	1.91	1.80	1.48	1.14			.91
266	Naphthylamine black D.....	.144	1.89	.84	1.01	.87	.94	.66	.86		.67
275	Diamond black.....	.172	2.50	1.40	1.48	1.55	1.25	.94	.87		.86
283	Bismark brown.....	.186	1.17	.81	1.01	.84	.78	.66	.60		.53
284	Bismark brown 2 R.....	.183	1.48	.97	1.04	.91	.85	.63	.58		.51
304	Chrysophenine G.....	.270	12.64	5.71	2.53	2.81	2.03	1.70	1.03		.84
307	Congo red.....	.179	2.47	2.01	1.12	.86	.89	.65	.59		
327	Diamine violet N.....	.255			3.32	2.97	2.17	1.44	1.39		1.28
333	Oxamine black B H N.....	.133	2.50	3.25	2.72	2.49	1.48	.91	.73		.65
337	Benzo blue 2 B.....	.041	2.00	1.37	1.00	.88	.69	.48	.41		.37
340	Benzo orange R.....	.231	2.00	1.56	.88	1.07	.86	.89	.80		.72
342	Chrysamine G.....	.189	1.97	1.53	1.36	1.08	.99	.93	1.15		.81
343	Diamine fast red F.....	.362			2.72	2.59	2.00	1.39	1.20		1.06
344	Diamine brown.....	.194		2.60	2.20	1.99	1.65	1.10	.95		.83
363	Benzo purpurine 4 B.....	.133	2.82	2.46	1.80	1.46	1.20	.90	.89		.73
391	Benzo blue 3 B.....	.209	2.32	2.23	1.69	1.67	1.03	.78	.54		.51
405	Benzo purpurine 10 B.....	.234		4.73	2.07	2.47	2.33	1.64	1.07		1.42
410	Benazaurine G.....	.267		3.00	3.18	1.98	1.53	1.28			
419	Chicago blue R W.....	.222			2.40	1.88	1.67	1.45	1.51		1.19
424	Chicago blue 6 B.....	.275			3.08	2.11	1.90	1.52	1.40		1.26
426	Benзамine pure blue.....	.440	5.00	4.40	1.97	2.43	1.39	1.22	.97		.79
462	Direct deep black E W.....	.144	.75	.85	1.04	1.03	.79	.42	.43		.38
463	Erie direct black R X.....	.139			1.04	.99	.71	.61	.52		.49
474	Oxamine green B.....	.174	2.30	2.20	1.85	1.51	1.21	.92	.82		.68
475	Oxamine green G.....	.230	2.16	2.09	2.14	1.20	1.03	.98	.83		.79
476	Benзамine brown 3 G O.....		1.80	1.70	1.65	1.60	1.15	.73	.64		.49
477	Congo brown G.....	.194	2.00	2.25	1.83	1.58	1.45	.88	.94		
485	Benzo brown G.....	.170	1.80	1.50	1.23	1.39	1.06	.93	.78		.72
493	Auramine.....	.240	3.08	3.76	3.08	2.48	2.02	1.66	1.72		1.52
495	Malachite green.....	.241	6.28	5.60	3.26	3.32	1.97	1.22	1.60		1.70
499	Brilliant green.....	.221		5.63	4.66	4.23	3.68				
502	Guinea green.....	.255	8.50	8.10	5.12	5.22	3.94	1.77	1.72		1.61
512	Magenta.....	.294	9.10	7.72	4.57	4.67	3.28	2.26	2.08		1.72
515	Methyl violet.....	.248	3.84	2.78	2.44	2.39	1.66	1.29	1.25		1.13
521	Aniline blue.....	.368	4.85	5.56	4.86	6.82	2.91	4.56			
530	Acid violet.....	.281	8.50	7.00	4.93	5.20	3.64	1.86	1.86		1.72
536	Alkali blue.....	.409	4.71	8.33	6.35	5.90	3.42	2.42	2.39		2.56
543	Patent blue.....	.305	10.78	8.68							
559	Victoria blue B.....	.312	11.91	8.46	3.65	5.14	3.86				
566	Wool green S.....	.353	6.98		5.95	4.99	1.88	1.10	.83		.75
573	Rhodamine B.....	.415	10.00	15.92	6.90	6.72					
587	Eosine.....	.418	8.58	7.81	6.30	4.19	2.51	1.90	1.84		1.85
606	Phosphine.....	.352	6.00	6.00	3.86	4.17	3.70	2.05	1.93		1.86
616	Primuline.....	.144	4.43	3.04	1.71	1.59	1.37	1.07	.70		.79
617	Columbia yellow.....	.136	3.00	3.56	2.66	2.36	1.59	1.29	1.17		1.09
626	Gallocyanine.....	.347	5.96	5.12	3.03	3.06	2.44	1.92	1.93		1.86
659	Methylene blue.....	.390	3.09	2.80	3.03	2.94	1.94	1.40	1.47		1.26
679	Safranine.....	.359	5.93	5.85	4.02	3.88	2.60	1.69	1.45		1.45
697	Induline (spirit-soluble).....	.198	5.41	1.46	.53	1.21	.75	.94	.93		.78
698	Nigrosine (spirit-soluble).....	.126	1.11	.71	.71	.88	.70	.54	.52		.48
699	Induline (water-soluble).....	.258	1.51	.70	.67	1.03	.96	.82	.83		.74
700	Nigrosine (water-soluble).....	.149	.80	.63	.59	.72	.68	.53	.46		.48
720	Sulphur black.....	.100	.60	.29	.37	.25	.23	.21	.20		.19
	Sulphur blue.....		1.63	1.45	1.11	.98	.64	.60	.50		.55
	Sulphur brown.....	.107	.55	.48	.47	.35	.38	.40	.39		.38
	Sulphur tan.....		.90	.65	.34	.47	.59	.56	.48		.37
	Sulphur maroon.....	.186			1.23	1.62	.95	.79	.77		
	Sulphur yellow.....		.99	1.09	.83	.71	.73	.78	.73		.53
763	Indantrene dark blue B O.....	.227				2.12	2.31	1.65	2.00		2.23
778	Alizarin.....	.100	3.38	1.95	1.58	1.45	.65				
779	Alizarin orange.....	.224			1.45	1.46					
782	Alizarin brown.....	.290	.88	.80	1.58	1.68	1.32	1.86	1.24		2.68
842	Indantrene blue G C D.....	.354			6.96	2.40	2.41		1.63		
849	Indanthrene yellow.....	.334			17.42	4.68	3.76		1.24		
874	Indigo synthetic.....	.128	1.42	.88	.59	.74	.45	.25	.23		.22
877	Indigo extract.....	.340	.38	.62	.64	1.00	.65	.45	.58		.50



Relation of production to consumption.—Imports of coal-tar dyes in 1924 were 3,022,539² pounds, with an invoice value of \$2,908,778. Production in that year was 68,679,000 pounds, valued at \$37,086,660. Imports were accordingly 4.4 per cent of the total output by quantity and 7.8 per cent by value. As the price paid by the consumer for

² This total poundage is in excess of the actual quantity imported because most of the vat dyes have been reduced to a single strength basis in order to facilitate comparison of imports and production.

imported dyes is greater than the invoice value, it follows that the true ratio of the sales value of imports to the value of production is greater than the estimate of 7.8 per cent.

The domestic exports of dyes, colors, and stains derived from coal tar in 1924 totaled 15,713,428 pounds, valued at \$5,636,244. Assuming domestic consumption to equal domestic production plus imports minus exports, 55,988,111 pounds were consumed in 1924. This does not, however, take into consideration stocks carried over. Imports constituted only 5.4 per cent by quantity of the apparent consumption.

NEW DYES PRODUCED

The commercial production of over 60 dyes not made in 1923, and many of which had never before been made in the United States, was reported in 1924. These additions include dyes previously imported, some of them being the leading dyes imported into this country. These dyes are complex types of high fastness, and their manufacture is a step marking progress toward a self-contained domestic industry. Conspicuous among these additions are the vat dyes, such as Indanthrene golden orange RRT and G. Others include representatives of each class of dyes applied to cotton, silk, wool, and leather. Among the new direct colors for cotton are specialties of higher fastness and types for coupling with certain intermediates. A variety of acid and chrome dyes for wool first produced in 1924 include Cyananthrol RXO and several alizarin derivatives, such as Alizarin emeraldole G and Alizarin rubinol R, GH.

The Gallopont dyes, which are very brilliant in color, represent a development of interest to the textile printing industry. They are related to the basic dyes, but are said to have better fastness than the basic colors. They have the advantage of being easy to apply, as no mordants are required and steaming is unnecessary.

Work now under way in this country may be expected to result in the production of a number of other valuable dyes not heretofore produced in the United States and tending to give a more complete line of colors.

TARIFF CONSIDERATIONS

AMERICAN SELLING PRICE APPLIED TO COAL-TAR PRODUCTS

The act of 1922 provides that the ad valorem rate of duty on any imported coal-tar products coming within paragraph 27 or 28 shall be based upon the American selling price (as defined in subdivision (f) of section 402, Title IV) of any similar competitive article manufactured in the United States. A product is defined by the act as similar or competitive with any imported coal-tar product when it accomplishes results substantially equal to those accomplished by the domestic product used in substantially the same manner.

In the event of a similar competitive article not being manufactured in the United States, the ad valorem rate is based upon the United States value (as defined in subdivision (d) of section 402, Title IV) which is the selling price in the United States of the imported article less certain statutory deductions, including profit, general expense, cost of insurance, transportation, and duty.

For the administration of these new provisions the Department of the Treasury made additions to its corps of experts and assistants and installed new laboratory equipment for testing dyes and allied coal-tar products. It collected and tested many thousands of dye samples of both foreign and domestic manufacture, in order to establish lists of competitive and noncompetitive dyes and standards of strength for the assessment of specified duties.

Difficulties arising in the early administration of paragraphs 27 and 28 were largely met by regulations issued by the Treasury Department on March 3, 1923. (T. D. 39485, art. 709, Customs Regulations, 21923.) The major regulations may be summarized as follows:

The importer shall be permitted, under proper supervision, to take samples from his importations prior to entry.

Importers seeking information from the appraiser shall furnish such relevant information as the appraiser may request.

In the determination of a similar competitive article, the use requiring the major portion of the total consumption shall be the basis for deciding whether the article accomplishes substantially the same results.

An imported article used for the same purpose as a domestic article not freely offered for sale, but used to produce a domestic article freely offered for sale, shall be considered competitive.

The appraiser shall be required to issue lists of competitive and noncompetitive dyes, such lists to be for advisory purposes only.

The appraiser may furnish the importer under certain conditions, information as to the American selling price or the United States value of imported articles.³

If any imported article is not listed, either as competitive or noncompetitive, the appraiser shall be required to ascertain whether it is competitive or noncompetitive, and advise the importer of his decision, pending which the importer may withhold formal entry.

When an imported similar competitive article is of different strength from the domestic, the price is to be adjusted in proportion to the difference in strength between the two.

The value of an imported article competitive with a domestic article not freely offered for sale but used in the manufacture of other articles shall be the American selling price of the article freely offered for sale, adjusted according to the relation that it bears to the domestic article not freely offered for sale.

When the price of the domestic article is found to be unreasonable, it shall not be used, but instead the price the producer would have received within the meaning of section 402 (f).

In case two or more domestic articles are considered similar to and competitive with the imported article, the American selling price of that article which accomplishes results most nearly equal to the imported article shall be taken.

Articles of noncoal-tar origin may be considered in determining a similar competitive article.

Tests on articles are to be made under conditions approximating those obtaining in the trade.

Appraisers at ports other than New York shall when in doubt consult the appraiser at New York and if dissatisfied with his advice may submit the matter to the Treasury Department.

The method of calculating the United States value has been fixed by the Treasury Department.

The first lists of competitive and noncompetitive dyes were issued by the Treasury Department in the early part of April, 1923; and supplementary lists were subsequently issued, so that they now cover most of the products imported.

A tentative list of standards of strength for use as a basis in levying specific duties was issued and distributed among importers, manu-

³ The regulations as issued on Mar. 3, 1923, allowed the appraiser to furnish information only as to the American selling price of competitive products. On July 18, 1924, this regulation was amended (T. D. 40332) to permit the appraiser also to furnish information as to the United States value of noncompetitive articles.

facturers, and other dye interests with a request that criticism be offered prior to May 27, 1923; on August 14, 1924, the standards adopted were set forth in T. D. 39765, which was superseded by T. D. 40192.

With the development of an organization by the Treasury Department for the administration of paragraphs 27 and 28, and a better understanding by importers of the operation of the law, the most difficult problems have been solved.

The constitutionality of the American selling price provisions was sustained by the Court of Customs Appeals (T. D. 40313 of June 28, 1924).

The sole statutory test or criterion as to what constitutes a competitive product is whether the foreign substantially equals the domestic product in results accomplished and in manner of use. The law does not similarly require that the domestic shall substantially equal the foreign product in the particulars mentioned. (G. A. 8839, T. D. 40365, of 1924.) In determining whether the one accomplishes the same result as the other no exact formula is prescribed. If by a slight change the imported article accomplishes substantially equal results to those accomplished by the domestic article, it is competitive. (G. A. 8897, T. D. 40517, of 1924; appeal pending in Court of Customs Appeals.)

Delivery is not essential to establish the existence of similar competitive articles manufactured and produced in the United States if other necessary conditions exist, including ability to deliver, packed ready for delivery in the ordinary course of trade and in the usual wholesale quantities. (G. A. 8981, T. D. 40832, of 1925; appeal pending in Court of Customs Appeals.)

The provisions of section 402, subdivision (f), have reference to the American product. Hence the determination of the principal market is governed entirely by the sale of the American product, and the determination of the usual wholesale quantities must be confined to a consideration of the sales which occur in such market. (G. A. 9004, T. D. 40926, of 1925.)

Effect of reduction in duty on imports.—On September 22, 1924, under the provisions of the tariff act of 1922, the ad valorem rate on dyes and other finished coal-tar products, paragraph 28, was reduced from 60 per cent to 45 per cent, and that on intermediates, paragraph 27, from 55 per cent to 40 per cent. The specific duty remained at 7 cents per pound.

In the commission's report for 1923 it was pointed out that the specific duty is more effective on the low-priced dyes and that the ad valorem rate is more effective on the high-priced dyes, and consequently a reduction in the ad valorem rate would more directly affect the higher-priced dyes. This is borne out by the figures of Table No. 17, showing the actual and the equivalent ad valorem duties under the act of 1922 on seven groups of dyes ranging from 25 cents to \$3 per pound for both competitive and noncompetitive products.

TABLE 17.—Duty on dyes under the tariff act of 1922

Competitive dyes					Noncompetitive dyes										
7 cents plus 60 per cent ad valorem Sept. 22, 1922, to Sept. 22, 1924					7 cents plus 45 per cent ad valorem after Sept. 22, 1924										
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Value of dye per pound	60 per cent duty	B plus 7 cents	Ad valorem equivalent of 7 cents	Ad valorem equivalent of C	45 per cent duty	F plus 7 cents	Ad valorem equivalent of G	Domestic selling price of imported dyes	United States value	60 per cent duty	K plus 7 cents	Equivalent ad valorem of L	45 per cent duty on J	N plus 7 cents	Equivalent ad valorem of O
			Per cent	Per cent			Per cent					Per cent			Per cent
\$0.25	\$0.15	\$0.22	28	88	\$0.113	\$0.18	72	\$0.25	\$0.0697	\$0.0418	\$0.1118	44.7	\$0.0314	\$0.1014	40.6
.50	.30	.37	14	74	.225	.205	59	.50	.202	.1212	.1912	38.2	.0909	.1609	32.2
.75	.45	.52	7	69.3	.338	.408	54.4	.75	.334	.20	.27	30	.1303	.2203	29.4
1.00	.60	.67	4	67	.45	.52	32	1.00	.4665	.28	.35	35	.2099	.2799	28
1.50	.90	.97	4.7	64.7	.68	.745	49.7	1.50	.73	.438	.508	33.9	.3285	.3985	26.6
2.00	1.20	1.27	3.5	63.5	.90	.97	48.5	2.00	1.52	.597	.667	33.35	.4478	.5178	25.9
3.00	1.80	1.87	2.3	62.3	1.35	1.42	47.33	3.00	1.52	.912	.98	32.7	.684	.754	25.1

The rapid increase in monthly imports indicates increased competition from foreign-made dyes. Imports are almost entirely of German and Swiss manufacture and consist largely of the higher cost dyes.⁴

The average monthly imports of dyes from October, 1924, to April, 1925, inclusive, was 452,403 pounds. This is an increase of 152 per cent over the monthly average of the first nine months of 1924, preceding the tariff reduction on dyes. Further details of monthly imports are given in Table 18 and in the graph below.

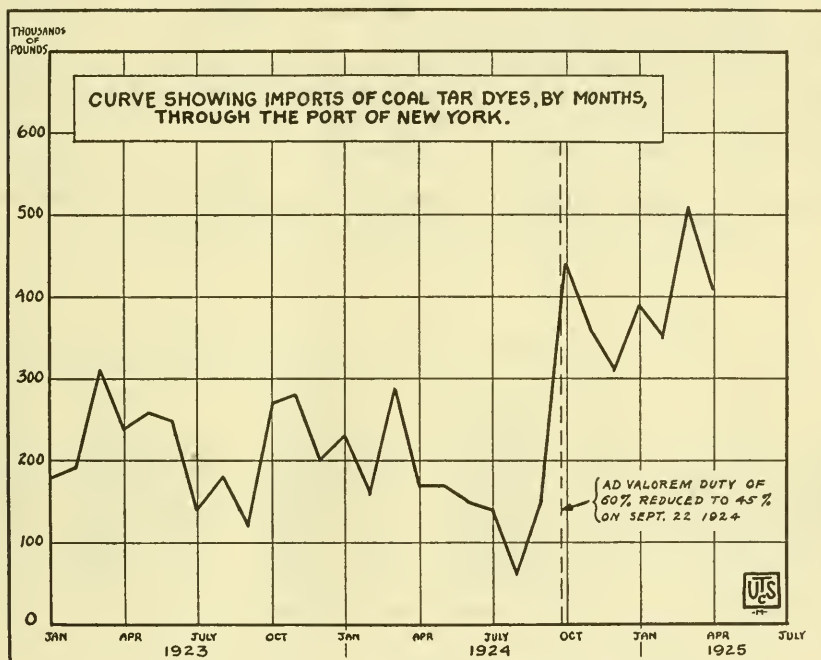


TABLE 18.—Imports of coal-tar dyes into the United States

Period	Pounds	Invoice value	Monthly average]	
			Pounds	Value
1922.....	3, 982, 631	\$5, 243, 257	338, 850	\$436, 838
1923.....	3, 098, 193	3, 151, 363	258, 153	262, 614
1924:				
First 9 months.....	1, 611, 931	1, 642, 632	179, 103	182, 515
Last 3 months.....	1, 410, 608	1, 266, 146	470, 203	422, 049
Total 12 months.....	3, 022, 539	2, 908, 778	251, 878	242, 398
1925:				
January.....	403, 984	359, 376		
February.....	373, 259	365, 268		
March.....	527, 964	488, 501		
April.....	451, 005	426, 141		
Total 4 months.....	1, 756, 212	1, 639, 286	439, 053	409, 821

⁴ See detailed monthly dye import lists, published jointly by the chemical divisions of the Department of Commerce and the Tariff Commission.

PRODUCTION OF DYES BY CLASSES

The dyes produced in the United States in 1924 are classified according to method of application as follows: (1) Acid dyes, (2) basic dyes, (3) direct dyes, (4) lake and spirit-soluble dyes, (5) mordant or chrome dyes, (6) sulphur dyes, (7) vat dyes, subdivided into indigo and other vats, and (8) unclassified dyes. While in certain instances the classification is arbitrary, because a dye may have properties which permit of its application by more than one method, it is believed that the above classification facilitates a comparison of production and import figures.

Comparative data for dyes produced in the United States from 1917 to 1924, inclusive, and those imported in the fiscal year 1914 and in the calendar years 1920 to 1924, inclusive, are arranged according to the classes given in Table 19.

TABLE 19.—Comparison of imports of dyes, by classes, fiscal year 1914 and calendar year 1920–1924, with domestic production, calendar years 1917–1924

Class	1914		1917		1918	
	Imports	Per cent of total	United States production	Per cent of total	United States production	Per cent of total
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Acid.....	9,286,501	20.2	9,372,121	20.4	9,799,071	16.8
Basic.....	3,002,480	6.5	2,073,043	4.5	2,879,639	4.9
Direct.....	10,264,757	22.3	11,181,761	24.3	12,285,683	21.1
Lake and spirit-soluble.....	1,512,605	3.3	934,360	2.2	1,068,466	1.8
Mordant and chrome.....	4,450,442	9.7	4,164,902	9.1	5,447,192	9.3
Sulphur.....	7,053,879	15.4	15,588,222	33.9	23,698,826	40.5
Vats (including indigo).....	10,352,663	22.5	289,296	.6	3,281,337	5.6
(a) Indigo.....	8,407,359	18.3	274,771	.55	3,083,888	5.3
(b) Other vats.....	1,945,304	4.2	14,525	.05	197,449	.3
Unclassified.....	27,568	.1	2,368,541	5.0	4,232	-----
Total.....	45,950,895	100	45,977,246	100	58,464,446	100

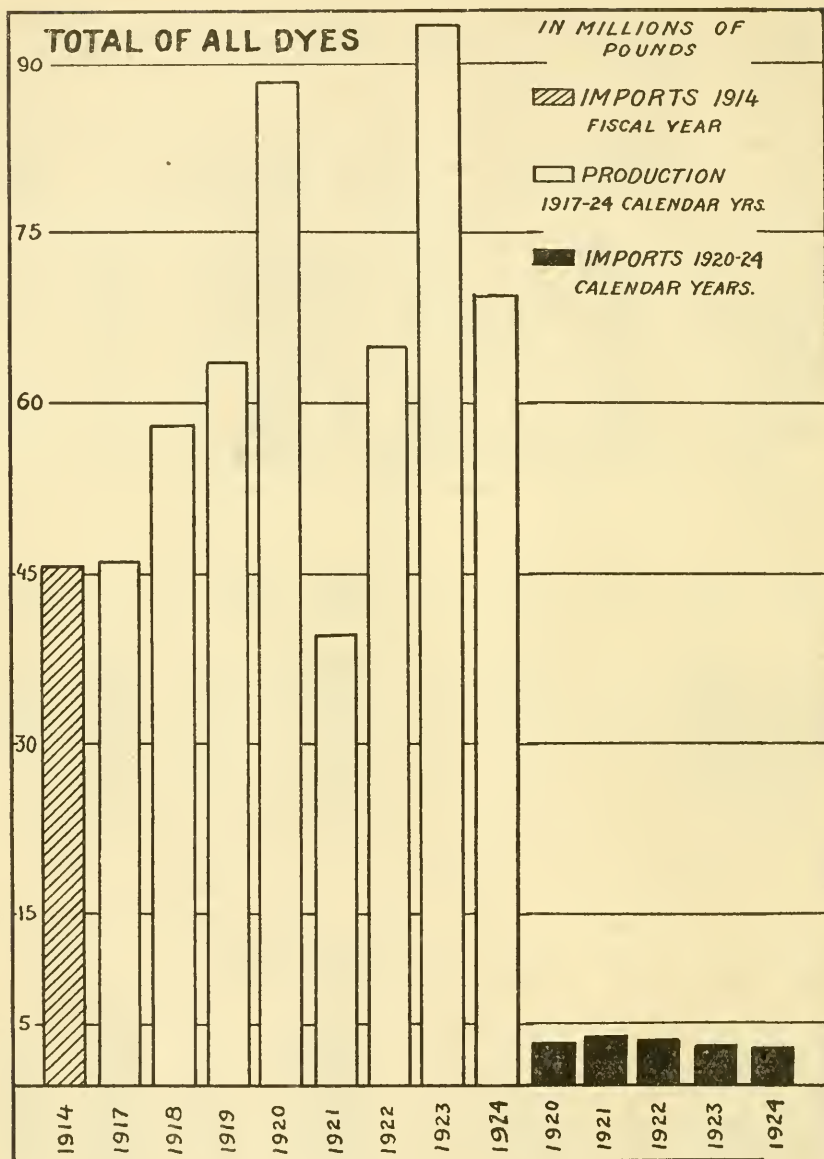
Class	1919		1920		Imports	Per cent of total
	United States production	Per cent of total	United States production	Per cent of total		
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Acid.....	12,195,968	19.2	17,741,538	20.1	733,405	21.5
Basic.....	4,036,532	6.4	4,993,001	5.7	192,163	5.7
Direct.....	14,444,934	22.8	19,882,631	22.5	571,581	16.8
Lake and spirit-soluble.....	1,813,199	2.8	2,205,281	2.5	17,527	.5
Mordant and chrome.....	3,985,050	6.3	3,900,209	4.4	709,482	20.9
Sulphur.....	17,624,418	27.8	20,034,500	22.7	229,140	6.7
Vats (including indigo).....	9,252,982	14.6	19,338,099	21.9	932,464	27.4
(a) Indigo.....	8,863,824	14.0	18,178,231	20.6	171,101	5.0
(b) Other vats.....	389,158	.6	1,159,868	1.3	761,363	22.4
Unclassified.....	49,111	.1	168,517	.2	16,820	.5
Total.....	63,402,194	100	88,263,776	100	3,402,582	100

TABLE 19.—Comparison of imports of dyes, by classes, fiscal year 1914 and calendar year 1920–1924, with domestic production, calendar years, 1917–1924—Con.

Class	1921				1922			
	United States production	Per cent of total	Imports	Per cent of total	United States production	Per cent of total	Imports	Per cent of total
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Acid.....	7,843,069	20.11	1,455,823	34.24	9,880,014	15.29	601,395	15.10
Basic.....	1,853,094	4.75	163,527	3.84	2,937,585	4.54	155,084	3.89
Direct.....	7,053,761	18.08	537,664	12.64	11,931,737	18.46	671,621	16.86
Lake and spirit-soluble.....	720,406	1.85	43,553	1.02	1,009,512	1.56	76,853	1.93
Mordant and chrome.....	3,997,442	10.25	695,961	16.36	3,749,701	5.80	716,790	18.00
Sulphur.....	10,239,255	26.25	220,938	5.20	16,913,767	26.17	194,883	4.89
Vats (including indigo).....	7,019,120	17.99	1,116,345	26.25	16,926,744	26.19	1,549,024	38.90
(a) Indigo.....	6,673,968	17.11	70,975	1.66	15,850,752	24.52	505	.01
(b) Other vats.....	345,152	.88	1,045,370	24.59	1,075,992	1.67	1,548,519	38.89
Unclassified.....	282,603	.72	19,100	.45	1,283,127	1.99	16,981	.43
Total.....	39,008,690	100	4,252,911	100	64,632,187	100	3,982,631	100

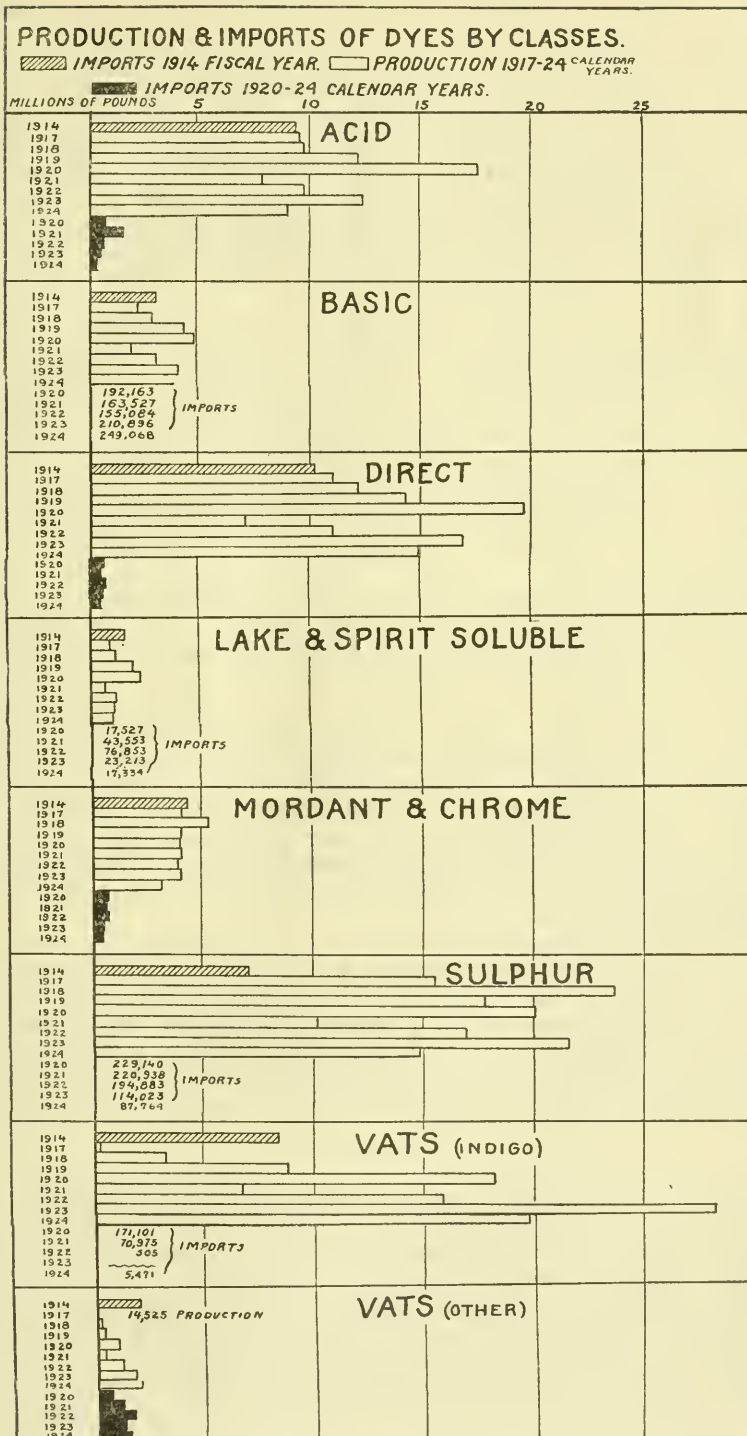
Class	1923			
	United States production	Per cent of total	Imports	Per cent of total
Acid.....	12,498,817	13.34	544,048	17.56
Basic.....	4,157,373	4.44	210,896	6.81
Direct.....	16,858,387	18.00	527,014	17.01
Lake and spirit-soluble.....	1,171,854	1.25	23,213	.75
Mordant and chrome.....	4,078,504	4.35	453,415	14.63
Sulphur.....	21,558,469	23.02	114,023	3.68
Vats (including indigo).....	30,113,642	32.15	1,207,554	38.98
(a) Indigo.....	28,347,259	30.26	-----	-----
(b) Other vats.....	1,766,383	1.89	1,207,554	-----
Unclassified and special.....	3,230,478	3.45	18,030	.58
Total.....	93,667,524	100	3,098,193	100

Class	1924			
	United States production	Per cent of total	Imports	Per cent of total
	<i>Pounds</i>		<i>Pounds</i>	
Acid.....	9,187,256	13.38	324,538	10.74
Basic.....	3,676,997	5.35	249,068	8.24
Direct.....	14,662,577	21.35	421,538	13.95
Lake and spirit-soluble.....	967,550	1.41	17,334	.57
Mordant and chrome.....	2,953,987	4.30	413,902	13.69
Sulphur.....	14,561,257	21.20	87,764	2.90
Vats (including indigo).....	21,818,022	31.77	1,499,322	49.61
(a) Indigo.....	19,996,703	29.12	5,471	.18
(b) Other vats.....	1,821,319	2.65	1,493,851	49.43
Unclassified and special.....	851,354	1.24	9,073	.30
Total.....	68,679,000	100	3,022,539	100



ACID DYES

Description.—The acid dyes are commonly applied in an acid bath; they have acid properties and are usually sodium salts of a color acid. They constitute the most important group used in wool dyeing, being especially adapted to the dyeing of hosiery and carpet yarns, suitings, dress goods, and hat materials; they have, in addition, considerable application on silk. They are little used on cotton or linen because of their lack of affinity for vegetable fibers, but are of value in the



dyeing of jute. In general they are used on goods not requiring repeated washings.

Acid dyes yield clear, bright shades. They are superior to the direct and mordant dyes in purity of shade, but are not equal to basic dyes in this respect. They have a wide color range, and in fastness show great individual variation; as a rule they are fairly fast to light and acids, and have a tendency to bleed in washing. They yield faster shades on wool than on silk. Some of the more complex acid dyes produce shades of good general fastness. A considerable part of this group is of the lowest-priced dyes produced. Their method of application in an acid bath is simple and of low labor cost.

The line of demarcation between acid dyes and certain colors of the direct and mordant groups is arbitrary. Certain acid dyes when "aftertreated" with sodium or potassium dichromate yield shades of good fastness to milling, light, washing, and other agents. These known as acid chrome colors are used chiefly on wool, especially on loose wool yarns and piece goods, such as men's suitings.

Most of the acid dyes are chemically included in one of the following groups: (1) Nitro compounds, (2) azo compounds, (3) sulphonated basic dyes (mostly triphenylmethane derivatives)-(4) alizarin derivatives.

Production and imports.—Measured quantitatively, acid dyes ranked fourth in production in 1924, with a total of 9,187,256 pounds. Agalma black 10 B, the first of the acid dyes, was fifth of all dyes manufactured in 1924, with an output of 1,271,980 pounds, and sales of 1,178,769 pounds, valued at \$757,920 Nigrosine (water soluble), second in quantity of all acid dyes, had an output of 1,241,330 pounds. Orange II was third, with an output of 1,163,021 pounds. The next largest were Tartrazine, with an output of 551,235 pounds; metanil yellow, 333,369 pounds; and Ponceau 2 R, 322,999 pounds. Among the new acid dyes reported in 1924 are Fast acid blue BGA, Brilliant fast red G, Brilliant sulphon red, Azo acid blue and the Acid alizarin dyes, Alizarin emeraldole G, Alizarin rubinol R and GW.

Imports of acid dyes amounted to 324,538 pounds, or nearly 11 per cent of the total imports and 3.5 per cent of the domestic production of this group. The eight leading acid dyes imported in 1924 were: Fast green, 30,721 pounds; Erioglaurine, 28,655 pounds; patent blue, 23,606 pounds; Xylene light yellow, 23,247 pounds; Palatine black, 12,050 pounds; Alizarin rubinol, 11,514 pounds; Brilliant sulphon red, 11,373 pounds; Patent blue A, 10,715 pounds.

BASIC DYES

Description.—The basic dyes surpass all others in depth, brilliancy of shade, and purity of tone. They possess high tinctorial power, but as a class lack fastness, especially to light and washing.

Basic colors are used on cotton in dyeing and printing where bright shades or color tints are desired without special requirements for fastness. They are also employed in the dyeing of paper and jute and for lithographic inks, typewriter ribbons, copy paper, and pencils. With the exception of Rhodamine B and a few others they have little application on wool. Dyes of this class are chemically

basic in character and are fixed on vegetable fibers with an acid mordant, namely, tannic acid.

They are historically the oldest of the coal-tar dyes. Mauve or Perkin violet, discovered by W. H. Perkin in 1856, was the first aniline dyestuff produced on a commercial scale. Basic dyes are not as important as formerly; for cotton dyeing they have been superseded by direct and sulphur dyes, which cost less to apply and many of which excel in fastness. In wool dyeing the acid dyes have almost entirely displaced the basic colors. Chemically, basic dyes include a large number of the triphenyl-methane derivatives and, in addition, members of the following classes: (1) Azines, (2) azos, (3) thioazines, (4) thioazols, and (5) acridines.

Production and imports.—In volume of output basic dyes ranked fifth among dyes produced in 1924, production amounting to 3,676,997 pounds, or 5.3 per cent of the total. Chrysoidine Y, with a production of 563,858 pounds, led this group. Dyes produced in next largest quantity were Bismarck brown 2 R, with an output of 559,670 pounds; Methylene blue, 413,075 pounds; Auramine, 390,192 pounds; and Malachite green, 183,536 pounds.

Imports in 1924 amounted to 249,068 pounds, or 8.2 per cent of the total dye imports and 6.8 per cent of the production of basic dyes. The six leading basic dyes imported were Rhodamine B (single strength), 97,254 pounds; Rhodamine 6 G (single strength), 57,375 pounds; Phosphine, 24,300 pounds; Indamine 6 R, 7,900 pounds; Thioflavine T, 6,842 pounds; and Homophosphine, 4,860 pounds.

DIRECT COTTON DYES

Description.—The direct or substantive dyes have been introduced within the past 25 years. Their method of application is simple, as they dye vegetable fibers full shades in a neutral or alkaline bath, "directly," without the use of mordants. Although their principal application is on cotton, they are of special value in dyeing fabrics containing both cotton and wool, or silk and cotton (union goods). They are also used on linen, silk, and paper and to an increasing extent on wool, especially for knitting yarns, worsted and shoddy yarns, and loose wool.

In fastness, individual dyes of this group show a wide variation. On account of their high solubility they have a tendency to run when washed. Many direct dyes, particularly those first introduced, are sensitive to acids and fade on exposure to sunlight; others, especially the newer ones, have good fastness to both acids and light as well as to other agents. Certain direct colors are of good fastness, particularly to washing, after a treatment of the dyed fiber by "coupling" with certain intermediates. An aftertreatment with metallic salts or formaldehyde also improves the fastness of certain direct dyes. These "developed" direct dyes were not available in the early years of the war; the ordinary direct dyes then used for hosiery were unsatisfactory to consumers. Developed blacks, such as Zambesi black V, are now manufactured in this country for hosiery.

With a few exception the direct dyes are chemically "azo" compounds and are nearly all derivatives of benzidine, tolidine, diamino

stilbene, or a group closely similar to one of these. A small but valuable group of direct colors belongs in the thiazol class.

Production and imports.—The direct cotton or substantive dyes, with a production of 14,662,577 pounds, ranked second in quantity, comprising 21.4 per cent of the output of all dyes. Direct deep black EW, with an output of 5,466,392 pounds, ranked first among the direct dyes and third among all dyes. Its production was 8 per cent of all dyes produced. Sales in 1924 were 4,947,568 pounds, valued at \$1,877,534. Benzamine brown 3 GO ranked second, with an output of 816,179 pounds, and Oxamine black BHN fourth, with an output of 769,929 pounds. Other direct cotton dyes with a large output include Chrysophenine G, the production of which was 507,720 pounds, and Direct yellow R, with an output of 453,424 pounds.

There was in general a decline in the production of the bulk dyes of this group. Conspicuous increases occurred, however, in the output of many of the faster and special types, among which may be mentioned Columbia black and yellow, Diamine fast red F, Benzo fast black and orange, and Chloramine fast orange. Progress in the group lies in the production of a number of specialties of greater fastness, giving an increased range of direct dyes for cotton and silk. These, although, for the most part, consumed in relatively small amounts, are essential for certain uses in the textile industry.

Among the new direct dyes reported in 1924 are Trisulphon brown B and 2G, Diamine catechine B, Chlorantine violet, Benzoazurine 3G, Direct fast blue, gray, and black. The first two mentioned are among the leading direct colors imported during the last four years.

The six leading direct dyes measured by volume of imports in 1924 were: Chlorantine fast brown, 30,202 pounds; Trisulphon brown B, 24,020 pounds; Diaminogene blue, 23,970 pounds; Chlorantine fast blue, 17,268 pounds; Toluylene orange, 16,818 pounds; Trisulphon brown GG, 14,754 pounds; Diaminogene B, 13,951 pounds. Imports of this group in 1924 amounted to 421,538 pounds, or 13.95 per cent of the total imports for that year and 2.9 per cent of all direct cotton dyes produced.

MORDANT AND CHROME DYES

Description.—These colors are used in conjunction with metallic mordants, such as salts of chromium, aluminum, iron, and tin, to dye both vegetable and animal fibers. The resulting shades are, in general, of exceptional fastness to color-destroying agents. The mordant dyes yield on wool fast shades to light, washing, and other agents. They are also important in textile printing, particularly on cotton piece goods, but are little used on silk.

The mordant dyes are frequently designated as chrome colors. As many of them are derived from alizarin, they were formerly called alizarin dyes. Certain dyes may be acid, acid chrome, or chrome, according to the method of application. The true alizarins are generally used with a mordant; the new acid alizarins can be used either with or without a mordant. In the application of chrome dyes on wool, the mordant may be applied before, during, or after the dyeing operation. The labor cost of dyeing with mordant and chrome dyes is higher than for other groups.

Formerly the most important dye of this class was alizarin, used on cotton to produce the well-known Turkey red, one of the shades made in ancient times from madder root. Alizarin has for about 50 years been prepared synthetically from anthracene. In the United States it has been replaced in part by certain of the so-called "ice" dyes, such as Para red and Naphthol AS red.

Chemically, the mordant dyes are members of the following classes: (1) Anthracene, (2) azo, (3) oxazine, (4) triphenylmethane, (5) nitroso, (6) oxyquinone, and (7) xanthone.

Production and imports.—The output of mordant and chrome dyes was 2,953,987 pounds, or 4.3 per cent of all dyes manufactured in 1924. Salicine black U with an output of 765,708 pounds ranked first among the mordant and chrome dyes. Total sales were \$84,634 pounds valued at \$420,004. Alizarin saphirol B, second in production, was followed by fast red VR, Diamond black, Alizarin yellow G and Eriochrome black A. Among the new dyes of this group reported in 1924 are Mordant yellow GRO, Anthracyl chrome green, Anthranol chrome violet ECB and Yellow HSW, Chromate brown EBN, Erio chrome brown R, Fast chrome brown R, and Green 6 B, Fast mordant blue B and Chrome blue, orange, and yellow.

Imports of this class were 413,902 pounds, or 13.69 per cent of the total dye imports, or 14 per cent of the production of this group. The eight leading mordant and chrome dyes imported are—

	Pounds
Alizarin blue black	78, 195
Alizarin	42, 645
Alizarin saphirol B	40, 600
Alizarin pure blue B	20, 729
Alizarin astrol	16, 117
Alizarin orange	15, 202
Eriochrome azurol BC	12, 664
Alizarin brown	10, 996

SULPHUR DYES

Description.—This group of dyes produces heavy deep shades of blue, green, brown, and black. They are used almost entirely in cotton dyeing, being especially adapted to uniform cloths, hosiery, gingham yarns, and cotton warps to be woven with wool and later dyed with acid dyes. Their greatly extended use during the war served to increase permanently their application on cotton. They are also used in the dyeing of linen and artificial silk.

The sulphur dyes possess excellent fastness to washing, fulling, alkalis, and acids in cross-dyeing. With some exceptions, their fastness to light is good. As they are not fast to chlorine, they do not withstand the repeated bleaching action of hypochlorites in the modern laundry treatment. They are applied in a sodium sulphide solution with, in certain cases, aftertreatment with metallic salts to improve their fastness. "Cachou de Laval," the first of this group to be discovered, was made in 1867 by the fusion of sawdust with sodium sulphide and sulphur. Sulphur dyes are now prepared by the fusion of various intermediates (containing the nitro, amino, or imino groups) with sodium sulphide and sulphur. These dyes are not pure, distinct compounds, and the presence of other substances renders them of comparatively low color value. Recent develop-

ments, however, have greatly increased the tinctorial value and shade range of many of them.

Production and imports.—Sulphur dyes, with an output of 14,561,257 pounds, ranked third in quantity of output, constituting 21.2 per cent of all dyes manufactured in 1924. Sulphur black was second among all dyes manufactured in 1924, the output being 11,728,790 pounds, or 17 per cent of the total production. Sales of this dye were 11,190,445 pounds with a value of \$2,131,299, or a unit value of 19 cents per pound. The production of sulphur brown amounted to 1,401,334 pounds; sulphur blues, 515,666 pounds. Conspicuous reductions in price occurred in many of the sulphur dyes. Sulphur purple was one of the dyes first reported in 1924.

Imports of sulphur dyes amounted to 87,764 pounds, or 2.9 per cent of the total dye imports, and 0.6 per cent of the domestic production of this group.

The five leading sulphur dyes imported were:

	Pounds
Cross dye green.....	35, 246
Thionol brown.....	16, 060
Thional brilliant blue.....	6, 001
Pyrogene green 2G.....	4, 630
Katigene green.....	4, 409

VAT DYES

Description.—Vat dyes as a class possess exceptional fastness to light, washing, acids, alkalis, and chlorine. Some of them are not fast to all of these agents. The consumption of vat dyes is increasing as a result of the increased demand by the ultimate consumer of textiles for fast-dyed fabrics. As cotton goods dyed with these colors withstand the severe treatment of the modern laundry, the increased cost of dye per yard is a minor factor compared with the increased life of a fabric dyed. Their superior fastness and the variety and beauty of shades which they yield have been largely responsible for a steady increase in their use. They are applied on dyed and printed shirtings, blouse material, dress goods, gingham, muslin curtains, and other cotton wash goods, and have a limited application on silk and wool. Because of their high cost they have a comparatively limited use in solid or heavy shades, but they are extensively used for color stripes or for small printed patterns on a white background. They possess technical advantages in application over the alizarin mordant dyes.

With the exception of indigo, one of the oldest dyes known, vat dyes are of recent origin, having been developed since 1904. The Badische Co. of Germany manufactured the first members of this class, known in the trade as the indanthrenes. This group was followed by the ciba dyes of the Society of Chemical Industry at Basle, Switzerland, and later by other series produced by several different German concerns, including the algols, helindones, thio-indigoes and hydrons. Prior to the war vat dyes other than indigo were made exclusively in Germany and Switzerland.

Following the outbreak of the war, the United States and Great Britain, two of the leading consumers of these dyes, began their manufacture on an extensive scale.

Vat dyes are among the most complex of dyes, difficult to manufacture, and relatively high in cost. Chemically, they consist of

indigoids (including thioindigoids), anthraquinone derivatives, and the carbazole derivatives.

In 1924, a water soluble leuco derivative of indigo, under the name of indigosol, was placed upon the market by Swiss and German firms. A similar derivative of Caledon jade green, known as Soledon jade green, was manufactured by the Scottish Dyes (Ltd.). The commercial production of water soluble leuco derivatives is a noteworthy advance not only in this group, but in the entire realm of dye manufacture. They can be used on animal as well as vegetable fibers. Their application by the "direct method" with subsequent oxidation is less complex than by the alkali hydrosulphite process generally used for the vat dyes.

Extended use of these new derivatives will depend in part upon their selling prices.

Production and imports.—The total production of vat dyes in 1924, including indigo, was 21,818,022 pounds, or 31.77 per cent of all dyes manufactured. The total for this group in 1923 was 30,113,642 pounds.

The 1924 production of indigo (20 per cent paste) was 19,996,703 pounds, a decline of 8,350,556 pounds from 1923, the peak year. Sales of indigo in 1924 amounted to 17,977,120 pounds, valued at \$3,916,569. The average price per pound was 21.8 cents as compared with 23 cents in 1923. In April, 1925, the price had declined to 14 cents per pound, a figure below the level of 1913, when our entire requirements were imported. If allowances were made for the difference between the present purchasing power of the dollar as compared with its 1913 value, the 1925 figure for this dye would be further reduced. A comparison of the 1925 domestic selling price with prices in foreign countries, for which data are obtainable, indicates that the United States consumer is paying less for domestic indigo than consumers in other countries are paying for their indigo.

The production of vat dyes other than indigo in 1924 was 1,821,319 pounds as compared with 1,766,383 pounds in 1923. This is a record output and marks a distinct advance in the progress of the domestic dye industry. The increasing consumption of vat dyes is shown in the following table:

TABLE 20.—*Production, imports, and consumption of vat dyes other than indigo, in the United States, 1914 and 1920-1924*

Year	Production	Imports	Consumption
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1924	1,821,319	1,493,851	3,315,170
1923	1,766,383	1,207,554	2,973,937
1922	1,075,992	1,548,519	2,624,511
1921	345,152	1,045,370	1,390,522
1920	1,159,868	761,363	1,921,231
1914		1,945,304	1,945,304

Among vat dyes other than Indigo, Indanthrene blue GCD led in quantity of production and value of sales. Indanthrene yellow ranked second. Conspicuous increases were recorded in the output of Indanthrene green, black, and brown, and in Hydron pink FF.

The commercial production of Indanthrene golden orange RRT and G is one of the notable achievements of the domestic dye industry

in 1924. Other vat dyes recently added to the domestic manufacturing program include Hydron scarlet BB, Hydron orange R, Anthrene golden orange 4R, Ponsol brown G and R for printing, Sulfanthrene blue GR, Indanthrene red BN, and Indanthrene violet R.

Imports of vat dyes in 1924 totaled 1,493,851 pounds. The nine leading vat dyes (single strength) imported in largest quantity were:

	Pounds
Indanthrene golden orange R.....	112, 339
Ciba violet B.....	82, 598
Indanthrene golden orange G.....	76, 046
Algol brown B.....	71, 313
Indanthrene blue GCD.....	68, 450
Indanthrene red BN.....	58, 520
Hydron pink FF.....	50, 460
Hydron brown.....	42, 681
Ciba scarlet.....	40, 200

German production of vat dyes.—Table 21 shows the German production of vat dyes other than indigo from 1920 to 1924, inclusive. (1) As a total of the different powder and paste types shown in the monthly lists of the Reparation Commission; (2) as converted to a single strength basis. This latter figure is comparable with both imports into and production in the United States. During this five-year period the imports into the United States comprised about 13 per cent of the total German production. By individual years they were as follows: 1920, 15 per cent; 1921, 14 per cent; 1922, 16 per cent; 1923, 12 per cent; 1924, 9 per cent.

A comparison of the German output of individual vat dyes with their corresponding imports into the United States shows that this country imported during the period 1920 to 1924 from one-quarter to over one-half of the German output of many vat dyes. Among the vat dyes which have found a large market in the United States are Indanthrene golden orange R and G, Algol brown R, Indanthrene red BN, Indanthrene yellow G, Indanthrene blue GCD, and BCS, and the Hydron and Helindone pinks.

TABLE 21.—*Production of vat dyes (other than indigo) in Germany, 1920-1924*¹

Year	Total of powder and paste	Total on a single strength basis
	<i>Pounds</i>	<i>Pounds</i>
1920 ²	2, 603, 712	5, 094, 205
1921.....	4, 215, 125	7, 480, 468
1922.....	4, 543, 716	9, 640, 002
1923.....	4, 549, 166	10, 237, 852
1924.....	8, 323, 767	16, 879, 308

¹ From monthly reports to the Reparation Commission, *Matières Colorantes Fabriquées par les Usines Allemandes*.

² 11 months, February-December.

COLOR-LAKE AND SPIRIT-SOLUBLE DYES

These dyes, constituting one of the smaller groups, are used in the preparation of a class of pigments known as color lakes, discussed in detail on page 61. The spirit-soluble dyes are insoluble in water, but dissolve in oils, fats, or various organic solvents; consequently they

find application for coloring varnishes, fats, oils, waxes, and similar products. As many of the spirit-soluble dyes are converted by chemical treatment, such as sulphonation, into water-soluble dyes for use in textile dyeing, they may be considered as partly completed dyes.

The output of color-lake and spirit-soluble dyes in 1924 was 967,550 pounds, or 1.4 per cent of the total output of all dyes produced. Imports of this group were 17,334 pounds, or 0.57 per cent of all dyes imported.

FOOD DYES

Dyes classified under this group include a limited number of selected dyes which meet the specifications of the Bureau of Chemistry, Department of Agriculture. They also include a highly refined grade of Methyl violet, used for marking meats and certain other food products. The total production of food dyes in 1924 was 264,178 pounds, with sales of 246,125 pounds, valued at \$855,920. Production in 1923 was 230,343 pounds, and in 1921, the first year in which they were separately compiled, 50,709 pounds. The average value of the sales was \$3.48 per pound in 1924, \$3.76 in 1923, and \$5.80 in 1921.

DYES EXPORTED FROM THE UNITED STATES

Exports in 1924 declined 12 per cent in quantity, but increased 1 per cent in value. The total exports of "colors, dyes, and stains" in 1924 amounted to 15,713,428 pounds, a decrease of 2,210,772 pounds from the previous year. The value of the exports in 1924 was \$5,636,244, an increase of \$70,977 over 1923. The decline in quantity in face of a slight increase in value is probably due to increased exports of indigo in the form of powder (100 per cent) instead of paste (20 per cent). Otherwise, exports in 1924 show little change from the previous year.

Our export trade in dyes of domestic manufacture consists very largely of Indigo and Sulphur black shipped mostly to the markets of the Far East. Other dyes constitute a relatively small part of the total by both value and quantity. The domestic dye producers have exported Indigo and Sulphur black for several years. The peak year for exports was 1920, a year of world-wide business activity, prior to the reappearance of German dyes in international trade. Dyes other than Indigo and Sulphur black were also exported in considerable quantity in 1920.

Keen competition has been encountered in foreign markets from German and Swiss manufacturers, particularly from Germany since the withdrawal of the French from the Ruhr. The price of German indigo in China was reduced from 33 cents in January to 24 cents in December, 1925. The principal markets for American dyes in 1923 were China, Japan, and Canada, followed by British India and Central and South American countries. Details as to quantity and value of exports to the various countries are shown in Part VI, Appendix.

Prior to 1922 the Department of Commerce reported only the value of exports of domestic dyes and dyestuffs, under the following groups: (1) Aniline dyes, (2) logwood extracts, (3) all other dyes and dyestuffs. The third classification covers both coal-tar dyes and natural

dyes other than logwood extract. Since logwood extract is by far the most important natural dye exported from the United States it is reasonable to assume that the figures returned for all other dyes and dyestuffs are largely coal-tar dyes. The most important natural dye included in the third group is derived from the bark of the black oak (*Quercus velutina*) in two forms, viz, quercitron and flavine. These were exported in considerable amounts during the war and in smaller amounts previously. In 1922 the Department of Commerce adopted a new classification, grouping coal-tar dyes under (1) color lakes and (2) other colors, dyes, and stains. For the first time the quantity as well as the value of the exports was published.

Table 22 shows by months the total exports of dyes from the United States from 1919 to March, 1925, inclusive.

TABLE 22.—*Domestic exports of dyes, by months, 1919–1925 (three months)*

Month	1919			1920		
	Aniline dyes	All other dyes ¹	Total	Aniline dyes	All other dyes ¹	Total
January.....	\$1,405,017	\$755,382	\$2,160,399	\$917,574	\$372,468	\$1,290,042
February.....	1,231,355	617,050	1,848,405	1,850,662	379,825	2,230,487
March.....	492,291	278,591	770,882	2,648,615	850,695	3,499,310
April.....	777,123	359,512	1,136,635	1,829,771	891,467	2,721,238
May.....	555,970	239,744	825,714	2,180,606	817,713	2,998,319
June.....	858,661	475,571	1,334,232	2,389,515	1,239,191	3,628,706
July.....	574,274	267,425	841,699	1,770,780	947,411	2,718,191
August.....	761,009	350,491	1,111,500	1,151,196	623,181	1,774,377
September.....	785,497	557,005	1,342,502	2,114,915	551,113	2,666,028
October.....	1,037,708	453,390	1,491,098	1,802,142	334,167	2,136,309
November.....	887,710	300,041	1,187,751	2,006,534	211,465	2,217,999
December.....	1,327,456	350,226	1,677,682	1,788,170	154,415	1,942,585
Total.....	10,724,071	5,004,428	15,728,499	22,450,480	7,373,111	29,823,591

Month	1921		
	Aniline dyes	All other dyes ¹	Total
January.....	\$943,595	\$349,114	\$1,292,709
February.....	397,123	72,641	469,764
March.....	574,969	95,322	670,291
April.....	305,760	59,250	365,010
May.....	278,331	91,753	370,084
June.....	444,273	81,477	525,750
July.....	310,357	65,626	375,983
August.....	513,012	70,663	583,675
September.....	322,477	70,228	392,705
October.....	349,981	73,706	423,687
November.....	372,244	78,763	450,947
December.....	254,878	94,656	349,534
Total.....	5,067,000	1,203,139	6,270,139

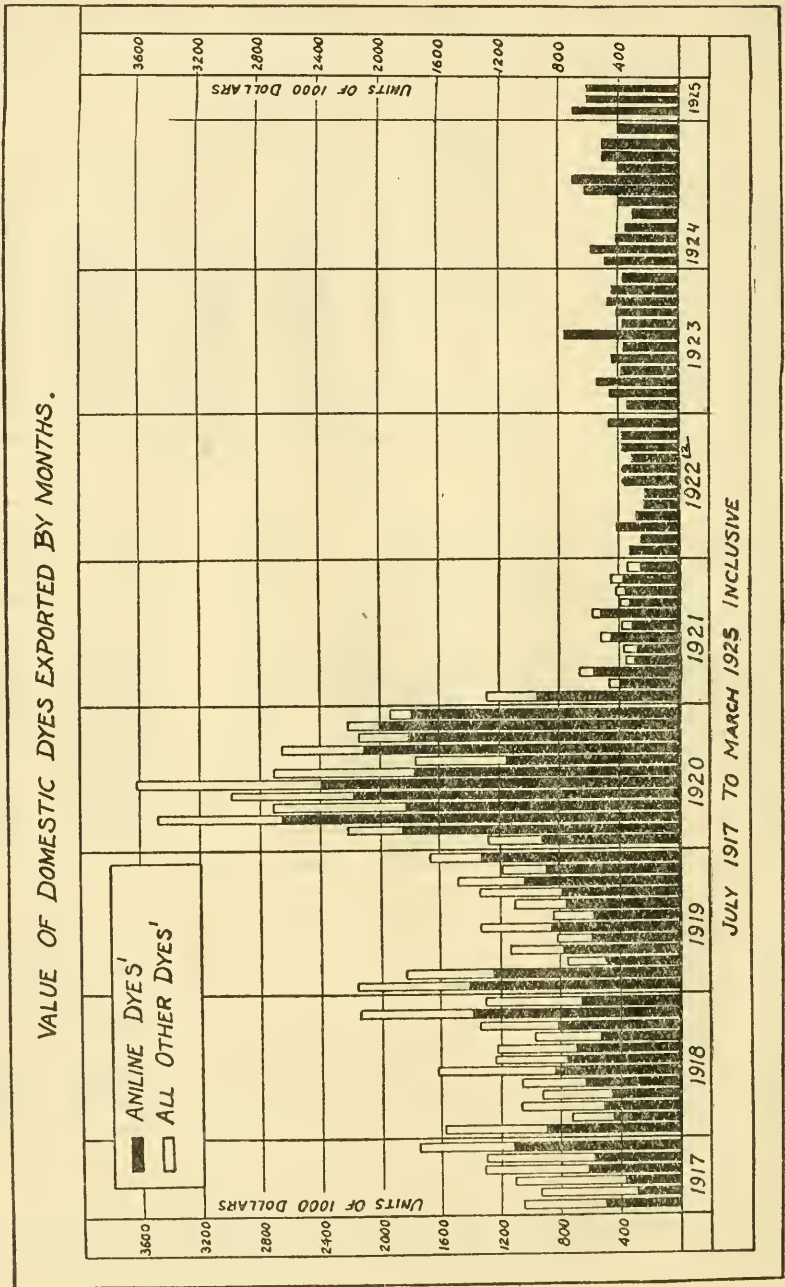
¹ Commerce and Navigation reports under domestic exports of "dyes and dyestuffs"—"aniline dyes," "logwood extract," and "all other dyes and dyestuffs." Under this last-named designation may be included both natural and coal-tar dyes. However, since logwood extract—shown separately—is the most important natural dye exported from the United States, it may be assumed that a considerable portion of the exports under "all other dyes and dyestuffs" are coal-tar dyes.

TABLE 22.—Domestic exports of dyes, by months, 1919–1925 (three months)—Con.

Month	1922					
	Color lakes		Other colors, etc.		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
January.....	5,059	\$4,188	364,971	\$325,048	370,030	\$329,236
February.....	6,796	5,124	298,364	230,544	305,160	255,668
March.....	3,612	3,162	708,792	405,250	712,404	408,412
April.....	8,446	2,105	581,367	271,571	589,813	273,676
May.....	401	500	328,733	227,898	329,134	228,398
June.....	282	361	398,975	222,370	399,257	222,731
July.....	356	249	726,624	364,737	726,980	364,986
August.....	593	411	896,701	383,692	897,294	384,103
September.....	341	607	664,348	304,022	664,689	304,629
October.....	576	890	954,922	399,439	955,498	400,329
November.....	1,702	2,228	1,084,890	395,579	1,086,592	397,807
December.....	64	103	1,307,272	446,365	1,307,336	446,468
Total.....	28,228	19,928	8,315,959	3,976,515	8,344,187	3,996,443

Month	1923		Month	1924	
	Colors, dyes, and stains			Colors, dyes, and stains	
	Pounds	Value		Pounds	Value
January.....	821,847	\$332,008	January.....	1,432,721	\$494,666
February.....	1,338,395	443,505	February.....	1,739,400	571,776
March.....	1,606,168	513,129	March.....	1,244,264	408,029
April.....	1,690,402	498,421	April.....	1,014,824	344,605
May.....	1,830,068	539,358	May.....	751,152	323,917
June.....	1,062,256	383,321	June.....	1,288,177	410,314
July.....	2,915,531	778,168	July.....	1,818,873	555,615
August.....	1,008,878	388,815	August.....	2,083,628	667,696
September.....	1,514,228	402,751	September.....	970,880	437,352
October.....	1,543,869	474,215	October.....	1,079,935	538,099
November.....	1,390,927	433,892	November.....	1,267,978	505,546
December.....	1,261,631	377,684	December.....	1,021,596	378,629
Total.....	17,924,200	5,565,267	Total.....	15,713,428	5,636,244

Month	1925 (3 months)	
	Colors, dyes, and stains	
	Pounds	Value
January.....	2,006,681	\$657,919
February.....	2,067,046	602,316
March.....	1,990,398	554,111



¹ The domestic exports of dyes, as shown by the Commerce Department, are divided into 3 groups—(1) aniline dyes, (2) logwood extract, and (3) all other dyestuffs.

The third classification may include both natural dyes (other than logwood extracts, shown separately) as well as coal-tar dyes. Since logwood extract, however, is the most important natural dye exported from the United States, it is reasonable to assume that a considerable portion of "all other dyes and dyestuffs" represents coal-tar dyes.

In 1922, however, the Commerce Department adopted a new classification. Coal-tar dyes were grouped under coal-tar finished products and were divided into (1) color lakes and (2) other colors, dyes, and stains. Since 1923 color lakes have not been separately listed.

OTHER FINISHED COAL-TAR PRODUCTS

COLOR LAKES

Description.—A color lake is an insoluble color pigment. It is commonly made by precipitating a coloring matter (a coal-tar dye) on a carrier (the base). The desired properties of a color lake are good coloring power, easy workability, brightness, and fastness to weather, light, alkali, and acids. The precipitating agents used for coal-tar colors are barium chloride, lead salts, aluminium hydroxide, and tannin or tannin tartar-emetic. Among the more important carriers are aluminium hydroxide, zinc white, lithopone, barytes, whiting, China clay and certain native clays, and ocher. The principal requirements of a carrier are (1) ready reduction to a finely divided state and (2) absence of any deleterious effect on the shade of the finished lake. The coloring matter includes those coal-tar dyes known as acid dyes, basic dyes, and mordant dyes, as well as certain azo dyes produced directly on the carrier. An example of the latter is Para red produced from the intermediates p-nitroaniline and b-naphthol. Another group of color lakes is made by the precipitation of a water-soluble acid dye, with the aid of a mineral salt to form an insoluble product.

After precipitation the insoluble lake is filtered, dried, and ground with or without oil; it is then ready for use as a pigment in paints, lithographic inks, artists' colors, wall paper, rubber products, and for other coloring purposes.

Production.—The total production of color lakes in 1924 amounted to 9,343,147 pounds, with sales of 9,281,673 pounds, valued at \$4,045,799. The average value of 44 cents per pound is an increase over 1923, when the average price was 41 cents. Production in 1923 was 13,079,115 pounds, with sales of 12,627,359 pounds, valued at \$5,124,732.

PHOTOGRAPHIC CHEMICALS

Because of their strong reducing properties, coal-tar chemicals of this class are used for developing photographic films, plates, and prints. They are popularly known as "developers," and are sold under various trade names.

The total output of photographic chemicals in 1924 was 316,183 pounds, a decrease of 343,289 pounds from 1923. Sales in 1924 were 321,865 pounds, valued at \$461,379, the average value per pound being \$1.43.

The developer produced in largest quantity in 1924 was hydroquinol, the production of which was 203,464 pounds, as compared with 230,079 pounds in 1923. Metol (methyl p-aminophenol sulfate) also showed an increase over the 1923 production.

MEDICINALS

Description.—Coal-tar products of this group include many compounds of the utmost importance from the standpoint of national welfare. The development in recent years of the manufacture of many of the coal-tar medicinals is a notable feature of the history of our coal-tar chemical industry. The coal-tar medicinals are

essential to the treatment of many grave types of disease and a shortage in the United States at a time when imports from other countries might be shut off would cause a serious situation.

Production.—The total production of medicinals in 1924 was 2,967,944 pounds; sales were 2,688,329 pounds, valued at \$5,178,099, an average price of \$1.93 per pound. Production in 1923 was 3,273,085 pounds, with sales of 2,995,448 pounds, valued at \$4,720,253.

Arsphenamine, known also as salvarsan and as "606," the hydrochloride of 3-diamino-4-dihydroxy-1-arsenobenzene, used for combating syphilis and other protozoan infections, is one of the most important of this group. Its production by 7 manufacturers in 1924 was 555 pounds; sales were 387 pounds, valued at \$109,154, or \$282.05 per pound, as compared with 576 pounds, valued at \$173,381—\$301.01 per pound—in 1923.

Nearsphenamine (3-diamino-4-dihydroxy-1-arsenobenzene methanol sulphoxylate) was reported by 6 manufacturers whose total production was 3,220 pounds. Sales were 2,981 pounds, valued at \$959,473, an average price of \$321.86 per pound.

Aspirin (acetylsalicylic acid) led all coal-tar medicinals in 1924 in quantity produced, the output by 4 firms being 1,366,530 pounds, as compared with 1,525,795 pounds in 1923. Sales in 1924 were 1,264,254 pounds, valued at \$934,780, a decrease in the price per pound from 81 cents to 74 cents.

Acetanilide, of which 425,950 pounds were produced by 3 firms, ranked second in quantity manufactured; total sales were 330,988 pounds, valued at \$99,449, or 30 cents per pound. This is a large decrease from the 1923 production of 564,498 pounds.

Sodium salicylate, of which 412,707 pounds were produced, ranked third, with sales of 375,825 pounds, valued at \$143,196. Phenol sulphonates (calcium, sodium, zinc, etc.), with a production of 197,644 pounds, ranked fifth. Other medicinals showing a relatively large production were phenolphthalein, salol, acetphenetidin, chloramine T, and cinchophen.

Among medicinals reported in 1924 but not in 1923 are: Luminal and luminal sodium which are useful hypnotics in nervous insomnia and important in the treatment of epilepsy. Two coal-tar dyes reported as medicinals for the first time in 1924 are methylene blue, said to be of value as an antiseptic, and methyl violet.

FLAVORS AND PERFUME MATERIALS

Description.—There is no sharp line of demarcation between these two classes of coal-tar chemicals, many of them being used both as flavors and perfumes; a separate classification is, therefore, in certain cases arbitrary. They serve as perfume materials for soaps and other toilet articles and as flavors for food products.

Production of flavors.—The total production of flavors in 1924 was 1,750,555 pounds; sales amounted to 1,691,863 pounds, valued at \$1,471,089. The 1923 production was 1,458,024 pounds.

Methyl salicylate, a flavor used largely as an artificial wintergreen, showed a substantial increase in 1924, production amounting to 1,282,505 pounds as compared with 967,505 pounds in 1923. The 1924 sales of this product amounted to 1,260,765 pounds, valued at \$531,324.

Coumarin is another flavor for which an increased output was reported. Production in 1924 amounted to 129,111 pounds as compared with 114,682 pounds in 1923. Sales in 1924 were 109,378 pounds, valued at \$362,340, or \$3.32 per pound.

Production of perfumes.—The output of perfume materials in 1924 was 1,895,267 pounds, this being a large increase over 1923 when 1,365,449 pounds were produced. Sales in 1924 totaled 1,945,488 pounds, valued at \$945,773.

Diethylphthalate ranked first in quantity of production and in value of sales. Production in 1924 was 1,676,911 pounds, with sales of 1,750,510 pounds, valued at \$673,517. Production in 1923 was 1,250,280 pounds. Diethylphthalate is used under a special formula as an ethyl alcohol denaturant.

TABLE 23.—Imports of synthetic aromatic chemicals of coal-tar origin, 1924¹

Name	Pounds	Name	Pounds
Acetophenone.....	757	Linalyl benzoate.....	1
Acetyl toluene.....	16	Mellilot.....	14
Amyl phenyl acetate.....	2	Methyl acetophenone.....	333
Amyl salicylate.....	1,192	Methyl anthranilate.....	2,689
Anisic aldehyde.....	552	Methyl methyl anthranilate.....	38
Benzaldehyde.....	992	Methyl benzoate.....	76
Benzoic acid natural.....	100	Methyl benzyl acetate.....	1
Benzophenone.....	257	Methyl cinnamate.....	113
Benzylidene acetone.....	34	Methyl coumarin.....	2
Benzyl acetate.....	11,427	Methyl nonyl acetaldehyde.....	3
Benzyl alcohol.....	3,642	Methyl para tolyl ketone.....	1
Benzyl benzoate.....	4,053	Methyl para cresol.....	14
Benzyl butyrate.....	37	Methyl phenyl acetate.....	144
Benzyl cinnamate.....	3	Methyl phenyl glycidic ethyl ester.....	1
Benzyl formate.....	1	Musk ambrette.....	8,722
Benzyl propionate.....	56	Musk ambrette pure.....	50
Benzyl valerianate.....	1	Musk ketone.....	3,973
Benzyl phenyl acetate.....	1	Musk xylol.....	3,948
Bromstyrol.....	246	Musk P. C.....	3,402
Butyl phenyl acetate.....	2	Musk residue.....	736
Butyl salicylate.....	26	Musk ambrette residue.....	2,362
Cetone D.....	66	Musk xylol residue.....	298
Cinnamic acid.....	12	Naphthyl methyl ketone.....	44
Cinnamic aldehyde.....	1,362	Neroline.....	875
Coumarin.....	313	Oere rose.....	33
Craetaegon.....	260	Oleo musk.....	160
Cyclohexanol.....	444	Paracresol methyl ester.....	10
Cyclohexanol acetate.....	22	Paracresol phenyl acetate.....	7
Cumaric aldehyde.....	1	Paramethyl quinoline.....	1
Diethyl phthalate.....	5,900	Phenylacetic acid.....	443
Dimethyl hydroquinol.....	137	Phenylacetic aldehyde.....	1,545
Dimethyl acetophenone.....	10	Phenyl ethyl acetate.....	86
Diphenyl oxide.....	103	Phenyl ethyl alcohol.....	3,584
Ethyl anthranilate.....	3	Phenyl ethyl benzoate.....	1
Ethyl cinnamate.....	105	Phenyl ethyl cinnamate.....	1
Ethyl phenyl acetate.....	7	Phenyl ethyl butyrate.....	5
Ethyl salicylate.....	1	Phenyl ethyl phenyl acetate.....	1
Gardenal.....	419	Phenyl ethyl propionate.....	75
Heliotropine.....	3,180	Phenyl propyl alcohol.....	16
Hyacinth absolute.....	495	Phenyl pronyl aldehyde.....	64
Hyacinth compound.....	370	Phthalic ether.....	325
Indol.....	18	Skatol.....	5
Isobutyl phenyl acetate.....	3	Toncarine.....	42
Isobutyl salicylate.....	1	Vanillin.....	187
Jacinth.....	91	Vertena D.....	5
Jacinth absolute.....	411	Yara yara.....	640

¹ Compiled from monthly import list of products within paragraphs 27 and 28 of the Act of 1922, a joint publication of the respective chemical divisions of the Department of Commerce and the United States Tariff Commission.

Diphenyl oxide also showed a large increase over 1923, production in 1924 being 95,080 pounds. Sales in 1924 were 83,040 pounds, valued at \$55,853. Other perfumes produced in larger quantities in 1924 than in 1923 are phenyl ethyl alcohol and methyl anthranilate.

Some of the products showing a decrease in production in 1924 from 1923 are amyl salicylate, benzylidene acetone, phenyl propyl alcohol, and phenyl acetic aldehyde.

The imported phenyl acetic aldehyde supplies a large part of our domestic consumption. Domestic production of the artificial musks has not yet been reported.

Products reported in 1924 but not in 1923 include dibutyl phthalate, diamyl phthalate, ethyl benzoate and methyl acetophenone.

SYNTHETIC PHENOLIC RESINS

The manufacture of synthetic resins is distinctly an American development and has resulted only from the most careful research and engineering skill. These were first made by the condensation of phenol with formaldehyde and ammonia and later with hexamethylene-tetramine, but in recent years paracumarone, as well as cresol, has been used as a base. Synthetic resins are used in large quantities by practically all American automobile manufacturers in the construction of many different parts of the automobile. The increase in the demand for radio equipment in the United States during the past few years has led to a large increase in the use of the synthetic resins for constructing panels and other parts of receiving sets. Synthetic resins are also used as a substitutes for amber in the manufacture of pipe stems, cigarette holders, jewelry, and similar articles. There is a large consumption for electric insulating materials and for varnishes and lacquers. Production in 1924 shows an increase over 1923, but figures can not be published without disclosing the operations of individual concerns.

SYNTHETIC TANNING MATERIALS

The synthetic tanning materials known as "syntans" are of very recent development, having come into commercial use in Germany and England since 1912. They give considerable promise for use in the tanning of leather in conjunction with natural tanning extracts.

Synthetic tans are made by the condensation of certain coal-tar derivatives, such as the sulfonated phenols, cresols, and naphthols, with formaldehyde in the presence of an acid. They are commonly used in conjunction with the natural tanning extracts. Their use is reported to result in (1) an economy of the time required for tanning, (2) a satisfactory leather of light color, and (3) a reduction in the amount of natural extract required.

Production figures for synthetic tanning materials can not be published without disclosing the operations of individual concerns. The combined production of synthetic phenolic resins and synthetic tanning materials in 1924 was 12,778,115 pounds, with sales of 12,745,458 pounds, valued at \$8,818,041.

STATISTICS OF PRODUCTION

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924

[The number in the first column identifies the dyes according to the 1914 edition of the Schultz tables. The second column gives the common name of the product. The numbers in the third column refer to the numbered alphabetical list of manufacturers printed on page 211. An X signifies that a manufacturer did not consent to the publication of his identification number in connection therewith. A blank in the fourth and fifth columns indicates that the sales figures can not be published without revealing information in regard to the output of individual firms. A blank in the seventh column indicates that the production of the corresponding dye in the United States can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the total]

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production <i>Pounds</i>
			Quantity <i>Pounds</i>	Value	Average price per pound	
	Total finished coal-tar products.		93,636,109	\$55,932,580	\$.60	97,730,211
	NITROSO DYES					
4	Naphthol green	8, 61				
	NITRO DYES					
7	Naphthol yellow S	34, 84, 170				
8	Pigment chlorine	176				
	STILBENE DYES					
9	Direct yellow R	8, 34, 39, 67, 75, 124, 129, 136	440,160	289,422	.66	453,424
10	Stilbene yellow	60, 67, 75, 138				
11	Chloramine orange G	8, 67, 124, 129, 136	122,895	131,384	1.07	138,234
	PYRAZOLONE DYES					
19	Fast light yellow	9, 60, 124, 126, 141	88,511	233,645	2.64	85,306
22	Xylene yellow	39, 141				
23	Tartrazine	29, 81, 124, 141, 169	545,446	416,648	.76	551,235
29	Eriochrome red B	60, 126				
	AZO DYES					
	MONOAZO DYES					
32	Butter yellow	9, 34, 44, 84, 129, X	25,049	20,034	.80	
33	Chrysoidine Y	8, 9, 29, 34, 60, 61, 81, 84, 124	562,594	276,724	.49	563,858
34	Chrysoidine R	8, 9, 34, 44, 60, 61, 81, 84, 124	147,536	73,516	.50	181,167
35	Sudan G	34, 44				
36	Sudan I	34, 44, 84, 124, 129, X	38,467	30,469	.79	46,752
37	Croceine orange	9, 124, 157				10,979
38	Orange G	29, 34, 60, 94, 124, 157	128,246	70,107	.55	92,549
40	Chromotrope 2R	44, 124, 129	7,352	8,627	1.17	
41	Fast acid fuchsine B	9, 34, 45, 124, 129	19,076	10,858	.57	
42	Amido naphthol red G	8, 9, 34, 39, 44, 60, 75, 81, 124, 136, X	202,183	114,428	.57	218,173
45	Brilliant lake red R	113				
48	Alizarin yellow G	8, 9, 29, 39, 44, 45, 51, 60, 81, 124, 126, X, X	176,979	86,967	.49	135,934
57	Chromotrope 2B	129				
58	Alizarin yellow R	8, 9, 29, 39, 44, 45, 60, 81, 126, 129, 157, X, X	109,468	59,061	.54	103,347
61	Victoria violet	8, 39, 124, 129, 136	38,378	32,410	.84	
63	Azo acid blue	45				
64	Lanafuchsine	126, 129, 157				
65	Azo coralline	75, 81				
66	Amido naphthol red 6B	8, 34, 39, 44, 60, 75, 81, 124, 129, 136	104,233	72,915	.70	112,334
67	Chromotrope 6B	44, 124, 129				
68	Spirit yellow R	34, 44, 124, X	46,921	42,715	.91	48,066
72	Pigment orange R	176				
76	Sudan II	9, 34, 44, 60, 84, 124, X	39,377	40,437	1.03	64,426
79	Xylidine orange 2R	8				

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924—Continued

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production
			Quantity	Value	Average price per pound	
	AZO DYES—Continued					
	MONOAZO DYES—CON.					
			<i>Pounds</i>			<i>Pounds</i>
82	Ponceau 2R.....	8, 9, 29, 34, 39, 44, 124, 129, 157.	316, 166	\$173, 498	\$0.55	322, 999
88	Acid anthracene brown R.....	60, 81.....				
89	Metachrome brown B.....	5, 29, 60, 124, X.....				214, 409
91	Anthracyl chrome green D.....	X.....				
93	Sudan R.....	129.....				
94	Azo eosine C.....	129.....				
102	Diamond flavine G.....	81, 126.....				
103	Mordant yellow GRO.....	81.....				
108	Sudan brown.....	9.....				
106	Antol red RLP.....	34.....				
107	Sulfanine brown A.....	157.....				
109	Palatine red A.....	157.....				
112	Bordeaux B.....	8, 9, 29, 34, 39, 60, 124, 129, 157.	68, 270	54, 363	.62	111, 129
114	Chromotrope 10B.....	129.....				
117	Erica 2 GN.....	129, 138.....				
119	Diamine rose.....	19, 67, 124, 135.....				
121	Erica B.....	67, 129.....				
124	Metanil yellow.....	9, 39, 60, 81, 84, 124.....	390, 294	282, 872	.72	333, 369
137	Acid yellow G.....	60, 61, 124.....				
141	Azo yellow.....	9, 34, 60, 61, 81, 124, 170.....	112, 504	108, 468	.96	123, 636
143	Tropaeoline.....	84, 170.....				
144	Orange I.....	34.....				
145	Orange II.....	9, 29, 34, 39, 44, 60, 84, 124.....	1, 224, 706	398, 377	.33	1, 163, 021
147	Azo fuchsine 6B.....	60.....				
151	Orange R.....	60, 84, 124.....	89, 995	34, 646	.39	71, 868
152	Permanent red 4B.....	39, 60, 113.....	45, 307	91, 540	2.02	37, 692
153	Lake red C.....	60, 113, 157, 159.....				
154	Palatine chrome brown.....	45, 124, 126.....	18, 805	20, 867	1.11	
155	Acid alizarin garnet R.....	8, 124.....				
156	Palatine chrome violet.....	60, 81, 124, 126.....				
157	Diamond black PV.....	60, 81, 124.....	26, 688	20, 087	.77	
161	Fast red A.....	29, 34, 39, 60, 81, 84, 124, 129, 157, X.....	175, 581	123, 749	.71	233, 729
162	Brilliant fast red G.....	44.....				
163	Azo rubine.....	8, 34, 39, 44, 60, 81, 99, 124, 129.....	297, 497	233, 516	.79	294, 254
164	Fast red VR.....	8, 9, 39, 44, 124, 126, 129, 136, X.....	142, 501	166, 054	1.17	154, 024
166	Fast red E.....	8.....				
167	Croceine scarlet 3BX.....	39.....				
168	Amaranth.....	34, 39, 60, 124, 129, 157.....	35, 736	17, 570	.49	25, 639
169	Cochineal red.....	29, 34, 44, 124, 157, X.....				
173	Lithol red R.....	8, 30, 39, 63, 157, 159, 176, X.....	205, 562	157, 380	.91	205, 685
177	Mordant yellow.....	8, 9, 39, 124.....	27, 765	15, 066	.54	41, 494
175	Crumpsal yellow.....	124.....				
179	Lake Bordeaux B.....	176.....				
180	Eriochrome blue black B.....	39, 124, 126.....				
181	Salicine black U.....	8, 9, 19, 34, 39, 44, 60, 81, 124, 126, 129, 157, X.....	884, 634	420, 094	.48	765, 708
182	Brilliant sulphon red.....	126.....				
183	Eriochrome black T.....	34, 39, 60, 81, 126.....	229, 765	149, 114	.65	127, 977
184	Eriochrome black A.....	9, 39, 60, 81, 124, 126.....				
186	Lanacyl violet B.....	60.....				
188	Sulphon acid blue R.....	8, 60, 81, 124, 126.....	203, 555	154, 590	.76	158, 069
189	Sulphon acid blue B.....	124.....				
193	Stanley red.....	138.....				
194	Thiazine red R.....	67, 129.....				
195	Rosopenine SG.....	19, 138, X.....	13, 467	21, 391	1.59	12, 404
197	Thiazine red G.....	75, 138.....				
198	Mimosa C.....	19, 129, 138.....				
200	Lake red D.....	176.....				
202	Palatine chrome red B.....	8, 9, 34, 39, 44, 60, 81, 124, 126, 129, 176.....	47, 733	39, 635	.83	99, 509

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924—Continued

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production
			Quantity	Value	Average price per pound	
AZO DYES—Continued						
DISAZO DYES						
211	Resorcin brown	8, 39, 44, 60, 84, 124, 136, X, X.	Pounds 166,630	\$125,013	\$0.75	Pounds 159,204
213	Fast brown	9, 34, 44, 81, 124, X, X	31,214	33,071	1.06	36,631
217	Agalma black 10B	8, 9, 34, 39, 44, 45, 60, 81, 124, 129, 136, 157, X.	1,178,769	757,920	.64	1,271,980
221	Anthracene acid brown	60				
227	Brilliant croceine	9, 34, 44, 60, 81, 124, 157.				
228	Ponceau 5R	34				
230	Cloth red 3G	60				
232	Sudan IV	9, 34, 39, 44, 84, 124, X.	26,036	22,409	.86	37,162
236	Wool red B	8, 39, 81, 124, 126, X.	31,719	33,664	1.06	34,056
241	Neutral gray G	129				
246	Cloth scarlet G	61, 84				
247	Scarlet EC	61, 124, 126	17,130	21,019	1.23	
250	Milling orange G	19, 126				
257	Sulphonyaniline G	60, 81, 124, 126	266,833	236,212	.89	272,836
261	Buffalo black 10B	8, 124, 126				
264	Fast sulphon black F	81				
265	Sulphonyaniline black	60, 81, 124, 126	133,490	122,003	.91	133,347
266	Naphthylamine black D	8, 60, 129	7,480	4,978	.67	
270	Brilliant croceine 9B	34				
274	Diaminogen	60				
275	Diamond black	8, 60, 124, 129	129,955	111,638	.86	144,572
276	Diamond green	8, 60, 81	13,466	12,950	.96	
279	Benzo fast scarlet	39, 60, 124, 129	166,431	318,043	1.91	187,625
283	Bismarck brown	4, 34, 39, 60, 81, 84, 124.	140,548	74,137	.53	119,687
284	Bismarck brown 2R	8, 34, 39, 44, 60, 61, 81, 84, 124, X.	535,862	272,502	.51	559,670
288	Palatine chrome black	126				
294	Fast mordant yellow	8, 81				
296	Benzo fast yellow	60				
297	Benzo fast pink 2BL	60				
303	Paper yellow	60, 124, 129	61,754	88,975	1.44	50,839
304	Chrysophenine G	9, 60, 67, 124, 129	446,809	375,068	.84	507,720
307	Congo red	60, 124, 129				
311	Orange TA	124				
312	Congo corinth G	8, 9, 34, 49, 81, 124, 129	107,410	108,622	1.01	111,862
313	Congo rubine	39, X				
319	Diamine scarlet	8, 60, 124, X	53,254	79,797	1.50	
322	Trisulphon violet B	39, 124, 129	38,123	41,727	1.10	
327	Diamine violet N	9, 34, 39, 60, 99, 124, 129, 136.	42,514	54,311	1.28	45,709
332	Benzo fast red	60				
333	Oxamine black BHN	8, 9, 34, 39, 51, 60, 124, 129, 136.	687,773	449,528	.65	769,929
336	Benzo cyanine R	124				
337	Benzo blue 2B	8, 9, 34, 39, 44, 45, 51, 60, 124, 129, 136, X.	691,238	257,542	.37	701,715
340	Benzo orange R	9, 39, 44, 45, 60, 81, 129.	71,485	51,770	.72	65,943
341	Crumpsall direct fast red R.	X				
342	Chrysamine G	39, 45, 60, 124, X	11,008	8,923	.81	
343	Diamine fast red F	8, 9, 34, 39, 44, 60, 67, 124, 129, 136, X.	81,140	85,792	1.06	138,737
344	Diamine brown	8, 9, 34, 39, 44, 60, 67, 75, 124, 129, 136, X.	142,741	118,046	.83	195,547
349	Diamine brown B	X				
351	Cresotine yellow G	124				
355	Anthracene red	129				
362	Oxydiamine orange	9, 124				
363	Benzopurpurine 4B	34, 39, 60, 99, 124, 129.	403,555	295,149	.73	449,391
365	Benzopurpurine B	8, 49				
378	Trisulphon blue R	129				
382	Azo mauve B	124				
385	Oxamine blue 4R	124				
386	Benzo blue BX	39, 124, 129	29,689	25,256	.85	
387	Columbia blue G	60				

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924—Continued

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production
			Quantity	Value	Average price per pound	
	AZO DYES—Continued					
	DISAZO DYES—contd.					
			<i>Pounds</i>			<i>Pounds</i>
391	Benzo blue 3B	8, 34, 39, 99, 124, 129	111, 873	\$56, 442	\$0. 51	131, 593
392	Tolylene orange G	124, 129				
400	Acid anthracene red	X				
405	Benzopurpurine 10B	9, 39, 60, 124, 129	30, 351	43, 208	1. 42	32, 530
410	Benzazurine G	9, 60, 124, 129				
411	Benzazurine 3G	129				
415	Dianil blue G	129				
419	Chicago blue RW	9, 39, 60, 124, 129	77, 604	92, 071	1. 19	94, 957
421	Oxamine blue B	124				
424	Chicago blue 6B	9, 39, 60, 124, 129	269, 149	339, 196	1. 26	244, 837
426	Benzamine pure blue	8, 39, 60, 124, 129, 136, X	180, 398	141, 543	. 79	203, 560
	TRISAZO DYES					
436	Columbia black	8, 39, 45, 60, 124	163, 271	126, 218	. 77	185, 156
441	Diazo blue black RS	124, 129				
449	Trisulphon brown B	8, 129				
456	Benzo fast blue	60, 124				
457	Trisulphon brown 2G	8				
462	Direct deep black EW	8, 9, 34, 39, 44, 60, 124, 129, X	4, 947, 568	1, 877, 534	. 38	5, 466, 392
463	Erie direct black RX	8, 9, 39, 45, 60, 124, 129	436, 029	213, 530	. 49	
464	Erie direct green ET	45, 49, 124	53, 657	41, 444	. 77	
469	Chloramine black N	129				
470	Chloramine green B	9, 129				
471	Chloramine blue 3G	9, 129				
474	Oxamine green B	8, 9, 39, 49, 60, 67, 124, 129, X	274, 490	187, 445	. 68	263, 528
475	Oxamine green G	8, 39, 49, 60, X	60, 960	47, 847	. 79	51, 566
476	Benzamine brown 3GO	8, 9, 34, 39, 49, 67, 81, 124, 129, X	825, 640	400, 655	. 49	816, 179
477	Congo brown G	44, 60, 81, 124, 126, 129, 138, X				
480	Congo brown R	60				
	TETRAKISAZO DYES					
485	Benzo brown G	34, 44, 49, 60, 67, 129	109, 629	79, 258	. 72	126, 033
487	Benzo brown B	67, 129				
	All other azo dyes		1, 951, 285	2, 045, 634	1. 05	2, 069, 763
	Total azo dyes		23, 378, 002	15, 334, 277	. 66	24, 170, 181
	DIPHENYLMETHANE DYES					
493	Auramine	13, 40, 60, 97, 124	398, 729	604, 513	1. 52	390, 192
	TRIPHENYLMETHANE DYES					
495	Malachite green	60, 97, 124, 190	162, 134	274, 931	1. 70	183, 536
499	Brilliant green	97, 190				
502	Guinea green	37, 39, 60, 124	54, 666	87, 983	1. 61	38, 389
503	Brilliant milling green B	124				
505	Light green	60				
506	Erioglaucine	124				
512	Magenta (or Fuchsine)	39, 52, 84, 89, 124, 147, 157, X	87, 032	149, 843	1. 72	71, 199
513	New fuchsine O	124				
515	Methyl violet	34, 52, 60, 84, 94, 95, 124, X	538, 533	607, 391	1. 13	543, 031
516	Crystal violet	60				
517	Methyl violet 5B	124				
521	Aniline blue	84, 89				
528	Fast acid violet 10B	37, 60				
530	Acid violet	37, 39, 60, 75, 124, 136	109, 291	188, 230	1. 72	113, 792
531	Eriocyanine	124				
536	Alkali blue	39, 52, 84, 89, 94, 124, 147, 157	127, 258	325, 486	2. 56	115, 164
538	Methyl blue for cotton	89				
539	Soluble blue	39, 52, 84, 89, 124	61, 688	157, 883	2. 56	38, 433
543	Patent blue V	37, 124				

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924—Continued

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production
			Quantity	Value	Average price per pound	
AZO DYES—Continued						
TRIPHENYLMETHANE DYES—continued						
			<i>Pounds</i>			<i>Pounds</i>
545	Patent blue A.....	37, 124.....				
548	Acid violet 6 BN.....	60.....				
555	Aurine.....	60.....				
558	Victoria blue R.....	60.....				
	Total triphenylmethane dyes.....		1, 419, 973	\$2, 372, 150	\$1. 67	1, 358, 547
DIPHENYL-NAPHTHYLMETHANE DYES						
559	Victoria blue B.....	60.....				
562	Fast acid blue.....	60.....				
564	Naphthalene green V.....	124.....				
566	Wool green S.....	60, 81, 124, 136.....	162, 357	121, 644	. 75	170, 537
XANTHONE DYES						
573	Rhodamine B.....	53, 60.....				
582	Fast acid violet A2R.....	60.....				
585	Uranine.....	9, 84.....				
587	Eosine.....	9, 53, 84, 94.....	152, 615	282, 404	1. 85	131, 634
592	Erythrosine B.....	53, 60, 84.....				
596	Phloxine.....	53, 60, 84.....	3, 426	12, 881	3. 76	4, 021
597	Rose bengale B.....	60, 84.....				
599	Gallein.....	194.....				
600	Coerulein.....	194.....				
	Total xanthone dyes.....		271, 120	504, 671	1. 86	240, 647
ACRIDINE DYES						
606	Phosphine.....	60, 84, 124, 141.....	74, 862	139, 102	1. 86	100, 753
QUINOLINE DYES						
613	Quinoline yellow.....	28, 124, 170.....	36, 612	62, 133	1. 70	51, 151
THIOBENZENYL DYES						
615	Thioflavine S.....	138.....				
616	Primuline.....	19, 67, 75, 124, 129, 138.....	189, 576	150, 431	. 79	178, 071
617	Columbia yellow.....	19, 67, 75, 124, 129, 138.....	197, 098	214, 239	1. 09	210, 531
618	Thioflavine T.....	129.....				
OXAZINE AND THIAZINE DYES						
622	Delphine blue B.....	45, 124.....				
626	Gallocyanine.....	9, 29, 45, 124, 194.....	63, 928	118, 598	1. 86	53, 085
631	Chromocyanine V.....	9, 124.....				
636	Prune pure.....	9.....				
649	Cotton blue or Meldola's blue.....	9, 45, 99, 124.....	37, 834	68, 360	1. 81	33, 973
659	Methylene blue.....	29, 124, 190.....	359, 483	451, 355	1. 26	413, 075
660	Methylene green.....	124.....				
667	Brilliant alizarin blue.....	75, 81.....				
AZINE DYES						
672	Azo carmine.....	60.....				
679	Safranine.....	60, 124, 145.....	121, 092	175, 847	1. 45	
681	New fast gray.....	29, 129.....				
683	Safranine MN.....	124.....				
687	Rosolane O.....	60.....				
697	Induline (spirit-soluble).....	19, 34, 39, 81, 84, 124.....	37, 308	28, 967	. 78	32, 833

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924—Continued

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production
			Quantity	Value	Average price per pound	
	AZO DYES—Continued					
	AZINE DYES—continued					
698	Nigrosine (spirit-soluble).	19, 29, 34, 81, 84, 124.	<i>Pounds</i> 411,326	\$197,237	\$.48	<i>Pounds</i> 360,166
699	Induline (water-soluble).	19, 39, 81, 84, 124.....	89,935	66,121	.74	74,439
700	Nigrosine (water-soluble).	19, 29, 81, 84, 124, 126.	1,232,658	588,802	.48	1,241,330
	SULPHUR DYES					
720	Sulphur black.....	4, 60, 81, 99, 124.....	11,190,445	2,131,299	.19	11,728,790
	Sulphur blue.....	18, 39, 45, 60, 99, 124, 129, X.	390,833	214,020	.55	515,666
	Sulphur brown.....	4, 18, 39, 44, 45, 46, 53, 60, 81, 99, 124, 162, 173, X.	1,408,892	541,320	.38	1,401,334
	Sulphur green.....	8, 45, 60, 99, 124, 129.				
	Sulphur maroon.....	8, 9, 45, 60, 61, 99, X.				
	Sulphur olive.....	19, 45, 46, 60, 81, 129, 162, 173.	166,321	62,722	.38	158,485
	Sulphur orange.....	4, 39, 45, 162				
	Sulphur purple.....	45, X				
	Sulphur tan.....	4, 8, 39, 45, 46, 81, 173, X.	142,382	52,995	.37	156,925
	Sulphur yellow.....	4, 39, 45, 60, 80, 81, 124, 129, 162, X.	423,256	224,558	.53	329,866
	Total sulphur dyes.....		14,000,372	3,438,920	.25	14,561,257
	CARBAZOLE DYES					
748	Hydron blue.....	60, 99.....				
	ANTHRAQUINONE DYES					
760	Indanthrene golden orange G.	129.....				
761	Indanthrene golden orange R.	60.....				
763	Indanthrene dark blue BO.	60, 114, 129.....	14,432	32,161	2.23	21,883
765	Indanthrene green B and black.	60, 114, 129.....	33,860	48,440	1.43	72,523
766	Indanthrene violet R.	129.....				
767	Indanthrene violet RR.	60.....				
768	Indanthrene violet B.	60.....				
778	Alizarin.....	18, 124.....				
779	Alizarin orange.....	18, 124.....				
780	Alizarin red S.	18.....				
782	Alizarin brown.....	45, 60, 62, 124, 176, 194, X.	41,759	86,634	2.08	37,350
784	Alizarin SX.....	124.....				
785	Alizarin GI.....	18, 129.....				
789	Anthracene blue WR.	62, 92, 124.....				
831	Indanthrene red BN.	129.....				56,487
838	Indanthrene blue RS.	60, 129.....				
840	Indanthrene blue 3G.	60.....				
842	Indanthrene blue GCD.	60, 129.....				
843	Indanthrene blue GC.	129.....				
849	Indanthrene yellow.....	60, 129.....				
858	Alizarin saphirol B.	81, 92, 124, 129.....	250,473	826,119	3.30	
859	Cyananthrol R.	129.....				
862	Alizarin blue black.....	37, 176.....				
865	Alizarin cyanine green.....	37, 176.....				
867	Indanthrene brown B.	129.....				
	Total anthraquinone dyes.....		1,685,439	3,053,899	2.04	1,970,769

TABLE 24.—Production and sales of dyes and other finished coal-tar products, 1924—Continued

Schultz No.	Common name	Manufacturers' identification number (according to list on p. 211)	Sales			Production
			Quantity	Value	Average price per pound	
AZO DYES—Continued						
INDIGO AND ITS DERIVATIVES						
			<i>Pounds</i>			<i>Pounds</i>
874	Indigo, 20 per cent paste.	59, 60, 124	17,977,120	\$3,916,569	\$0.22	19,996,703
876	Indigo, white	45				
877	Indigo extract	9, 60, 103, 124, X	84,667	47,697	.56	75,211
881	Ciba blue 2B, 2BD	59				
883	Indigo 6B	59				
ANILINE BLACK GROUP						
923	Ursol	77, 109, 157, X	9,186	31,549	3.43	10,087
FOOD DYES						
7	Naphthol yellow S	X				
23	Tartrazine	9, 29, 124, 184, X	60,256	196,837	3.27	66,650
83	Ponceau 3R	124, X				
144	Orange I	9, 124, 184, X				
168	Amaranth	9, 99, 124, 184, X	97,033	269,200	2.77	104,790
502	Guinea green B	124, 184				
505	Light green SF (yellowish)	124, 184				
515	Methyl violet	124				
592	Erythrosine	66, 124, X				
877	Indigo disulfonic acid	124, X				
	Yellow AB	9, 84, 124, 164	6,981	9,788	1.40	12,106
	Yellow OB	9, 84, 124, 164	8,450	16,382	1.94	7,824
	Total food dyes		246,125	855,920	3.48	264,178
PHOTOCHEMICAL DYES						
	Orthochrome T	66				
	Pinacyanole	66				
	All other dyes	60				
	Bacteriological stains and indicators	41, 66, 84, 90, 102, 124, 144, 161, 167				
	Research chemicals	66, 82				
	Total dyes		64,961,433	35,012,400	.54	68,679,000

DYES NOT CLASSIFIED BY SCHULTZ NUMBER

Manufacturers were requested to report separately, in terms of their familiar pre-war designations, the production of dyes not classified by Schultz. The following table is a list of such dyes, together with certain new dyes of American development for which there are no foreign equivalents:

Name of dye	Manufacturers' identification number (according to list on p. 211)	Name of dye	Manufacturers' identification number (according to list on p. 211)
Acid anthracene brown B	81	Chrome green SW	51
Acid anthracene yellow GR	75	Chrome orange RB	129
Acid black BA	8	Chrome red SW	51
Acid blue GG, R	129	Chrome wool blue G	61
Acid naphthol blue black	39	Chrome yellow	29, 129
Acid red OTH	129	Chrome yellow CLU	76
Acid yellow HM, PIW	84	Chrome yellow 5G	8, 39
Alizarin black	194	Chrome yellow DS	39
Alizarin blue IS	194	Chrome yellow SS	81
Alizarin brown 5R	194	Cindiazol blue B	39
Alizarin emeraldole G	81	Cloth red, R 2R	124
Alizarin rubinol R, GW	81	Cotton brown R	8
Alizarin serge blue GS	62	Developed black 2B	129
Alizarol black 3G	8, 124	Diamine bordeaux B	60, 124
Alizarol brown B	124	Diamine catechine	60
Alizarol gray DG	124	Diamine catechine B, 3G	124
Alizarol yellow 3G	124	Diamond green WLU	76
Amaacid red 3B	9	Dianol dark blue B	60
Amanil black FIC	9	Diazine beta black N	124
Amanil fast black L	9	Diazine black DM	124
Amanil fast orange PRZ	9	Diazine black V extra	124
Amanil sky blue	9	Diazine black VN extra	124
Anthracene chrome black DNW	37	Diazine black VZ	124
Anthranol chrome brown EB	126	Diazo bordeaux 7B	60
Anthranol chrome violet ECB	126	Diazo fast red 5BL, 7BL	60
Anthranol chrome yellow DF ex, HSW	126	Diazo indigo blue M	60
Anthrene jade green	129	Diazo seal brown	X
Artificial silk black G	60	Direct black EV	129
Azanol brown N, RY	X	Direct black GX, GXR	39
Azanol dark brown RR	X	Direct blue 3RX, 4R	39
Azanol red brown R	X	Direct brown G2R, G3R	39
Azo acid violet	61	Direct dark green	8
Azo dark green	129	Direct fast black B	39
Azo eosine 2B	129	Direct fast blue B, R	39
Azo fast blue B high conc.	124	Direct fast blue 2B	129
Azo fast blue G high conc.	124	Direct fast gray BL	X
Azo fast blue 2R high conc.	124	Direct fast light blue FF	39
Azo fast violet 2R	124	Direct fast orange R, 2R, RCL	39
Azo violet 2B, BS	8	Direct violet R conc.	X
Benzo chrome brown G	9	Erie brown GB	124
Benzo fast black L ¹	8, 60, 81, 124, 129	Erie fast gray, M, R	124
Benzo fast black LM	75	Eriochrome brown R	39
Benzo fast orange S	60	Fast acid violet ERR ex.	60
Benzo fast pink 2BLU	75	Fast brown R	81
Benzo fast scarlet 4BA	60	Fast chrome brown R	129
Benzo rhoduline red B	60	Fast crimson R	124
Benzol brown R	44	Fast green 6B	37
Brilliant croceine FL	60	Fast mordant blue B	37, 45
Brilliant wool blue N	124	Fast wool violet B	124
Bromo fluorescein	53	Furamine B	156
Buffalo black AF, RB, 8B, 3G	124	Furol DB	X
Buffalo chrome black NS	124	Gloss flux basic blue V	119
Chloramine fast orange GG, G3G, GR	75	Gloss flux basic orange	119
Chlorantine violet	124	Gloss flux basic yellow	119
Chromate brilliant brown R	37	Gloss flux Persian rose	119
Chromate brown	8	Gloss flux red O	119
Chromate brown EBN	61	Guinea fast red BL	60
Chromaven brown orange 2R	9	Helio bordeaux BL	60
Chrome black	29, 45	Hydron pink FF	60, 129
Chrome blue ATX	60	Indanthrene blue BCS	60, 129
Chrome green	8	Indanthrene blue BSP, GFC, GX	129
Chrome green B	39	Indomine navy blue 2BM	126
Chrome green CB	124	Jet black APX	60
		Lake scarlet G	124

¹ Sales of Benzo fast black L were 107,954 pounds, valued at \$178,569, with a production of 134,730 pounds.

Name of dye	Manufacturers' identification number (according to list on p. 211)	Name of dye	Manufacturers' identification number (according to list on p. 211)
Leather yellow	124	Paranol direct violet R	126
Lithol fast orange	113	Permanent red R	176
Midland vat blue MB	59	Pluto black	8
Midland vat cadet blue	59	Pontachrome brown R, SW	60
Naphthol green black B	39	Pontachrome yellow SW	60
Navy blue T	29	Pontamine blue GH conc	60
Nerol 2B	39, 129	Pontamine diazo black H	60
Niagara blue NR	124	Radiant violet ink toner	147
Niagara fast blue RL	124	Red for lake P	X
Nigrosine base B, N, NB, R, 2R	124	Rosanthrene A, R	60
Oil brown	X	Rosanthrene orange	60
Oil brown H, I	84	Safranine 8B	124
Oil brown M	124	Serichrome black WSE	124
Oil maroon O	124	Serichrome green B	124
Oil orange 3 O	X	Silk black 4BF	39
Oil orange RR	44	Solamine blue FF	8, 60, 129
Oil orange conc	9	Solantine red 8BLN	124
Oil orange Y 293	84	Sudan AT, AX, T	34
Oil red	19, X	Sulfanthrene orange R paste	60
Oil red O	189	Sulfanthrene scarlet 2B	60
Oil red PN conc	44	Toluidine red	X
Oil red O	124	Trisulphon brown R	8
Oil scarlet	189	Victoria fast violet 2RL ex	81
Oil soluble yellow	189	Violet 4B	138
Oil yellow AB, OB	84	Violet violet 2R	37
Oil yellow F, 2625	124	Violine	37
Oxamine copper blue RRX	60	Wool black B, 2B	129
Oxydiaminogen OB	124	Wool blue BM, CB, CG	124
Palachrome maroon	X	Wool fast violet 2R	75
Palaside blue R	X	Wool green B	124
Palaside brown B conc	X	Wool navy B	124
Palaside green	X	Zambezi black BG, D, PC	39
Paranol direct brown B	126	Zambezi black D	124
Paranol direct orange GL	126	Zambezi black V ²	39, 60, 124

¹ Sales of Zambezi black V were 223,823 pounds, valued at \$249,682, with a production of 180,317 pounds.

Production and sales of dyes and other coal-tar products, 1924

Common name	Manufacturers' identification number according to list on p. 211	Sales			Production
		Quantity	Value	Unit value	
COLOR LAKES					
Black lakes	45, X				
Blue lakes	12, 24, 30, 38, 45, 56, 60, 64, 69, 83, 86, 91, 94, 100, 110, 119, 153, 158, 159, 165, 174, 175, 176, X, X, X, X, X, X, X, X	Pounds	\$510,899	\$0.51	Pounds 535,817
Brown lakes	30, 38, 45, 69, 100, 158, 159, 174, X	67,591	5,499	.08	69,921
Rosine lakes	12, 24, 30, 38, 56, 64, 69, 83, 86, 91, 94, 100, 110, 153, 157, 158, 159, 165, 174, 175, 176, X, X, X, X, X, X, X, X	625,459	417,550	.67	648,077
Green lakes	12, 24, 30, 38, 60, 64, 69, 79, 83, 86, 91, 94, 100, 110, 153, 158, 159, 165, X, X, X, X, X, X, X, X	366,801	142,596	.39	384,434
Lithol red lakes	12, 24, 30, 60, 63, 69, 83, 86, 91, 94, 96, 100, 110, 153, 157, 158, 159, 165, 174, 176, 189, X, X, X, X, X, X	599,017	395,774	.66	637,961

Production and sales of dyes and other coal-tar products, 1924—Continued

Common name	Manufacturers' identification number according to list on p. 211	Sales			Production
		Quantity	Value	Unit value	
COLOR LAKES—continued					
Maroon lakes.....	5, 12, 24, 30, 38, 56, 60, 64, 83, 86, 91, 96, 100, 106, 110, 115, 157, 158, 159, 165, 174, 176, 189, X, X, X, X, X, X, X, X	Pounds 1, 022, 504	\$298, 998	\$0. 29	Pounds 1, 013, 466
Orange lakes.....	12, 24, 30, 38, 64, 69, 83, 86, 91, 94, 100, 110, 153, 157, 158, 159, 165, 174, 175, 176, X, X, X, X, X, X, X, X	486, 190	132, 321	. 27	497, 305
Para red lakes.....	5, 12, 24, 30, 45, 48, 56, 60, 64, 86, 91, 94, 96, 100, 106, 110, 157, 159, 165, 174, 175, 189, X, X, X, X, X, X, X, X, X, X, X, X	2, 673, 993	952, 427	. 36	2, 619, 770
Red lakes.....	12, 24, 30, 38, 45, 48, 56, 60, 64, 69, 83, 86, 91, 94, 96, 100, 106, 110, 115, 153, 157, 158, 159, 174, 176, 189, X, X, X, X, X, X, X, X, X, X, X, X	981, 903	604, 427	. 62	1, 000, 992
Scarlet lakes.....	5, 12, 24, 30, 38, 56, 64, 69, 83, 86, 91, 96, 100, 106, 110, 115, 153, 157, 158, 159, 165, 174, 176, X, X, X, X, X, X, X, X, X, X, X, X	824, 760	255, 038	. 31	774, 721
Violet lakes.....	12, 24, 30, 38, 45, 64, 69, 83, 84, 86, 91, 94, 100, 110, 153, 158, 159, 165, 174, 176, 189, X, X, X, X, X, X, X, X, X, X, X, X	440, 156	329, 335	. 75	463, 772
Yellow lakes.....	12, 30, 45, 60, 69, 83, 86, 91, 94, 100, 110, 158, 159, 165, 176, 189, X, X, X, X, X, X, X, X, X, X, X, X	356, 232	164, 534	. 46	370, 485
All other color lakes.....	X				
Total color lakes.....		9, 281, 673	4, 045, 799	. 44	9, 343, 147
PHOTOGRAPHIC CHEMICALS					
Diaminophenol hydrochloride.....	188				
p-Hydroxy phenylglycine.....	66				
Hydroquinol.....	116, 194, X	206, 387	230, 374	1. 12	203, 464
Methyl p-aminophenol sulfate (metol).....	66, 194, X				
Total photographic chemicals.....		321, 865	461, 379	1. 43	316, 183
MEDICINALS					
Acetanilide.....	114, 116, 128	330, 988	99, 449	. 30	425, 950
Acetphenetid.	X				
Acriflavine and neutral acriflavine (3:6-diamino-10-methyl acrid ne chloride).....	1, 124				
Aminopyrine.....	118				
Ammonium salicylate.....	87				
Anesthesin. (See Benzocaine.)					
Apothesin (hydrochloride of diethylaminopropyl-cinnamate).....	X				
Arsphenamine.....	1, 57, 108, 112, 118, 143, 163	387	109, 154	282. 05	555
Aspirin (acetyl salicylic acid).....	17, 59, 116, X	1, 264, 254	934, 780	. 74	1, 366, 530
Atophan. (See Cinchophen.)					
Benzocaine (ethyl p-amino benzoate or anesthesin).....	1, 118, X	2, 234	32, 335	14. 47	2, 080
Benzyl succinate.....	156, 164				
Benzyl succinate, sodium salt.....	156				
Bismuth betanaphthol.....	116, 128, 143	1, 020	3, 226	3. 16	
Bismuth tribromophenol.....	70, 116, 128				
Butyn (p-amino benzoyl gamma di normal butyl aminopropanol sulfate).....	1				

Production and sales of dyes and other coal-tar products, 1924—Continued

Common name	Manufacturers' identification number according to list on p. 211	Sales			Production Pounds
		Quantity Pounds	Value	Unit value	
MEDICINALS—continued					
Calcium-cresol sulfonate.....	17.....				
Chloramine T (sodium p-toluene sulfochloramide).	X.....				
Cinchophen (atophan) (phenyl cinchoninic acid).	1, 7, 29, 105, X.....	50, 324	\$398, 167	\$7. 91	56, 003
Creosote benzoate.....	156.....				
Creosote carbonate.....	132.....				
Dichloramine T (p-toluene sulfone dichloramide).	X.....				
Formidine (methylene disalicyclic acid derivative).	X.....				
Guaiacol benzoate.....	156.....				
Guaiacol crystals.....	129.....				
Lithium benzoate.....	114, 156.....				
Luminal (phenylethyl barbituric acid).	17.....				
Luminal sodium (phenylethyl barbituric sodium salt).	17.....				
Magnesium salicylate.....	87.....				
Methyl salicylate. (See Flavors.)	X.....				
Methylene blue.....	X.....				
Methyl violet.....	124.....				
Methylhydroxymethyl ester of salicylic acid.	17.....				
Methylene citryl salicylate.....	17.....				
Miscellaneous salicylates.....	143.....				
Monoglycol ester of salicylic acid.	17.....				
b-Naphthol benzoate.....	70.....				
Neorsphenamine.....	1, 57, 108, 118, 143, 163.....	2, 981	959, 473	321. 86	3, 220
Neocinchophen. (See Tolsyn.)					
Peralga (1-diethylbarbituric-2-amidopyrene).	7.....				
Phenacaine (ethenyl-p-diethoxydiphenylamidine hydrochloride).	118.....				
Phenolphthalein.....	140, X.....				
Phenolsulphonates (calcium, sodium, zinc, etc.).	1, 108, 116, 143.....	188, 743	64, 398	3. 41	107, 644
Procaine (p-amino benzoyl diethyl aminoethanol).	1, 118, X.....	4, 147	130, 082	31. 37	3, 790
Proflavine (3:6-diamino acridine sulfate).	1, 124.....				
Proposote (creosote derivative).	X.....				
Resorcinol monoacetate.....	66.....				
Salicylic acid (salicylic alcohol).	29.....				
Salol (phenyl salicylate).	87, 116.....				
Salophen (acetylparaminophenyl salicylate).	17.....				
Scarlet red.....	124.....				
Silver arspenamine.....	118.....				
Sodium salicylate.....	59, 87, 116, 155, X.....	375, 825	143, 196	. 38	412, 707
Strontium salicylate.....	87.....				
Sulforsphenamine.....	1, 112, 118, 143, 163.....	577	290, 918	504. 19	743
Tolsyn (p-methylphenyl cinchoninic ethyl ester) (neocinchophen).	1, 29.....				
Total medicinals.....		2, 688, 329	5, 178, 099	1. 93	2, 967, 944
FLAVORS					
Coumarin.....	26, 59, 70, X, X.....	109, 378	362, 340	3. 32	129, 111
Ethyl benzoate.....	43, 70, 73, 74, 131, 166, 180, X.....				
Ethyl cinnamate.....	26, 70, 74, 166, 180.....				
Ethyl salicylate.....	70, 74, 166, 180, X, X.....				
Methyl cinnamate.....	26, 70, 74, 166, X.....	1, 333	6, 324	4. 74	
Methyl salicylate.....	59, 74, 87, 116, 155, 166, X, X.....	1, 260, 765	531, 324	. 42	1, 282, 505
Saccharin.....	X, X.....				
Total flavors.....		1, 691, 863	1, 471, 089	. 87	1, 750, 555

Production and sales of dyes and other coal-tar products, 1924—Continued

Common name	Manufacturers' identification number according to list on p. 211	Sales			Production Pounds
		Quantity Pounds	Value	Unit value	
PERFUME MATERIALS					
Acetophenone.....	70, 74, 93, 166, 178	-----	-----	-----	-----
Amyl benzoate.....	74	-----	-----	-----	-----
Amyl cinnamate.....	74	-----	-----	-----	-----
Amyl salicylate.....	70, 73, 74, 87, 93, 166, 178, X.	9, 141	\$12, 363	\$1. 35	8, 692
Anisole (methylphenyl ether).....	74	-----	-----	-----	-----
Aubepine (anisic aldehyde) (see Part IV).	70, 73, 166	-----	-----	-----	-----
Benzophenone.....	70, 74	-----	-----	-----	-----
Benzyl acetate.....	26, 70, 74, 93, 114, 166, 178, X.	28, 674	37, 327	1. 30	28, 390
Benzyl alcohol.....	26, 70, 93, 114, 166, 178, X.	14, 865	20, 504	1. 38	14, 773
Benzyl benzoate.....	70, 74, 93, 116, 166, 178, X.	25, 318	34, 985	1. 38	-----
Benzyl butyrate.....	74	-----	-----	-----	-----
Benzyl cinnamate.....	70, 74, 93, 166, 178	133	631	4. 74	126
Benzyl formate.....	74, 166	-----	-----	-----	-----
Benzyl isoeugenol.....	166	-----	-----	-----	-----
Benzylphenyl acetate.....	166	-----	-----	-----	-----
Benzyl propionate.....	74, 166	-----	-----	-----	-----
Benzylidene acetone.....	114, 166, X.	-----	-----	-----	-----
Bromstyrol.....	74, 166, 178	-----	-----	-----	-----
Butyl phthalate.....	74	-----	-----	-----	-----
Butyl salicylate.....	74	-----	-----	-----	-----
Cinnamic acid.....	70, 73, 74, 178	1, 212	4, 160	3. 43	1, 625
Cinnamic alcohol.....	166	-----	-----	-----	-----
Cinnamic aldehyde.....	26, 70, 73, 166	7, 739	24, 727	3. 20	9, 284
p-Cresyl acetate.....	70, 74, X	-----	-----	-----	-----
p-Cresylphenyl acetate.....	70, 74	-----	-----	-----	-----
Diamyl phthalate.....	74	-----	-----	-----	-----
Dibenzyl ketone.....	70	-----	-----	-----	-----
Dibutyl phthalate.....	98	-----	-----	-----	-----
Diethyl phthalate.....	22, 26, 70, 74, 93, 98, 114, 137, 166, 177, 178, 180, 192, X, X.	1, 750, 510	673, 517	. 38	1, 676, 911
Dimethylbenzyl carbinol.....	70	-----	-----	-----	-----
Dimethyl hydroquinone.....	70	-----	-----	-----	-----
Dimethyl resorcinol.....	166	-----	-----	-----	-----
Diphenylmethane.....	74, 166, 178	-----	-----	-----	-----
Diphenyl oxide.....	26, 59, 166, 178	83, 040	55, 853	. 67	95, 080
Ethyl benzoate.....	177	-----	-----	-----	-----
Ethyl fumarate.....	177	-----	-----	-----	-----
Ethylphenyl acetate.....	166, 180	-----	-----	-----	-----
Ethyl salicylate.....	177	-----	-----	-----	-----
Guaiaecol phenyl acetate.....	70	-----	-----	-----	-----
Hydratropic aldehyde.....	166	-----	-----	-----	-----
Indol.....	70	-----	-----	-----	-----
Isobutyl benzoate.....	74	-----	-----	-----	-----
Isobutyl salicylate.....	166	-----	-----	-----	-----
Isobutyl anthranilate.....	70	-----	-----	-----	-----
Isobutyl indol.....	70	-----	-----	-----	-----
Isobutylphenyl acetate.....	70, 74	-----	-----	-----	-----
Methyl acetophenone.....	74, 166	-----	-----	-----	-----
Methyl anisate.....	166	-----	-----	-----	-----
Methyl anthranilate.....	22, 59, 70, 93, 166, 178	-----	-----	-----	-----
Methyl benzoate.....	70, 74, 166, X	-----	-----	-----	-----
p-Methylbenzyl acetate.....	70	-----	-----	-----	-----
p-Methylbenzyl anthranilate.....	70	-----	-----	-----	-----
Methyl-p-cresol (p-cresyl methyl ether).	74, 166	-----	-----	-----	-----
Methyl guaiaecol.....	166	-----	-----	-----	-----
Methyl indol.....	166	-----	-----	-----	-----
2-Methyl-5-isopropyl acetophenone.	74	-----	-----	-----	-----
Methyl methyl anthranilate.....	70, 74, 166	-----	-----	-----	-----
Methylphenyl acetate.....	70, 74, 166, 178, X, X.	805	4, 606	5. 72	724
Methylphenyl glycidate.....	70	-----	-----	-----	-----
p-Methyl quinoline.....	70	-----	-----	-----	-----
Methyl-p-tolyl ketone.....	70	-----	-----	-----	-----
b-Naphthyl anthranilate.....	70	-----	-----	-----	-----
b-Naphthyl isobutyl ether.....	74	-----	-----	-----	-----
Nerolin (b-naphthol ethyl ether).....	74, 166	-----	-----	-----	-----
Nonyl anthranilate.....	70	-----	-----	-----	-----
Phenetole (ethylphenyl ether).....	74	-----	-----	-----	-----
Phenyl acetate.....	59, 70	-----	-----	-----	-----

Production and sales of dyes and other coal-tar products, 1924—Continued

Common name	Manufacturers' identification number according to list on p. 211	Sales		Unit value	Production
		Quantity	Value		
		Pounds			Pounds
Phenylacetic acid.....	74.....				
Phenylacetic aldehyde.....	93, 166, 178.....				
Phenylacetic ketone.....	70.....				
Phenylethyl acetate.....	70, 93, 166, 178.....	33	\$389	\$11.79	28
Phenylethyl alcohol.....	26, 59, 70, 93, 166, 178.....				
Phenylethyl benzoate.....	166.....				
Phenylethyl formate.....	166.....				
Phenyl propyl alcohol.....	150.....				
Phenylvinylethylenemethyl ketone.....	166.....				
Phenylethyl phenyl acetate.....	166.....				
Phenylglycol acetate.....	70.....				
Santalylphenyl acetate.....	70.....				
Skatol (methyl indol).....	70.....				
Tetrahydroparamethyl quinoline.....	70.....				
Yara yara (b-naphthol methyl ether).....	74, 166.....				
Total perfume materials.....		1,945,483	945,773	.49	1,895,267
Synthetic tanning materials.....	99, 193, X.....	12,745,453	8,818,041	.69	12,778,115
Synthetic phenolic resins.....	15, 16.....				

TABLE 25.—Production of dyes, by groups, according to unit value

Group	1924		1923		1922		1921	
	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total
0-25 cents.....	31,725,493	46.194	44,651,483	47.670	28,728,401	44.449	7,832,696	20.079
26-50 cents.....	13,853,508	20.172	15,205,298	16.234	10,237,825	15.840	7,941,977	20.300
51-75 cents.....	9,105,018	13.257	12,717,546	13.577	8,418,271	13.025	6,843,004	17.542
\$0.76-\$1.....	4,259,988	6.203	8,604,351	9.186	6,992,018	10.818	4,762,791	12.209
\$1.01-\$1.50.....	6,283,687	9.149	8,207,420	8.762	6,833,577	10.573	6,329,421	16.226
\$1.51-\$2.....	1,774,660	2.584	2,318,343	2.475	2,010,413	3.111	3,321,581	8.515
\$2.01-\$3.....	1,118,953	1.629	1,244,493	1.329	838,849	1.298	1,220,966	3.130
Over \$3.....	557,693	.812	718,590	.767	572,833	.886	756,254	1.939
Total.....	68,679,000	100	93,667,524	100	64,632,187	100	39,008,690	100

EMPLOYEES AND RATES OF PAY

The number of employees receiving specified rates of pay on December 18, 1924, or on the nearest representative date for which this information could be obtained, as reported by 158 of the 193 firms manufacturing coal-tar products in 1924, is contained in Table 26. The 35 firms not reporting either conducted a business in which coal-tar products were not the primary articles of manufacture or they did not have separately organized departments dealing therewith.

According to the Bureau of the Census, the number of firms engaged in the manufacture of coal-tar colors and other products in 1914 was 7, with 528 employees, distributed as follows: Salaried employees, 130; wage earners (average number), 398. In 1924 there were 158 firms reporting 12,569 employees engaged in manufacturing operations. This represents a decrease of 2,272 employees from 1923, which in turn showed a decrease of 1,418 from 1922.

Chemists and technically trained men in 1924 constituted 13.4 per cent of all employees as compared with 12.7 per cent in 1923 and 10.8 per cent in 1922. Of the 1,684 men of this group in 1924, 30.82 per cent received between \$50 and \$75 per week, 24.23 per cent \$75 and over, 9.32 per cent between \$45 and \$50, and 9.62 per cent between \$40 and \$45. For men without technical training the scale of compensation was as follows: 26.56 per cent received between \$25 and \$30 per week, 22.52 per cent between \$30 and \$35, 19.93 per cent between \$20 and \$25. In general, chemists and technically trained men received higher rates of pay in 1924 than in 1923, while men without technical training received lower rates. Table 26 compares specified rates of pay of technically trained men with those of men not having such training. Among the technically trained men the increase in terms of percentages in the pay of each group was as follows: 5.35 per cent in the group receiving between \$40 and \$45 and 3.46 per cent in the group receiving between \$50 and \$75. Of men without technical training there was an average decrease of about 9 per cent distributed between the two groups receiving, respectively, \$30 but under \$35, and \$35 but under \$40 per week. These two groups in 1923 showed about a 25 per cent increase in weekly wages over 1922.

As stated in previous reports, the dye and coal-tar chemical industry has probably a larger proportion of technically trained men than any other manufacturing industry in the United States.

TABLE 26.—*Employees and rates of pay, dye and coal-tar chemical industry, 1924*

Wages per week	Number of employees at each specified wage engaged in manufacturing operations			Percentage receiving each specified wage		Percentage receiving each specified wage or more	
	Chemists and technically trained men	Men without technical training	All employees	Chemists and technically trained men	Men without technical training	Chemists and technically trained men	Men without technical training
Under \$10.....		42	42		0.39		100.00
\$10 but under \$15.....	6	227	233	0.35	2.09	100.00	99.62
\$15 but under \$20.....	23	541	564	1.37	4.97	99.64	97.52
\$20 but under \$25.....	55	2,170	2,225	3.27	19.93	93.28	92.55
\$25 but under \$30.....	94	2,891	2,985	5.58	26.56	95.02	72.62
\$30 but under \$35.....	130	2,452	2,582	7.72	22.52	89.44	46.06
\$35 but under \$40.....	130	1,433	1,563	7.72	13.17	81.72	23.53
\$40 but under \$45.....	162	554	716	9.62	5.09	74.00	10.37
\$45 but under \$50.....	157	336	493	9.32	3.09	64.38	5.28
\$50 but under \$75.....	519	215	734	30.82	1.97	55.05	2.20
\$75 and over.....	408	24	432	24.23	.22	24.23	.22
Total.....	1,684	10,885	12,569	100	100		

TABLE 26.—*Employees and rates of pay, dye and coal-tar chemical industry, 1924—Continued*

Wages per week	Percentage receiving each specified wage					
	Chemists and technically trained men			Men without technical training		
	1924	1923	Increase	1924	1923	Increase
Under \$10.....		100.00	-----	100.00	100.00	-----
\$10 but under \$15.....	100.00	99.89	0.11	99.62	99.43	0.19
\$15 but under \$20.....	99.64	99.04	.60	97.52	96.74	.78
\$20 but under \$25.....	98.28	97.07	1.21	92.55	90.78	1.77
\$25 but under \$30.....	95.02	93.14	1.88	72.62	75.20	¹ 2.58
\$30 but under \$35.....	89.44	87.30	2.14	46.06	55.23	¹ 9.17
\$35 but under \$40.....	81.72	78.11	3.61	23.53	33.24	¹ 9.71
\$40 but under \$45.....	74.00	68.65	5.35	10.37	16.85	¹ 6.48
\$45 but under \$50.....	64.38	61.42	2.96	5.28	8.30	¹ 3.02
\$50 but under \$75.....	55.05	51.59	3.46	2.20	3.34	¹ 1.14
\$75 and over.....	24.23	23.32	.91	.22	.15	.07

¹ Decrease.

RESEARCH WORK

Of the 193 firms engaged in the manufacture of dyes and other coal-tar chemicals in 1924, 54 had separately organized research laboratories for the solution of technical problems and for the development or discovery of new products. The total cost of the research work carried on in these laboratories, together with that done in laboratories not separately organized for research, was \$2,148,924. This figure is about the same as the amount (\$2,085,901), expended in 1923. The Tariff Commission's census includes in 1924, as in 1923, not only the total cost of the research work carried on by the companies reporting, but the net cost of such work chargeable to coal-tar products alone. The \$2,006,628 reported as the net cost in 1924 is doubtless an understatement of the real cost of experimental work, since the figures do not include, in all cases, the cost of research forming a part of manufacturing operations but not charged against research on the books of the companies.



PART III

DYES IMPORTED FOR CONSUMPTION IN THE
UNITED STATES, 1924

PART III

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1924

INTRODUCTION

Since 1919 the United States Tariff Commission has compiled a detailed census of dye imports similar to that published by the Department of Commerce under the title "Artificial Dyestuffs Used in the United States (fiscal year 1913-14)," commonly known as the "Norton Import Census."

The commission first compiled such statistics for use in the administration of section 501, title 5, of the tariff act of September 8, 1916, which made the continuance of specific duties on coal-tar products, after September 8, 1921, dependent upon the production in the United States of as much as 60 per cent in value of the consumption of these products. As the information was found to be of direct value to manufacturers, consumers, and importers, as well as to the commission itself, in considering the tariff aspects of the coal-tar chemical industry, the annual census of imports has been continued.

Imports for consumption, including warehouse withdrawals for dyes and other products within paragraphs 27 and 28 for the year 1924, have been compiled and published each month under a cooperative arrangement between the respective Chemical Divisions of the Department of Commerce and the Tariff Commission. The dye import figures obtained and published under this arrangement were rechecked and verified before they were tabulated in final figures for the year 1924, and for this reason do not agree in certain cases with the preliminary figures as published in the monthly reports.

In tabulating the dye statistics the commission has followed in the main "Schultz Farbstoff Tabellen" and the "Colour Index," issued by the British Society of Dyers and Colourists, as well as the Norton census and other sources of information in the files of the Tariff Commission.

Dyes identified by Norton as "a," "b," and "c," classes under a given Schultz number are listed under that number (without subdivision) except in a few instances where they had been incorrectly designated. Dyes included under these "a," "b," and "c" classes are not always chemically identical with the original Schultz types. Such dyes as could not be identified by Schultz numbers are classified by the ordinary method of application, as follows: Acid, basic, direct, lake and spirit-soluble, mordant and chrome, sulphur, and vat. In many cases the classification of a dye by its method of application is arbitrary, as certain colors may be applied by either of two methods.

The rate of exchange used in converting foreign invoice values to United States currency was either the rate given on the invoice, or, in comparatively few cases, the exchange value published by the Treasury Department for the month in which consular certification occurred.

SUMMARY OF IMPORTS OF DYES IN 1924

The total imports of coal-tar dyes in 1924 was 3,022,539 pounds with an invoice value of \$2,908,778, as compared with 3,098,193 pounds in 1923, with an invoice value of \$3,151,363. (For comparison of imports with domestic production and effect of change in duty on imports, see pp. 41-43.)

The following table shows the country of shipment of coal-tar dyes imported for consumption in recent years.

TABLE 27.—Imports of dyes into the United States, by country of shipment, 1920-1924

Country of shipment	Percentage of total quantity			
	1924	1923	1921	1920
Germany.....	50	47	48	51
Switzerland.....	30	28	41	34
Italy.....	5	12	3	(1)
England.....	4	4	7	6
Canada.....	4	(1)	(1)	(1)
France.....	3	6	(1)	(1)
Belgium.....	2	(1)	(1)	(1)
Holland.....	2	(1)	(1)	(1) ¹
All other countries.....	.....	3	1	9

¹ Included in "all other countries."

IMPORT STATISTICS

Table 30, page 88, shows the quantity and the value (when publishable) of individual dyes imported in 1924. Table 28 is a summary of dyes imported from 1921 to 1924, inclusive, classified according to method of application. Table 29 compares the volume of the 1924 imports of the leading dyes in each class by application with corresponding imports in the period 1921 to 1923 and in the fiscal year 1914.

TABLE 28.—Dyes imported into the United States, classified by method of application, 1921-1924

Class	1924		1923	
	Pounds	Per cent of total	Pounds	Per cent of total.
Acid.....	324, 538	10. 74	544, 048	17. 56
Vat:				
(a) Indigo.....	5, 471	. 18	.....	.....
(b) Vat (other than indigo).....	1, 493, 851	49. 43	1, 207, 554	38. 98
Total.....	1, 499, 322	49. 61	1, 207, 554	38. 98
Mordant and chrome:				
(a) Alizarin.....	42, 695	.....	27, 716	. 89
(b) Mordant and chrome.....	371, 207	.....	425, 699	13. 74
Total.....	413, 902	13. 69	453, 415	14. 63
Direct.....	421, 538	13. 95	527, 014	17. 01
Sulphur.....	87, 764	2. 90	114, 023	3. 68
Basic.....	249, 068	8. 24	210, 896	6. 81
Spirit-soluble and color-lake.....	17, 334	. 57	23, 213	. 75
Unidentified, unclassified special.....	9, 073	. 30	18, 030	. 58
Total.....	3, 022, 539	100. 00	3, 098, 193	100. 00

TABLE 28.—Dyes imported into the United States, classified by method of application, 1921 to 1924—Continued

Class	1922		1921	
	Pounds	Per cent of total	Pounds	Per cent of total
Acid.....	601,395	15.10	1,455,823	34.24
Vat:				
(a) Indigo.....	505	.01	70,975	1.66
(b) Vat (other than indigo).....	1,548,519	38.89	1,045,370	24.59
Total.....	1,549,024	38.90	1,116,345	26.25
Mordant and chrome:				
(a) Alizarin.....	27,086	.68	136,283	3.58
(b) Mordant and chrome.....	689,704	17.32	559,678	12.78
Total.....	716,790	18.00	695,961	16.36
Direct.....	671,621	16.86	537,664	12.64
Sulphur.....	194,883	4.89	220,938	5.20
Basic.....	155,084	3.89	163,527	3.84
Spirit-soluble and color-lake.....	76,853	1.93	43,553	1.02
Unidentified, unclassified special.....	16,981	.43	19,100	.45
Total.....	3,982,631	100.00	4,252,911	100.00

TABLE 29.—Dyes of each class, according to method of application, imported in largest quantity in the calendar year 1924, compared with corresponding imports in 1923, 1922, 1921, and in the fiscal year 1914

Schultz No.	Class and name of dye	1924	1923	1922	1921	1914
	ACID DYES					
		<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
523	Fast green.....	30,721	17,190	52,498	22,619	14,347
506	Erioglaucine.....	28,655	38,254	25,852	16,004	66,526
543	Patent blue.....	23,606	66,279	49,136	42,708	196,228
22	Xylene light yellow.....	23,247	46,886	12,937	60,422	23,074
220	Palatine black.....	12,050	33,500	11,436	14,850	299,274
	Alizarin rubinol.....	11,514	48,826	26,457	(¹)	10,917
182	Brilliant sulphon red.....	11,373	7,414	9,557	7,235	4,871
545	Patent blue A.....	10,715	11,872	3,436	16,170	63,744
19	Fast light yellow.....	9,625	6,211	25,555	23,315	38,908
265	Sulphon cyanine black.....	9,484	15,543	14,858	615	69,590
860	Cyanantbröl G.....	7,817	4,618	20,648	12,713	-----
	Polar red.....	7,756	15,031	14,926	2,579	2,821
531	Eriocyanine.....	7,716	19,202	14,808	16,808	25,091
613	Quinoline yellow.....	6,663	7,168	6,955	23,000	15,354
	Brilliant milling blue B.....	6,200	8,540	872	2,175	9,966
672	Azo carmine.....	6,200	7,218	9,327	8,684	17,500
	VAT DYES ²					
761	Indanthrene golden orange R.....	112,339	79,717	78,145	56,390	50,496
901	Ciba violet B.....	82,598	64,517	131,661	21,987	20,836
760	Indanthrene golden orange G.....	76,046	67,265	73,305	33,423	20,092
569	Algol brown B.....	71,313	55,081	16,778	6,640	1,596
842	Indanthrene blue GCD.....	68,450	70,546	16,802	201,835	478,980
831	Indanthrene red BN.....	58,520	16,825	27,353	21,331	6,056
	Hydron pink FF.....	50,460	³ 55,428	³ 20,250	-----	-----
	Hydron brown.....	42,681	4,065	754	-----	1,600
907	Ciba scarlet.....	40,200	37,524	33,246	10,695	22,265
849	Indanthrene yellow.....	39,771	87,946	15,507	49,609	12,683
	Indanthrene blue BCS.....	39,350	12,240	239,085	-----	-----
	Indanthrene pink B.....	39,131	13,348	18,680	(⁴)	602
913	Helindone orange R.....	37,077	22,571	9,240	919	14,511
759	Anthraflavone G.....	35,936	27,721	20,594	10,594	7,143
844	Algol blue 3G.....	32,396	5,516	5,315	4,623	9,191
832	Indanthrene violet RN.....	31,925	20,436	1,000	1,050	11,667
833	Algol olive R.....	30,665	1,050	1,464	337	13,334
918	Helindone red 3B.....	29,038	21,916	32,819	17,566	27,874
919	Ciba bordeaux B.....	29,000	35,714	33,621	4,625	899
838	Indanthrene blue RS.....	28,814	38,235	39,999	28,908	187,379

¹ Included in Schultz No. 856.
² Single strength.

³ Includes Hydron pink FB.
⁴ Included in Schultz No. 873.

TABLE 29.—*Dyes of each class, according to method of application, imported in largest quantity in the calendar year 1924, compared with corresponding imports in 1923, 1922, 1921, and in the fiscal year 1914—Continued*

Schultz No.	Class and name of dye	1924	1923	1922	1921	1914
MORDANT AND CHROME DYES						
		<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
862	Alizarine blue black	78,195	70,917	22,277	43,277	54,706
778	Alizarin (synthetic)	42,695	27,716	27,086	136,283	202,392
858	Alizarin saphirol B	40,600	26,615	46,596	28,606	77,148
855	Alizarin pure blue B	20,729	9,132	14,993	12,796	19,471
856	Alizarin astrol	16,117	11,224	8,155	24,657	-----
779	Alizarin orange	15,202	8,444	15,523	5,854	14,239
551	Eriochrome azurol BC	12,664	-----	43,191	19,344	21,060
782	Alizarin brown	10,996	14,531	4,596	20,700	115,586
784	Alizarin SX, GD	11,773	8,206	7,795	12,205	-----
	Metachrome blue black	9,500	7,000	3,251	725	399
785	Alizarin RG, GI	9,385	12,528	6,500	18,266	49,021
804	Alizarin blue S	8,152	7,948	32,916	21,521	21,231
	Omega chrome brown	8,003	11,511	8,570	5,486	-----
865	Alizarin direct green G	7,636	16,241	11,669	36,534	2,000
	Anthracene chromate brown EB	6,669	8,420	12,326	12,694	9,548
	Eriochrome flavine A	6,614	10,713	12,293	110	-----
854	Alizarin viridine DG, FF	5,778	17,217	25,910	9,499	-----
622	Delphine blue B	5,597	2,001	19,323	13,842	-----
DIRECT DYES						
	Chlorantine fast brown	30,202	13,558	7,715	4,589	-----
449	Trisulphon brown B	24,020	26,980	45,697	38,558	16,781
273	Diaminogene blue	23,970	88,778	22,420	19,182	8,308
	Chlorantine fast blue	17,268	-----	12,898	5,070	-----
392	Toluylene orange	16,818	14,382	36,920	523	67,632
457	Trisulphon brown GG	14,754	16,150	37,648	22,872	7,562
274	Diaminogene B	13,951	32,903	8,527	7,864	313,629
204	Diphenyl fast brown GNC	13,781	10,126	9,797	969	992
	Diamine fast orange	11,763	17,793	8,719	6,261	17,387
358	Diphenyl red	11,608	21,160	33,945	4,036	14,305
339	Brilliant orange	11,300	3,821	-----	160	6,321
348	Diphenyl brown BN	10,471	17,534	2,598	-----	13,471
	Benzo fast black L	7,848	4,539	2,989	4,912	100,268
	Diazo indigo blue 4GL	7,758	2,482	841	277	-----
	Chlorantine fast yellow	7,602	2,205	9,808	3,637	-----
681	Direct gray R	6,801	2,172	12,608	11,155	-----
	Diazophenyl black	6,614	5,407	6,172	1,415	441
	Diamine catechine	6,282	6,643	9,418	7,545	66,876
	Diamine brilliant scarlet S	6,000	2,508	4,152	972	5,409
BASIC DYES						
573	Rhodamine B (single strength)	97,254	29,083	5,077	10,890	59,354
571	Rhodamine 6G (single strength)	57,375	31,242	13,545	10,069	37,515
606	Phosphine	24,300	42,176	51,711	21,325	168,225
705	Indamine 6R	7,900	3,500	2,800	9,946	66,170
618	Thioflavine T	6,842	20,283	6,765	7,297	35,224
609	Homophosphine	4,860	2,520	955	918	78,127
559	Victoria blue B	4,533	1,722	3,442	12,342	127,769
608	Euchrysin	4,525	9,483	3,476	872	15,403
516	Crystal violet	4,239	3,738	4,331	1,450	51,872
603	Aeridine orange	4,031	9,349	711	1,613	2,336
SULPHUR DYES						
	Cross dye green	35,246	26,242	27,831	51,074	100
	Thionol brown	16,060	28,802	48,750	20,632	-----
	Thionol brilliant blue	6,001	-----	3,757	1,884	-----
709	Pyrogene green 2G	4,630	-----	6,503	1,947	298
746	Katigene green	4,409	4,283	11,397	6,543	63,929

⁵ Figures from the Department of Commerce.

The following table gives the stocks of coal-tar dyes and intermediates remaining in bonded warehouse for each month since August 31, 1924, as published in the Monthly Summary of Foreign Commerce by the Department of Commerce.

Dyes remaining in bonded customs warehouse, August 31, 1924-March 31, 1925

Date	Coal-tar dyes and colors	Coal-tar intermediates
	<i>Pounds</i>	<i>Pounds</i>
Aug. 31, 1924.....	507, 338	1, 081, 287
Sept. 30, 1924.....	559, 661	1, 111, 656
Oct. 31, 1924.....	552, 556	1, 050, 037
Nov. 30, 1924.....	553, 760	1, 031, 460
Dec. 31, 1924.....	575, 051	1, 086, 108
Jan. 31, 1925.....	571, 371	952, 202
Feb. 28, 1925.....	566, 038	961, 406
Mar. 31, 1925.....	653, 020	1, 050, 539

KEY TO ABBREVIATIONS USED IN TABLE 30

1. THE SIX LEADING GERMAN COMPANIES

- A..... Actien-Gesellschaft für Anilin-Fabrikation, Berlin. Founded 1873.
- B..... Badische Anilin- und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
- By..... Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
- C..... Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
- K..... Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870.
- M..... Farbwerke, vormals Meister Lucius & Brüning, Höchst-on-the-Main. Founded 1862.

2. THE SMALLER GERMAN COMPANIES

- BK..... Leipziger Anilinfabrik Beyer & Kegel, Fürstenberg, near Leipzig. Founded 1882.
- CG..... Chemikalienwerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1881.
- CJ..... Carl Jäger G. m. b. H., Anilinfarbenfabrik, Düsseldorf. Founded 1823.
- GrE..... Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
- L..... Farbwerk Mühlheim, vormals A. Leonhardt & Co., Mühlheim-on-the-Main. Founded 1879.
- tM..... Chemische Fabriken, formals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
- WD..... Wülfig, Dahl & Co., A. G., Barmen. Founded 1842.
- A-S Co... Arzberger & Schöpff & Co., Eisenach.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES

- CN..... Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917.
- FA..... Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
- NF..... Niederländische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
- LG..... Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
- P..... Société Anonyme des Matières colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL

- DH..... Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
- G..... Anilinfarben-und-Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
- I..... Gesellschaft für chemische Industrie. Founded 1885.
- S..... Chemische Fabrik, vormals Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES

Bro.....	Brotherton and Co. (Ltd.), City Chambers, Leeds.
B. A. C....	British Alizarine Co. (Ltd.), Manchester.
B. C.....	British Celanese (Ltd.), London.
B. D.....	British Dyestuffs Corporation (Ltd.), London.
Cl. Co....	The Clayton Aniline Co. (Ltd.), Clayton, Manchester.
C. V.....	The Colne Vale Dye and Chemical Co. (Ltd.), Milnsbridge, Huddersfield.
Hol.....	L. B. Holliday and Co. (Ltd.), Huddersfield.
Scot.....	Scottish Dyes (Ltd.), Grangemouth.
Q.....	Importations of unknown source, through dealers in colors.

TABLE 30.—Imports of dyes, calendar year 1924

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
	Total		<i>Pounds</i> 3,022,539	\$2,908,778
6	Martius yellow		100	
	Martius yellow crystals (water soluble)	A		
10	Stilbene yellow		325	
	Mikado yellow	A		
	Stilbene yellow 3GX	B		
19	Fast light yellow		9,625	9,429
	Fast light yellow 2G	By		
	Fast light yellow 3G	By		
	Kiton fast yellow 3G	I		
22	Xylene light yellow		23,247	21,160
	Xylene light yellow 2G conc.	S		
	Xylene light yellow R conc.	S		
	Supra light yellow 2GL	By		
26	Dianil yellow R		100	
	Triazogene orange R pdr.	GrE		
35	Orange G		110	
	Alizarin yellow G	By		
48	Alizarin yellow 2G paste		500	
	Orseille red	M		
52	Orseille red V		11	
	Alizarin yellow R	P		
58	Ultra orange R		1,500	
	Victoria violet	S		
61	Dahlia violet		4	
	Azo acid blue	Q		
63	Azo acid blue B conc.		500	
	Sorbin red	S		
64	Sorrel red X		500	
	Amidonaphthol red 6B	B		
66	Amidonaphthol red N2B		24	
	Helio fast red	CN		
73	Stone fast scarlet RN pdr		20	
	Tannin orange	B		
74	Tannin orange R		130	
	Brilliant cochineal	C		
81	Brilliant wool scarlet PG		132	
	Brilliant cochineal 4R	K		
82	Ponceau 2R		800	
	Scarlet 2R	C		
88	Acid anthracene brown		2,827	
	Acid anthracene brown PG	S		
	Acid anthracene brown WSG	By		
94	Azo eosine		2,500	
	Guinea fast red 2R	By		
118	Geranine		1,018	
	Brilliant geranine B	A		
	Geranine G	By		
120	Salmon red		10	
121	Erica B		1,180	1,778
	Cotton pink BN	A		
	Erica B conc.	B		
	Erica B extra	S		
122	Erica G		100	
	Cotton pink GN	A		
124	Diazine green S		50	
	Janus green B	B		
125	Diazine black		200	
	Diazine black G	M		
		K		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
			<i>Pounds</i>	
126	Indoine blue R.....		330	
	Indoine A extra.....	G		
139	Orange IV.....		10	
	New yellow extra conc.....	By		
140	Curcumeine.....		5,395	\$5,968
	Chromocitronine R.....	DII		
	Chromocitronine V.....	DH		
	Jasmine, high conc.....	G		
141	Azo yellow.....		200	
	Indian yellow FF.....	C		
143	Tropaeoline.....		11	
	Mandarin yellow.....	Q		
158	Chrome brown RR.....		2,204	
	Chrome brown RVV.....	G		
160	Fast brown N.....		22	
	Reddish brown castor.....	Q		
166	Naphthol red GR.....	B	10	
175	Acid ponceau.....		1,100	
	Acid ponceau E.....	G		
177	Mordant yellow.....		2,903	2,322
	Mordant yellow G.....	B		
	Milling yellow O.....	C		
	Milling yellow O.....	M		
	Milling yellow O3G.....	A		
	Milling yellow GA.....	A		
150	Eriochrome blue black B.....		1,663	
	Eriochrome blue black BC.....	G		
	Eriochrome blue black G.....	G		
152	Brilliant sulphon red.....		11,373	11,253
	Brilliant sulphon red B.....	S		
	Brilliant sulphon red 10B.....	S		
	Fast sulphon violet 5BS.....	S		
153	Eriochrome black T.....	G	200	
194	Thiazine red R.....		2,305	
	Chicago red III.....	G		
	Trident red RXX.....	B		
205	Diphenyl chrysoine RR.....		498	
	Diphenyl chrysoine RRC.....	G		
206	Diphenyl catechine.....		4,250	
	Diphenyl catechine G supra.....	G		
207	Diphenyl fast brown G.....		13,781	
	Diphenyl fast brown GF.....	G		
	Diphenyl fast brown GNC.....	G		
211	Resorcin brown.....		335	
	Resorcin brown F.....	K		
217	Agalma black 10B.....		92	
	Agalma black 10BX.....	B		
	Fancy black.....	Q		
220	Palatine black.....		12,050	6,341
	Pilatus black SF.....	B		
	Wool black GRF.....	A		
	Wool black 6B.....	A		
221	Anthracene acid brown G.....		10	
222	Janus yellow G.....		400	
	Yellow JG.....	M		
224	Cloth red G.....	By	50	
227	Brilliant croceine.....		225	
	Brilliant croceine 3BX extra.....	K		
	Cotton scarlet extra.....	B		
232	Sudan IV.....		100	
	Biebrich scarlet R medicinal.....	K		
247	Scarlet.....		20	
	Imperial scarlet 3B.....	By		
257	Sulphonyaniline G.....	By	100	
264	Fast sulphon black F.....	S	25	
265	Sulphonyaniline black.....		9,484	
	Acid milling black B.....	G		
	Sulphonine black B.....	S		
266	Naphthylamine black.....		50	
	Naphthylamine black D.....	C		
272	Brilliant black.....		25	
	Naphthol black BGN conc.....	C		
273	Diaminogene blue.....		23,970	18,645
	Blue NA.....	C		
	Developing blue 2R.....	A		
	Diaminogene blue NA.....	C		
	Diazanil blue BB, RR.....	M		
	Diazo blue 2R.....	L		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
274	Diaminogene.....		<i>Pounds</i> 13,951	\$11,146
	Black extra.....	C		
	Black BR.....	By		
	Developing black B.....	C		
	Diaminogene extra.....	C		
	Diazo fast black MG.....	By		
279	Diazo indigo blue 2RL, 3RL.....	By		3,923
	Benzo fast scarlet.....			
	Benzo fast scarlet 4BS, 5BS.....	By		
	Benzo fast scarlet GS.....	By		
283	Direct fast scarlet SE.....	I		25
	Bismark brown.....			
284	Leather brown A.....	C		53
	Bismark brown 2R.....			
	Vesuvine BL.....	B		
293	Vesuvine BLX.....	B		1,543
	Milling red.....			
296	Acid milling red G conc.....	G		5,875
	Cotton yellow.....			
304	Benzo fast yellow RL.....	By		1,794
	Fast cotton yellow RL.....	A		
	Chrysophenine G.....			
308	Direct yellow CH.....	Q		350
	Pyramine yellow GX.....	B		
	Diazo black.....			
313	Developing black OB.....	C		302
	Developing black OT.....	C		
315	Congo rubine.....			50
	Congo rubine B.....	By		
	Congo orange.....	K		
319	Congo orange G.....	A		3,550
	Diamine scarlet.....			
	Benzo scarlet BC.....	By		
	Diamine brilliant Bordeaux R.....	C		
	Diamine scarlet 3B.....	C		
320	Universal Bordeaux C.....	C		50
	Bordeaux.....			
325	New Bordeaux RX.....	B		25
	Columbia blue R.....	A		
326	Oxydiamine violet.....			502
	Benzo violet O.....	By		
	Oxydiamine violet BF.....	C		
327	Diamine violet N.....			40
	Universal violet C.....	C		
330	Zambesi brown.....			70
	Zambesi brown 2G.....	A		
	Zambesi brown 4R.....	A		
332	Benzo fast red.....			1,600
	Benzo fast red 8BL.....	By		
	Fast cotton red 8BL.....	A		
339	Brilliant orange G.....			11,300
	Diamine orange B.....	C		
343	Diamine fast red.....			916
	Diamine fast red 8BL.....	C		
344	Diamine brown.....			630
	Cutch brown 2R conc.....	S		
348	Universal dark brown C.....	C		10,471
	Diphenyl brown BN.....			
	Diphenyl brown BBNC.....	G		
349	Diphenyl brown GS.....	G		40
	Diamine brown B.....			
	Universal olive brown C.....	C		
358	Diphenyl red.....			11,608
	Acetopurpurine SB.....	A		
	Chloramine red SBS.....	By		
	Toluylene red.....	Gr-E		
362	Toluylene orange R conc.....	S		50
	Benzo purpurine 4B.....			
363	Cotton red 4BX.....	B		1,460
	Universal scarlet C.....	C		
364	Diazo brilliant black.....			331
	Diazo brilliant black B pdr.....	By		
366	Deltapurpurine.....			1,322
	Deltapurpurine 5B.....	By		
368	Brilliant purpurine.....			200
	Brilliant purpurine 10B.....	A		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
			<i>Pounds</i>	
370	Brilliant Congo R		150	
	Brilliant Congo R	A		
	Brilliant Congo R	S		
373	Congo orange R		3,299	\$2,888
	Congo orange R	A		
	Congo orange R	By		
	Diamine orange F	C		
385	Oxamine blue		100	
	Minaxo blue 4RX	B		
387	Columbia blue		100	
	Columbia blue G	A		
392	Toluylene orange		16,818	16,651
	Direct fast orange K	I		
	Pyrazol orange G conc	S		
	Toluylene fast orange GL	By		
400	Acid anthracene red		3,002	2,387
	Acid anthracene red 3B	By		
	Acid anthracene red 5BL	G		
	Acid milling red R conc	G		
	Brilliant milling red R	C		
415	Dianil blue G		270	
	Universal light blue C	C		
418	Diamine brilliant blue G		135	
423	Chicago blue B		30	
	Universal steel blue C	C		
424	Chicago blue 6B		235	186
	Diamine sky blue FF	C		
	Dianil pure blue PH	M		
	Minaxo pure blue 6B high conc	B		
435	Janus brown		50	
	Janus brown B	M		
448	Diamine bronze G		675	
449	Trisulphon brown		24,020	
	Trisulphon brown B conc	S		
456	Benzo fast blue		6,471	
	Benzo fast blue 4GL	By		
	Benzo light blue 4GL	By		
457	Trisulphon brown GG		14,754	
	Trisulphon brown GG conc	S		
459	Benzo black blue G		30	
	Universal dark blue C	C		
462	Direct deep black EW		325	
	Cotton black RW extra	B		
	Union black S	C		
463	Cotton black E extra		25	
471	Chloramine blue 3G		1,631	
	Polyphenyl blue GC	G		
474	Oxamine green B		130	
	Minaxo green BX	B		
	Universal dark green C	C		
476	Benzamine brown 3GO		1,326	461
	Benzochrome brown G	By		
	Cupranil brown G	I		
	Oxydiamine brown KRS	C		
477	Congo brown G		25	
493	Auramine		1,500	
	Auramine N conc	S		
494	Auramine G		336	
	Auramine G	By		
	Auramine G	I		
495	Malachite green conc		25	
496	Setoglaucine		3,867	
	Setoglaucine 753	G		
	Setoglaucine	BD		
498	Turquoise blue		26	
	Turquoise blue BB	By		
	Turquoise blue G	By		
500	Setocyanine		441	
	Setopaline conc	G		
501	Brilliant glacier blue		330	
502	Guinea green B		110	
	New acid green 3BX	By		
503	Neptune green		4,796	6,219
	Brilliant acid green 6B	By		
	Brilliant milling green B	C		
	Erioviridine B supra	G		
	Guinea fast green B	A		
	Poseidon green SGX	B		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
505	Light green (yellowish).....		Pounds 1,712	\$1,595
	Acid green G.....	Gr E		
	Acid green GG.....	By		
	Acid green conc.....	M		
506	Acid green extra conc.....	C		
	Erioglaucline.....		28,655	
	Erioglaucline AP.....	G		
507	Erioglaucline EP.....	G		
	Xylene blue VS.....		6,005	
508	Xylene blue VS conc.....	S		
	Xylene blue AS.....		2,500	
	Xylene blue AS conc.....	S		
509	Chrome green.....		31	
	Chrome green BD.....	By		
	Chrome green GD.....	By		
512	Magenta.....		355	420
	Fuchsine N.....	CN		
	Magenta AB.....	B		
	Magenta IA.....	C		
515	Magenta S.....	B		
	Methyl violet.....		703	
	Methyl violet base.....	By		
516	Methyl violet NFB.....	B		
	Crystal violet.....		4,239	6,783
	Crystal violet extra pdr.....	B		
518	Crystal violet P.....	By		
	Crystal violet.....	CN		
521	Ethyl violet.....	B	2,000	
521	Aniline blue.....		50	
	Opal blue—blue shade.....	M		
523	Fast green.....		30,721	
	Fast green extra bluish.....	By		
524	Acid magenta.....	C	500	
526	Acid violet, red.....	Q	11	
527	Acid violet 4BN.....		99	
	Acid violet 8B extra.....	By		
528	Fast acid violet 10B.....		2,264	
	Kiton fast violet 10B.....	I		
530	Acid violet.....		1,931	2,265
	Acid violet 4 BLO.....	B		
	Acid violet 4 BLO.....	M		
	Acid violet 6B.....	t-M		
	Acid violet C 10B.....	B		
	Acid violet blue.....	Q		
531	Eriocyanine.....		7,716	
534	Eriocyanine AC.....	G		
537	Acid violet 7B conc.....	B	25	
537	Methyl blue for silk.....		3,970	8,390
	Methyl blue MBS.....	Gr-F		
	Methyl Lyons blue.....	G		
	Methyl silk blue new.....	G		
539	Soluble blue.....		415	715
	Conc. cotton blue No. 2.....	M		
	Soluble blue T.....	B		
541	Water blue, large lumps.....	A		
	Brilliant dianil blue 6G.....		800	1,280
	Brilliant dianil blue 6G.....	M		
	Brilliant sky blue 5G.....	By		
	Direct brilliant blue 8B.....	I		
543	Patent blue.....		23,606	20,222
	Brilliant acid blue V.....	By		
	Kiton pure blue V.....	I		
	Neptune blue BGX conc.....	B		
	Patent blue V.....	M		
	Poseidon blue BGX conc.....	B		
545	Patent blue A.....		10,715	12,226
	Brilliant acid blue A.....	By		
	Brilliant acid blue FF.....	By		
	Kiton blue A.....	I		
	Neptune blue BR.....	M		
	Patent blue A.....	M		
546	Poseidon blue BR, BXX.....	B		
	Cyanol.....		3,688	4,551
	Blue extra.....	C		
	Cyanol extra.....	C		
	Cyanol FF.....	C		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
			Pounds	
548	Acid violet 6BN		700	
	Acid violet 6BNOO	B		
549	Chrome violet		110	
	Brilliant chrome violet 4B	DH		
551	Eriochrome azuroI B		12,664	\$23,464
	Eriochrome azuroI BC	G		
	Eriochrome azuroI BX	G		
	Chromoxane brilliant blue G	By		
552	Chromal blue GC for printing	G	1,985	
553	Eriochrome cyanine RC	G	2,204	
554	Chromazurol S conc	G	551	
555	Aurine	Q	1,120	
557	Chrome violet	G	220	
558	Victoria blue R	I	660	
559	Victoria blue B		4,533	8,468
	Victoria blue B base	B		
	Victoria blue B base	CN		
	Victoria blue B base	I		
	Victoria blue B highly conc	B		
	Victoria pure blue BO	B		
560	Night blue	B	640	
562	Fast acid blue		3,141	4,009
	Acid blue RBF	I		
	Brilliant wool blue B extra	By		
	Brilliant wool blue FFR extra	By		
564	Naphthalene green		4,357	5,582
	Erio green B supra	G		
	Naphthalene green V	M		
	Xylene fast green B	S		
565	Acid blue B		1,100	1,218
	Wool blue 2B	A		
	Wool blue 5B	A		
	Wool blue G extra	A		
566	Wool green S	I	550	
568	Pyronine G	Q	5	
569	Acridine red		55	
	Acridine red 3B	L		
570	Rhodamine S		25	
	Rosazeine S	M		
571	Rhodamine 6G (single strength)		57,375	35,035
	Rhodamine 6G extra	B		
	Rhodamine 6G extra	I		
	Rhodamine 6GDN	B		
	Rhodamine 6GDN	By		
	Rosazeine 6G extra	M		
	Rosazeine 6GD extra	M		
572	Rhodamine G		25	
	Rosazeine G	M		
573	Rhodamine B (single strength)		97,254	34,868
	Rhodamine B extra	B		
	Rhodamine B extra	I		
	Rhodamine B extra	Q		
	Rhodamine B extra base	B		
	Rosazeine B extra	M		
	Rosazeine B base	M		
576	Rhodamine 3G		200	
	Rhodamine scarlet G	By		
579	Xylene red		30	
	Sulphorosazeine B extra	M		
580	Fast acid violet B		1,000	
	Fast acid violet B	M		
	Fast acid violet R	M		
581	Fast acid eosine G	M	5	
582	Fast acid violet A 2R		25	
	Fast acid violet RGE	M		
587	Eosine		68	
	Eosine A	CN		
	Eosine NDA	CN		
592	Erythrosine bluish		30	
	Erythrosine	M		
	Erythrosine extra	M		
597	Rose bengale B	M	10	
601	Coerulein S	B	149	
603	Acridine orange		4,031	8,872
	Acridine orange DHE	DH		
	Brilliant acridine orange A	DH		
	Rhoduline orange NO	By		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
606	Phosphine		Pounds 24,300	\$37,363
	Acid phosphine R	BD		
	Coriophosphine OX extra	By		
	Leather yellow A	Gr-E		
	Patent phosphine G., GG, M, R.	I		
	Philadelphia yellow 2G	A		
	Phosphine O	M		
607	Phosphine 3R	A	622	
	Rheonine			
	Runic AL conc.	B		
608	Neophosphine G conc.	Q		
	Euchry sine		4,525	8,510
	Euchry sine G extra	By		
	Euchry sine GRNTN	M		
609	Patent phosphine GRNTN	B		
	Patent phosphine RRDX	B		
	Homophosphine		4,860	10,421
	Corioflavine G000, RRO00	Gr-E		
612	Diamond phosphine R	C		
	Flavophosphine G conc.	M		
	Quinoline yellow (spirit soluble)	By	22	
613	Quinoline yellow (water soluble)		6,663	6,070
	Quinoline yellow conc.	G		
	Quinoline yellow conc.	S		
	Quinoline yellow KT ex. conc.	B		
	Quinoline yellow N ex. conc.	By		
617	Columbia yellow		3,057	2,984
	Chloramine yellow GG	By		
	Diphenyl chlorine yellow FF	G		
	Naphthamine yellow BNF	K		
	Universal yellow C	C		
618	Thioflavine T		6,842	13,427
	Basic yellow T	C		
	Basic yellow TCN	C		
	Methylene yellow H	M		
	Rhoduline yellow 6G	By		
	Rhoduline yellow T	By		
	Thioflavine T	C		
	Thioflavine TCN	C		
621	Cresyl blue BBS		15	
	Brilliant cresyl blue	Q		
	Brilliant cresyl blue BB	L		
622	Delphine blue B		5,597	
	Brilliant delphine blue B	S		
	Delphine blue B	I		
624	Modern violet N extra	DH	220	
625	Chrome heliotrope		440	
	Modern heliotrope DH	DH		
627	Anthracyanine		3,636	8,665
	Anthracyanine S	DH		
	Chromacetine blue S	DH		
	Chromacetine blue S extra	DH		
	Modern royal blue	DH		
635	Modern violet		1,925	4,599
	Blue 1900 TCD	DH		
	Gallo violet DF	By		
	Modern violet	DH		
644	Ultra cyanine R, B		2,000	
	Ultra cyanine RB	S		
645	Gallazine		1,432	
	Gallazine #90	DH		
649	Cotton blue		1,050	
	Cotton blue R extra conc.	B		
	Meldola's blue 3R conc.	S		
658	Fast black		695	
	Gallophenine D	By		
659	Gallophenine P	By		
	Methylene blue		83	128
	Methylene blue BG	B		
	Methylene blue NB	CN		
660	Methylene blue zinc free	CN		
	Methylene green		100	
	Methylene green G extra	S		
661	Thionine blue		1,306	2,270
	Thionine blue G old	M		
	Thionine blue G	I		
	Thionine blue GO	M		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
663	New methylene blue		Pounds 3,245	\$5,947
	New methylene blue N	C		
	New methylene blue N	M		
	New methylene blue NS conc.	S		
	New methylene blue NSS	C		
667	Indochromine		1,771	2,409
	Brilliant alizarin blue R	By		
	Indochromine BR conc.	S		
	Indochromine RR conc.	S		
672	Azo carmine G		6,200	
	Azo carmine GX	B		
	Rosinduline GXF	K		
673	Azo carmine B		2,326	
	Azo carmine B extra	B		
	Rosinduline 2B bluish	K		
679	Safranine		25	
	Safranine B conc. pure	S		
681	New fast gray			
	Direct gray R paste	G	6,801	
	Malta gray J	P	3,524	
685	Tannin heliotrope	C	50	
687	Rosolane O, T, R		1,240	
	Methylene heliotrope ex. strong	M		
	Rosolane O	M		
690	Metaphenylene blue R		2,500	
	Diphen blue R	A		
695	Paraphenylene violet		1,500	
	Diphen blue B	A		
698	Nigrosine (spirit soluble)		9	
	Black blue G	Q		
	Nigrosine wax D	M		
699	Induline (water soluble)		100	
	Induline NN	B		
700	Nigrosine (water soluble)		1,361	800
	Silver gray	Q		
	Silvery gray P	A		
	Nigrosine T	B		
705	Indamine 6R		7,900	
	Acid cyanine BF	A		
	Indocyanine B	A		
720	Sulphur black		10	
	Sulphur black AWL	A		
724	Immedial black		1,320	
	Immedial direct blue B	C		
725	Immedial brown		440	
	Immedial brown RR	C		
726	Pyrogene blue		20	
	Pyrogene direct blue	I		
733	Immedial indone		2,480	
	Immedial indogene CCL	C		
734	Pyrogene yellow		220	
	Pyrogene yellow M	I		
746	Katigene green		9,039	
	Pyrogene green GK	I		
	Pyrogene green 3G	I		
748	Hydron blue (single strength)		47	19
	Hydron blue G paste	By		
	Hydron blue G pdr	By		
	Hydron blue R pdr	By		
754	Kryogene direct blue 3B		700	
	Kurgan violet 3RX	B		
759	Anthraflavone G (single strength)		35,936	38,297
	Antra yellow GC paste	B		
	Antra yellow GC paste fine	B		
	Antra yellow GC pdr	B		
	Anthraflavone GC paste	B		
	Anthraflavone GC pdr	B		
	Helindone yellow AGC paste	M		
	Helindone yellow AGC pdr	M		
	Vat yellow GC paste	B		
760	Indanthrene golden orange G (single strength)		76,046	81,731
	Duranthrene golden orange Y paste	BD		
	Helindone golden orange IG dbl. paste	M		
	Helindone golden orange IG pdr	M		
	Helindone golden orange DIG dbl. paste	M		
	Indanthrene golden orange G paste	B		
	Indanthrene golden orange G dbl. paste	B		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
760	Indanthrene golden orange G (single strength)—Continued		<i>Pounds</i>	
	Vat golden orange G paste	B		
	Vat golden orange G dbl. paste	B		
	Vat golden orange G pdr	B		
761	Indanthrene golden orange R (single strength)		112,339	\$146,282
	Helindone golden orange IRRT paste	M		
	Helindone golden orange IRRT pdr	M		
	Indanthrene golden orange RRT paste	B		
	Vat orange RRT paste	B		
	Vat golden orange RRT paste	B		
	Vat golden orange RRT pdr	B		
762	Indanthrene scarlet GS (pdr.)		1,385	8,319
	Helindone orange I 4R pdr	M		
	Indanthrene scarlet GS pdr	B		
	Vat orange 4R pdr	B		
	Vat orange IRR pdr	M		
763	Indanthrene dark blue BO (paste)		2,943	1,760
	Helindone dark blue IBO paste	M		
	Indanthrene dark blue BO paste	B		
	Vat dark blue BO paste fine	B		
765	Indanthrene green B (single strength)		16,739	9,968
	Helindone black IBB dbl. paste	M		
	Indanthrene black BB dbl. paste	B		
	Indanthrene black BB extra pdr	B		
	Vat black BB dbl. paste	B		
766	Indanthrene violet R (single strength)		443	
	Vat violet R paste	B		
	Vat violet R pdr	B		
767	Indanthrene violet RR (single strength)		19,027	14,590
	Indanthrene violet RR ex. dbl. paste	B		
	Indanthrene violet RR pdr	Q		
	Vat violet RR paste	B		
	Vat violet RR dbl. paste	B		
	Vat RRT pdr	B		
768	Indanthrene violet B (single strength)		1,115	840
	Antra violet B paste	B		
	Antra violet B pdr	B		
	Helindone violet IB paste	M		
	Vat violet B paste	B		
774	Alizarin black		2,111	850
	Alizarin black S paste	M		
	Alizarin black WR paste	B		
	Alizarin black WR pdr	B		
	Alizarin black WX paste	B		
778	Alizarin, synthetic		42,695	6,530
	Alizarin VI extra pure paste	B		
	Alizarin red 2AB paste	Q		
	Alizarin red IB paste	By		
	Alizarin red DIB paste	M		
779	Alizarin orange		15,202	5,168
	Alizarin orange paste	BAC		
	Alizarin orange AO paste	BAC		
	Alizarin orange R paste	M		
	Alizarin orange R pdr	By		
	Alizarin orange RG pdr	Q		
	Alizarin orange RP paste	By		
	Alizarin orange SW pdr	B		
780	Alizarin red S		3,611	2,926
	Alizarin carmine	Q		
	Alizarin red S pdr	B		
	Alizarin red SW	Q		
	Alizarin red W pdr	By		
782	Alizarin brown		10,996	
	Anthracene brown RD paste	G		
	Anthracene brown SW pdr. (single strength)	B		
783	Purpurine	By	271	
784	Alizarin SX	B	11,773	
785	Alizarin GI		9,355	3,003
	Alizarin GI paste	B		
	Alizarin GI ex. new	B		
	Alizarin red SDG paste	M		
	Alizarin red YCA paste	BAC		
	Alizarin red XGP paste	By		
787	Alizarin Bordeaux		1,261	
	Alizarin Bordeaux BP paste	By		
788	Alizarin cyanine		798	
	Alizarin cyanine NS paste	By		
	Alizarin cyanine WRB paste	By		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
790	Acid alizarin blue BB, GR.....		<i>Pounds</i> 1,493	\$2,666
	Acid alizarin blue BBN.....	M		
	Anthracene blue SWGG pdr.....	B		
792	Anthracene blue SWR pdr.....	B		
	Cibanone orange R (single strength)	I	9,704	
794	Cibanone black (single strength)		10,935	6,758
	Cibanone black B paste.....	I		
	Cibanone black 2B paste.....	I		
795	Cibanone black 2G pdr.....	I		
	Cibanone yellow R (single strength)		21,085	
	Cibanone yellow R paste.....	I		
797	Cibanone yellow R pdr.....	I		
	Alizarin garnet.....		1,050	
798	Alizarin claret R paste.....	M		
	Alizarin maroon paste.....	B	630	
800	Anthracene blue.....		829	
	Anthracene blue WB paste.....	B		
	Anthracene blue WG paste.....	B		
803	Alizarin blue G, R pastes.....	Q	36	
804	Alizarin blue S.....		8,152	10,168
	Alizarin blue S pdr.....	B		
	Alizarin blue S pdr.....	By		
	Alizarin blue SB pdr.....	M		
	Alizarin blue SR pdr.....	Q		
807	Alizarin black S paste.....	M	650	
808	Alizarin green S paste.....	B	329	
810	Helindone yellow 3GN.....		735	822
	Helindone yellow 3GN paste.....	M		
	Helindone yellow IRK paste.....	M		
811	Vat yellow RK paste.....	B		
	Algol yellow 3G (single strength)		128	
	Algol yellow 3G pdr.....	By		
813	Vat yellow 5G paste.....	Gr-E		
	Indanthrene copper R paste.....	B	137	
	Algol yellow WF pdr. (single strength)	By	8	
814	Algol scarlet G (single strength)		41	
	Algol scarlet G pdr.....	By		
	Vat scarlet G paste.....	By		
816	Algol red 5G (single strength)		2,930	1,770
	Algol red 2G pdr.....	By		
	Algol red 5G pdr.....	By		
	Vat red 5G pdr.....	By		
	Vat red 5GK pdr.....	By		
817	Algol yellow R (single strength)		16,325	5,867
	Algol yellow R paste.....	By		
	Helindone yellow 1GK paste.....	M		
	Vat yellow GK paste.....	By		
	Vat yellow GK pdr.....	By		
819	Algol red FF, R (single strength)		19,342	8,602
	Algol brilliant red 2B pdr.....	By		
	Algol red FF extra pdr.....	By		
	Algol red R extra paste.....	By		
	Algol red R extra pdr.....	By		
	Vat red FF extra paste.....	By		
	Vat red FF extra pdr.....	By		
	Vat red R extra pdr.....	By		
	Algol brilliant violet R (single strength)		14,832	11,275
Algol brilliant violet R pdr.....	By			
Algol brilliant violet RK pdr.....	By			
Durantthrene brilliant violet R paste.....	BD			
Helindone brilliant violet IRK paste.....	M			
Vat brilliant violet RK paste.....	By			
Vat brilliant violet RK pdr.....	By			
Vat brilliant violet BR paste.....	Gr-E			
Vat brilliant violet R paste.....	By			
821	Algol brilliant violet 2B (single strength)		6,968	4,291
	Algol blue 3R pdr.....	By		
	Algol blue 3RP pdr.....	By		
	Algol brilliant violet 2B pdr.....	By		
	Helindone brilliant violet IBBK paste.....	M		
	Vat brilliant violet BBK paste.....	By		
Vat brilliant violet BBK pdr.....	By			
822	Algol brilliant orange FR (single strength)		15,917	14,510
	Algol brilliant orange FR pdr.....	By		
	Vat brilliant orange FR paste.....	By		
	Vat brilliant orange FR pdr.....	B		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
822	Algol brilliant orange FR (single strength)—Continued.		<i>Pounds</i>	
	Vat orange R paste.....	Gr-E	-----	-----
	Vat brilliant orange RRK pdr.....	B	-----	-----
	Vat brilliant orange RRK pdr.....	By	-----	-----
824	Algol orange R (single strength).....		16	
	Vat orange 6RTK pdr.....	By	-----	-----
825	Algol red B pdr. (single strength).....	By	16	
827	Indanthrene claret B extra (single strength).....		6,642	\$6,164
	Antra claret R paste.....	B	-----	-----
	Antra Bordeaux R paste fine.....	B	-----	-----
	Antra Bordeaux R pdr.....	B	-----	-----
	Antra Bordeaux B extra.....	B	-----	-----
828	Indanthrene claret B (single strength).....		3,641	
	Indanthrene Bordeaux B paste.....	B	-----	-----
	Indanthrene Bordeaux B pdr.....	B	-----	-----
829	Algol Bordeaux 3B pdr. (single strength).....	By	18	
830	Indanthrene red R (single strength).....		10,042	7,131
	Antra red RT paste.....	B	-----	-----
	Antra red RT dbl. paste.....	B	-----	-----
	Antra red RT pdr.....	B	-----	-----
	Vat red R paste.....	B	-----	-----
	Vat red R ex. pdr.....	B	-----	-----
831	Indanthrene red BN (single strength).....		58,520	76,543
	Duranthrene red BN paste.....	BD	-----	-----
	Helindone red IBN paste.....	M	-----	-----
	Helindone red IBN extra paste.....	M	-----	-----
	Helindone red IBN extra pdr.....	M	-----	-----
	Helindone red DIBN extra paste.....	M	-----	-----
	Helindone red IRK paste.....	M	-----	-----
	Indanthrene red BN extra paste.....	B	-----	-----
	Indanthrene red BN extra pdr.....	B	-----	-----
	Vat red BN extra paste.....	B	-----	-----
	Vat red RK paste.....	B	-----	-----
	Vat red RK pdr.....	By	-----	-----
	Vat red RKP.....	B	-----	-----
832	Indanthrene violet BN (single strength).....		31,925	56,231
	Helindone violet IBN ex. paste.....	M	-----	-----
	Indanthrene violet BN paste.....	B	-----	-----
	Indanthrene violet BN extra paste.....	B	-----	-----
	Indanthrene violet BN extra pdr.....	B	-----	-----
	Vat violet BN paste fine.....	B	-----	-----
	Vat violet BN extra paste.....	B	-----	-----
	Vat violet BN pdr.....	B	-----	-----
833	Algol olive R (single strength).....		30,665	19,017
	Algol olive R paste.....	By	-----	-----
	Algol olive R pdr.....	By	-----	-----
	Helindone olive IR paste.....	M	-----	-----
	Vat olive R paste.....	By	-----	-----
	Vat olive R pdr.....	B	-----	-----
	Vat olive R pdr.....	By	-----	-----
834	Algol gray (single strength).....		4,350	1,652
	Algol gray 2B paste.....	By	-----	-----
	Vat gray GK paste.....	By	-----	-----
	Vat gray GK pdr.....	By	-----	-----
	Vat gray K pdr.....	By	-----	-----
	Vat gray BR paste.....	Gr-E	-----	-----
838	Indanthrene blue RS (single strength).....		28,814	10,043
	Helindone blue IRS dbl. paste.....	M	-----	-----
	Indanthrene blue RS paste.....	B	-----	-----
	Indanthrene blue RS triple pdr.....	B	-----	-----
	Vat blue RS dbl. paste.....	B	-----	-----
	Vat blue RSP dbl. paste.....	B	-----	-----
	Vat blue RSP triple pdr.....	B	-----	-----
839	Algol blue K (single strength).....		816	
	Vat blue RK pdr.....	By	-----	-----
840	Indanthrene blue 3G (single strength).....		6,069	3,881
	Helindone blue I 3G paste.....	M	-----	-----
	Indanthrene blue 3G pdr.....	B	-----	-----
	Vat blue 3G paste.....	B	-----	-----
	Vat blue 3G paste fine.....	B	-----	-----
	Vat blue 3G pdr.....	B	-----	-----
841	Indanthrene blue GGS (single strength).....		11,824	8,337
	Vat blue GGSL pdr.....	B	-----	-----
	Vat blue GGSP dbl. paste.....	B	-----	-----
	Vat blue GGSZ dbl. paste.....	B	-----	-----

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
842	Indanthrene blue GCD (single strength).....		Pounds 68,450	\$30,918
	Helindone blue IGCD dbl. paste.....	M		
	Helindone blue IGCD dbl. paste fine.....	M		
	Indanthrene blue GCD dbl. paste.....	B		
	Indanthrene blue GCD pdr.....	B		
	Vat blue GCD dbl. paste.....	B		
843	Indanthrene blue GC (single strength).....			1,379
	Indanthrene blue GC paste.....	B	1,025	
	Indanthrene blue GCN pdr.....	By		
843	Cibanone blue G pdr.....	L	275	
844	Algol blue 3G (single strength).....		32,396	21,837
	Algol blue 3G paste.....	By		
	Algol blue 3G pdr.....	By		
	Vat blue 3G paste fine.....	B		
	Vat blue 3GP paste.....	By		
	Vat blue 5G paste.....	By		
847	Algol green B (single strength).....		2,518	2,179
	Vat green BB paste.....	By		
	Vat green BB pdr.....	B		
	Vat green BB pdr.....	By		
849	Indanthrene yellow (single strength).....		39,771	27,681
	Helindone yellow IG dbl. paste.....	M		
	Indanthrene yellow G paste.....	B		
	Indanthrene yellow G dbl. paste.....	B		
	Indanthrene yellow G pdr.....	B		
	Vat yellow G dbl. paste.....	B		
	Vat yellow G pdr.....	B		
	Vat yellow G pdr.....	By		
950	Indanthrene blue WB (pdr).....	B	200	
351	Alizarin direct blue B.....		3,310	9,843
	Alizarin direct blue B.....	M		
	Alizarin leveling blue B.....	C		
852	Alizarin leveling blue BBS.....	C		11,394
	Alizarin irisol D.....		3,946	
	Alizarin blue JR.....	By		
	Alizarin direct violet R.....	M		
853	Alizarin irisol B.....	By		1,486
	Alizarin irisol R.....	By		
	Anthraquinone violet.....	B		
854	Anthraquinone violet pdr.....	By		5,778
	Alizarin viridine FF paste.....	By		
855	Alizarin pure blue B.....		20,729	
	Alizarin blue SKY.....	By		
856	Alizarin sky blue B.....	By		16,117
	Alizarin astrol.....	By		
	Alizarin astrol B.....	By		
858	Alizarin blue AS.....	By		81,640
	Alizarin saphirol B.....		46,600	
	Alizarin blue SAP.....	By		
	Alizarin blue SAWSA.....	By		
	Alizarin light blue B.....	S		
	Alizarin light blue SE.....	S		
	Alizarin saphire blue SE.....	I		
	Alizarin saphirol SE.....	By		
	Alizarin saphirol WS.....	By		
	Alizarin saphirol WSA.....	B		
	Alizarin saphirol WSA.....	By		
	Guinea light blue SE.....	A		
860	Cyananthrol G.....		7,817	18,035
	Alizarin direct blue BGAOO.....	B		
	Cyananthrol BGAOO.....	B		
861	Anthraquinone blue SR.....		58	
	Anthraquinone blue SR extra.....	B		
	Anthraquinone blue SR extra.....	By		
862	Alizarin blue black.....		78,195	72,927
	Alizarin blue black B pdr.....	By		
	Alizarin blue black B pdr.....	M		
	Alizarin blue black 3B pdr.....	By		
863	Anthraquinone blue green BXO.....	B	700	
	Anthraquinone blue green BXO.....	B		
864	Anthraquinone green GXNO.....	B	1,041	
865	Alizarin direct green G.....		7,636	16,536
	Alizarin brilliant green G.....	C		
	Alizarin cyanine green G.....	By		
	Alizarin cyanine green 3G.....	By		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
867	Indanthrene brown B (single strength).....		Pounds	
	Anthra brown B dbl paste.....	B.	10,350	
	Indanthrene brown B dbl paste.....	B.		
868	Cibanone brown B, V (single strength).....		1,832	
	Cibanone brown B paste.....	I.		
869	Algol brown B (single strength).....	I.	71,313	\$62,735
	Algol brown R paste.....	By		
	Algol brown R pdr.....	By		
	Helindone brown IR paste.....	M.		
	Helindone brown IR pdr.....	M.		
	Helindone brown IRT paste.....	M.		
	Indanthrene brown R paste.....	B.		
	Vat brown IR paste.....	M.		
	Vat brown R paste.....	By		
	Vat brown R paste.....	B.		
	Vat brown R pdr.....	B.		
870	Algol corinth R (single strength).....	By	10,333	10,137
	Algol corinth R pdr.....	By		
	Helindone corinth IRK pdr.....	M.		
	Vat corinth R paste.....	B.		
	Vat corinth RK paste.....	By		
	Vat corinth RK pdr.....	By		
871	Indanthrene red violet (single strength).....	B.	10,932	11,005
	Indanthrene red violet RRK paste.....	B.		
	Indanthrene red violet RRN ex. paste.....	B.		
	Vat red violet RRK paste.....	B.		
	Vat red violet RRK paste fine.....	B.		
	Vat red violet RRK pdr.....	B.		
873	Helindone brown AN (single strength).....		300	22
	Helindone brown AN paste.....	M.		
	Helindone reddish brown IR paste.....	M.		
	Indanthrene reddish brown IR paste.....	M.		
874	Indigo, synthetic.....		5,471	
	Indigo.....	Q.		
876	Indigo MLB paste.....	M.		
	Indigo, white.....		975	1,386
	Indigosol DH.....	DH		
	Indigosol O.....	B.		
	Indigosol O.....	DH		
	Indigosol O.....	M.		
881	Indigosol 04B.....	DH		
	Ciba blue 2B (single strength).....		5,783	1,805
	Brilliant indigo 4B paste.....	B.		
	Brilliant indigo 4B pdr.....	B.		
	Brom-indigo FB pdr.....	By		
	Brom-indigo FBP paste.....	By		
	Brom-indigo FBP pdr.....	By		
	Ciba blue 2BD paste.....	I.		
	Indigo MLB/4B paste.....	M.		
	Indigo MLB/4B pdr.....	M.		
883	Indigo KG (single strength).....		4,500	
	Indigo MLB/6B pdr.....	M.		
885	Brilliant indigo B paste.....	B.	11,218	
886	Brilliant indigo G pdr (single strength).....	M.	250	
892	Helindone green G (single strength).....		350	
	Helindone green G paste.....	M.		
893	Helindone green G pdr.....	M.		
	Alizarin indigo G (single strength).....		3,506	
894	Alizarin indigo G paste.....	By		
	Alizarin indigo G pdr.....	By		
	Alizarin indigo B (single strength).....		1,447	2,653
	Alizarin indigo B pdr.....	By		
	Alizarin indigo green B pdr.....	By		
	Alizarin indigo green B paste.....	By		
895	Alizarin indigo violet B paste.....	By		
	Alizarin indigo violet B pdr.....	By		
	Alizarin indigo 3R (single strength).....		4,144	
	Alizarin indigo 3R paste.....	By		
896	Alizarin indigo 3R pdr.....	By		
	Helindone blue 3GN.....		175	
897	Helindone blue 3R paste.....	M.		
	Ciba heliotrope B (single strength).....		10,016	
	Ciba heliotrope B paste.....	I.		
	Ciba heliotrope B pdr.....	I.		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

Schultz No.	Name of dye	Manu- facturer	Imports	
			Quantity	Invoice value
899	Ciba gray (single strength)		Pounds 550	
	Ciba gray B pdr.	I		
901	Ciba violet B (single strength)		82,598	\$25,143
	Ciba violet B paste	I		
	Ciba violet B pdr.	I		
	Ciba violet R paste	I		
	Ciba violet R pdr.	I		
902	Helindone brown 2R (single strength)		700	
	Helindone brown 2R pdr.	M		
904	Helindone brown G (single strength)			2,729
	Helindone brown G paste	M	2,455	{
	Helindone brown G pdr.	M		
	Thioindigo brown G pdr.	K	385	
905	Thioindigo scarlet R paste	K	661	
906	Thioindigo scarlet G (single strength)		6,063	
	Ciba red G paste	I		
	Ciba red G pdr.	I		
907	Ciba scarlet (single strength)			32,922
	Ciba scarlet G extra paste	I	28,217	{
	Ciba scarlet G extra pdr.	I		
	Helindone fast scarlet C paste	M	8,478	
	Thioindigo scarlet GG paste	K	3,505	
908	Ciba red R paste	I	17,635	
910	Helindone pink (single strength)		17,808	12,958
	Anthra pink AN paste	B		
	Anthra pink BN paste	B		
	Helindone pink AN paste	M		
	Helindone pink AN pdr.	M		
	Helindone pink BN paste. l.	M		
	Vat pink AN paste	B		
	Vat pink BN paste	M		
911	Ciba orange G paste	I	2,204	
912	Thioindigo red B.		2,682	1,850
	Anthra red B paste	B		
	Ciba pink B paste	I		
	Thioindigo red B paste	K		
913	Helindone orange R (single strength)		37,077	37,263
	Helindone orange R paste	M		
	Hydron orange RF paste	C		
	Hydron orange RF pdr.	C		
	Thioindigo orange R paste	K		
915	Helindone fast scarlet R (single strength)		11,230	
	Helindone fast scarlet R pdr.	M		
917	Helindone red B (single strength)		948	
	Helindone red B paste	M		
	Helindone red B pdr.	M		
918	Helindone red 3B (single strength)		29,038	25,312
	Ciba red 3B paste	I		
	Durindone red 3B paste	BD		
	Durindone red 3B pdr.	BD		
	Helindone red 3B paste	M		
	Helindone red 3B pdr.	M		
	Helindone reddish violet 1RH1 pdr.	M		
	Thioindigo red 3B paste	K		
	Vat red 3B paste	M		
	Vat red violet RH paste	B		
919	Ciba Bordeaux B (single strength)		29,000	
	Ciba Bordeaux B paste	I		
	Ciba Bordeaux B pdr.	I		
920	Helindone violet (single strength)		6,179	4,696
	Helindone violet B paste	M		
	Helindone violet B pdr.	M		
	Helindone violet 2B pdr.	M		
	Helindone violet R paste	M		
	Helindone violet R pdr.	M		
923	Ursol		8,465	8,310
	Fur black DG	A		
	Fur blue black A, B, SB, SDF	A		
	Fur brown O, P, NZ, PY, 2R	A		
	Fur brown 4R, SK, SKG	A		
	Fur gray ALA, B	A		
	Fur gray brown SLA	A		
	Fur red brown 6R	A		
	Fur yellow 2G, 4G	A		
	Furrol yellow brown G	C		
	Nako B, DR, PS, RH	M		
	Nako black DBB	M		
	Nako gray B	M		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED ACID DYES

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
Acid black.....	Q	11	
Acid blue BBX.....	B	10	
Acid pure blue R supra.....	G	550	
Acid Rhodamine 3R.....	I	220	
Acid violet 10B.....	C	5	
Alizarin direct blue.....		1,606	\$4,205
Alizarin direct blue A.....	M		
Alizarin levelling blue BBS.....	C		
Alizarin supra blue A.....	By		
Alizarin direct violet E2B.....	M	1,500	
Alizarin emeraldole G pdr.....	By	530	
Alizarin geranole B pdr.....	By	1,874	
Alizarin levelling green blue B.....	C	25	
Alizarin rubinol.....		11,514	23,656
Alizarin rubinol 3G pdr.....	By		
Alizarin rubinol 5G pdr.....	By		
Alizarin rubinol GW pdr.....	By		
Alizarin rubinol R pdr.....	By		
Alizarin rubine 3G pdr.....	By		
Alizarin rubine GW pdr.....	By		
Alizarin rubine R pdr.....	By		
Alkali fast green 3G, 10G.....	By	206	
Alphanol blue BRN conc.....	C	100	
Anthosine.....		1,082	
Onis (Anthosine) 3B.....	B		
Anthracyanine 3FL.....	By	100	
Azo acid black B.....	M	300	
Azo flavine FFNX.....	B	100	
Azo orseille BB.....	C	5	
Azo wool violet 7R.....	C	25	
Black for ostrich feathers.....	Q	22	
Brilliant acid blue CB, EG.....	By	166	
Brilliant milling blue B, FG.....	C	6,260	
Brilliant wool scarlet P3R.....	K	198	
Cashmere black TN.....	By	699	
Cashmere blue TG extra.....	By	160	
Cloth fast red GRG.....	L	110	
Cloth fast yellow G.....	L	2,755	
Erio fast fuchsine BBL.....	G	992	
Erio navy blue.....	G	493	
Fast acid green BB extra.....	M	1,000	
Fast light red BL, GL.....	By	1,556	
Fast sulphon green 2G conc.....	S	2,204	
French blue.....	Q	11	
Guinea brown 2R.....	A	10	
Guinea fast red BL, 2BL.....	A	4,700	
Ink blue BITN.....	Gr-E	710	
Kiton fast red 4BL.....	I	1,430	
Mars red ATX.....	B	100	
Milling orange G.....	A	130	
Milling yellow F 3G, R.....	A	105	
Neolan blue 2G conc.....	L	220	
Onis violet BB.....	B	25	
Polar orange R conc.....	G	2,204	
Polar red.....		7,756	
Polar red G conc.....	G		
Polar red 3B conc.....	G		
Radio black 8B.....	C	200	
Radio brown B.....	C	5	
Radio red VB.....	C	25	
Radio yellow R.....	C	1,020	
Silk blue BT5B extra conc.....	Gr-E	250	
Sulpho rosazaine G pdr.....	M	100	
Sulphon orange G.....	By	300	
Sulphon yellow.....		802	712
Sulphon yellow G extra.....	By		
Sulphon yellow 5G.....	By		
Sulphon yellow R.....	By		
Supramine black BR.....	By	462	
Supramine bordeaux B.....	By	292	
Supramine brown G, R.....	By	446	
Supramine green G.....	By	419	
Supramine red.....		1,188	1,268
Supramine red B.....	By		
Supramine red 3B.....	By		
Supramine red 2G.....	By		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED ACID DYES—Continued.

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
Supramine yellow		<i>Pounds</i> 1,083	
Supramine yellow G	By		
Supramine yellow R	By		
Wool black BR	By	1,103	
Wool brown AF	Q	249	
Wool fast blue		4,440	
Wool fast blue BL	B		
Wool fast blue BL	By		
Wool fast scarlet conc.	G	55	
Wool fast yellow G	B	330	
Wool violet R C	G	55	
Xylene milling blue AE conc.	S	500	
Xylene milling orange R conc.	S	600	
Xylene milling red B conc.	S	1,500	

UNIDENTIFIED VAT DYES

Algol black (single strength)		32	
Algol black CL pdr.	By		
Algol black RO pdr.	By		
Algol blue (single strength)		35	\$24
Algol blue FB paste	By		
Algol blue FB pdr.	By		
Vat blue 3 GT pdr.	By		
Algol brown (single strength)		18,155	14,728
Algol brown G paste	By		
Algol brown G pdr.	By		
Vat brown G paste	By		
Vat brown G pdr.	By		
Vat brown GG pdr.	By		
Algol pink TR pdr. (single strength)	By	16	
Alizarin indigo 5R, 7R, 7G	By	9	
Alizarin indigo black B	By	123	
Alizarin indigo brown R paste	By	4,967	
Alizarin indigo gray B (single strength)	By	16	
Alizarin indigo green G, BB paste	By	563	
Alizarin indigo red B (single strength)	By	21	
Anthra wool black		200	
Anthra wool black 3B	B		
Anthra wool black T	B		
Anthra wool brown CM	B	25	
Anthra wool red CB, CR	B	6	
Brilliant indigo		2,202	
Brilliant indigo N	B		
Brilliant indigo 4 BG	B		
Ciba pink (single strength)		21,653	
Ciba pink BG paste	I		
Ciba pink BG pdr.	I		
Ciba printing black		10,799	
Ciba printing black B paste	I		
Ciba printing black G paste	I		
Cibanone blue 2G pdr.	I	385	
Cibanone brown R paste	I	1,322	
Cibanone green G paste	I	2,204	
Cibanone orange		330	
Cibanone orange 3R pdr.	I		
Cibanone orange 6R pdr.	I		
Cibanone red		606	
Cibanone red C pdr.	I		
Cibanone red G pdr.	I		
Grelanone brown RR paste	Gr-E	112	
Grelanone orange RB paste	Gr-E	112	
Grelanone red 2B paste	Gr-E	56	
Grelanone scarlet G paste	Gr-E	56	
Grelanone violet BR, 3B paste	Gr-E	56	
Grelanone yellow G paste	Gr-E	560	
Helindone black B in grains	M	25	
Helindone brown vat in grains	M	50	
Helindone claret red B paste	M	200	
Helindone fast scarlet		1,105	1,084
Helindone fast scarlet B paste	M		
Helindone fast scarlet G paste	M		
Vat fast scarlet G paste	M		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED VAT DYES—Continued

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
Helindone khaki C in grains	M	<i>Pounds</i> 10	
Helindone printing black RD paste	M	8,300	
Helindone red		50	
Helindone red BB vat	M		
Helindone red CR vat	M		
Helindone red 15 GK paste	M	200	
Helindone yellow CA paste	M	25	
Hydron black B pdr. (single strength)	C	6	
Hydron Bordeaux B (single strength)		100	
Hydron Bordeaux B dbl. paste	C		
Hydron Bordeaux R dbl. paste	C		
Hydron brown (single strength)		42,681	\$43,620
Hydron brown G paste	C		
Hydron brown G pdr.	C		
Hydron brown R paste	C		
Hydron brown R pdr.	C		
Hydron green		2,300	
Hydron green B paste	C		
Hydron green G paste	C		
Hydron navy blue C paste	C	250	
Hydron olive		250	
Hydron olive GN paste	C		
Hydron olive R paste	C		
Hydron pink FB (single strength)		11,837	12,135
Algol brilliant pink FB paste	By		
Algol brilliant pink FB pdr.	By		
Anthra pink B extra paste	B		
Helindone pink B extra paste	M		
Helindone pink B extra pdr.	M		
Hydron pink FB paste	C		
Hydron pink FB pdr.	C		
Hydron pink FF (single strength)		50,460	51,865
Algol brilliant pink FF paste	By		
Algol brilliant pink FF pdr.	By		
Anthra pink R extra paste	B		
Anthra pink R extra pdr.	B		
Helindone pink R extra paste	M		
Helindone pink R extra pdr.	M		
Hydron pink FF paste	C		
Hydron pink FF pdr.	C		
Thioindigo rose RN ex. paste	K		
Hydron scarlet (single strength)		8,668	8,424
Hydron scarlet 2B paste	C		
Hydron scarlet 2B pdr.	C		
Hydron scarlet 3B paste	C		
Hydron scarlet 3B pdr.	C		
Hydron sky blue FK paste	C	3,195	
Hydron violet (single strength)		625	
Hydron violet B pdr.	C		
Hydron violet R pdr.	C		
Hydron wool brown D paste	C	25	
Hydron wool olive B paste	C	25	
Hydron wool yellow G pdr.	C	50	
Hydron yellow NF paste	C	6,050	
Indanthrene black (single strength)		1,086	
Vat black BGA dbl. paste	B		
Indanthrene blue BCS (single strength)		39,350	17,733
Helindone blue IBCS pdr.	M		
Indanthrene blue BCD dbl. paste	B		
Indanthrene blue BCD dbl. paste fine	B		
Indanthrene blue BCS pdr.	B		
Vat blue BCD dbl. paste	B		
Vat blue BCS pdr.	B		
Indanthrene blue BGCS pdr.	B	10	
Indanthrene blue (single strength)		10,963	7,288
Indanthrene blue RC paste	B		
Indanthrene blue RC dbl. paste	B		
Indanthrene blue RHZ pdr.	B		
Indanthrene blue RZ dbl. paste	B		
Indanthrene brilliant blue R (single strength)		1,782	3,040
Helindone brilliant blue IR paste	M		
Vat brilliant blue R paste	B		
Vat brilliant blue R paste fine	M		
Vat brilliant blue R pdr.	B		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED VAT DYES—Continued

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
		Pounds	
Indanthrene brown G (single strength)		16,130	\$11,856
Helindone brown IG paste	M		
Helindone brown IG pdr	M		
Vat brown G paste	B		
Vat brown G pdr	B		
Vat brown GG paste	B		
Indanthrene brown		4,123	2,663
Helindone brown I 3R paste	M		
Indanthrene brown 3R paste	B		
Vat brown 3R paste	B		
Indanthrene golden orange 3G (single strength)		55	
Vat golden orange 3G paste	By		
Vat golden orange 3G pdr	By		
Indanthrene golden orange 3R (single strength)		9,168	9,609
Helindone golden orange I 3R paste	M		
Indanthrene golden orange 3R paste	B		
Vat orange 3R paste	B		
Vat orange 3R paste fine	B		
Indanthrene gray (single strength)		1,102	1,384
Vat gray 3B dbl. paste	B		
Vat gray BTR paste	B		
Vat gray RRII	B		
Indanthrene green (single strength)		3,800	2,131
Helindone green IG dbl. paste	M		
Helindone green IGG dbl. paste	M		
Vat green G dbl. paste	B		
Vat green GG dbl. paste	B		
Indanthrene pink B (single strength)		39,131	36,553
Helindone pink IB dbl. paste	M		
Helindone pink IB dbl. paste fine	M		
Helindone pink IB pdr	M		
Indanthrene pink B dbl. paste	B		
Vat pink B dbl. paste	B		
Vat pink B dbl. paste fine	B		
Vat pink B extra paste	B		
Indanthrene red (single strength)		4,620	4,095
Helindone red IGG paste	M		
Helindone red IGG pdr	M		
Vat red GG paste	B		
Vat red GG paste fine	B		
Vat red GG pdr	B		
Indanthrene yellow		117	104
Helindone yellow I 3RT	M		
Vat yellow 3 RT pdr	B		
Vat yellow 3 RT conc. pdr	B		
Vat blue IggSNL, IRL	M	15	
Vat printing black BR paste	B	11	
Vat violet No. 162 for lakes	Q	2,695	
Vat yellow GP pdr	B	50	
Vat yellow 6G, 6GD pdr	A	10	

UNIDENTIFIED MORDANT AND CHROME DYES

Acid alizarin blue black R conc.	M	10	
Acid alizarin gray G	M	7,025	
Acid alizarin red G	M	50	
Acid chrome blue 3RX, 3G	By	226	
Acid anthracene brown KE pdr	By	6	
Acid chrome yellow		204	
Acid chrome yellow GL	By		
Acid chrome yellow RL extra	By		
Alizarin blue WS	By	465	
Alizarin Bordeaux GP paste	By	441	
Alizarin cyclamine R paste	By	796	
Alizarin fast blue BII G	By	106	
Alizarin fast brown GL pdr	By	6	
Alizarin fast gray 2 BL	By	4,456	
Alizarin fast light red 5G pdr	By	6	
Alizarin heliotrope R paste	By	11	
Alizarin light green GS conc	S	2,000	
Alizarin red FS pdr	M	500	
Alliance fast brown 5G paste	BD	50	
Anthracene chromate brown EB	C	6,669	

TABLE 30.—Imports of dyes, calendar year 1924—Continued.

UNIDENTIFIED MORDANT AND CHROME DYES—Continued

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
		<i>Pounds</i>	
Anthracene chrome brown DWN.....	C.....	10	
Autochrome olive brown G.....	M.....	20	
Brilliant chrome blue.....		991	
Brilliant chrome blue 2B.....	DH.....		
Brilliant chrome blue R pdr.....	By.....		
Brilliant chrome violet 3R, RG.....	DH.....	330	
Chromanol black RVI.....	DH.....	55	
Chromazurine.....		1,465	\$3,669
Chromazurine DN.....	DH.....		
Chromazurine G.....	I.....		
Chromazurine E.....	DH.....		
Chrome brilliant blue G.....	G.....	276	
Chrome brilliant yellow 3G.....	By.....	6	
Chrome fast blue.....		355	
Chrome fast blue FB.....	A.....		
Chrome fast blue BX.....	B.....		
Chrome fast garnet BL.....	A.....	5	
Chrome fast phosphine R.....	DH.....	385	
Chrome fast yellow 5RP.....	A.....	5	
Chrome garnet B.....	DH.....	110	
Chrome olive JCSB pdr.....	DH.....	110	
Chrome printing blue G pdr.....	By.....	93	
Chrome printing red.....		1,541	
Chrome printing red Y.....	DH.....		
Chrome printing red B.....	DH.....		
Chrome sky blue B pdr.....	By.....	666	
Chrome yellow CR.....	G.....	1,102	
Chromocitronine 3R.....	DH.....	440	
Chromorhodine.....		4,621	13,907
Chromorhodine BN.....	DH.....		
Chromorhodine 6 GN extra.....	DH.....		
Chromorhodine BR.....	DH.....		
Chromorhodine BB.....	DH.....		
Chromorosamine 2B.....	DH.....	22	
Chromovesuvine RA.....	DH.....	110	
Chromoxane azulol BD pdr.....	By.....	12	
Chromoxane brilliant violet SB.....	By.....	5	
Diamond black P2 B conc.....	By.....	16	
Diamond bordeaux R.....	By.....	519	
Eriochromal gray 5G conc.....	G.....	110	
Eriochrome flavine A conc.....	G.....	6,614	
Eriochrome green L.....	G.....	2,864	
Eriochrome red G.....	G.....	2,204	
Fast chrome green B.....	DH.....	55	
Metachrome blue black 2 BX.....	A.....	9,500	
Metachrome brilliant blue BL, SRL.....	A.....	310	
Metachrome brown 6G.....	A.....	2,000	
Metachrome green G, 3G.....	A.....	70	
Metachrome olive.....		6,120	3,789
Metachrome olive B.....	A.....		
Metachrome olive D.....	A.....		
Metachrome olive 2G.....	A.....		
Metachrome olive brown.....		5,100	
Metachrome olive brown G pdr.....	Bro.....		
Metachrome olive brown G.....	A.....		
Metachrome red G.....	A.....	300	
Metachrome violet.....		950	
Metachrome violet B.....	A.....		
Metachrome violet 2R.....	A.....		
Modern gray RCN.....	DH.....	550	
Modern green N.....	DH.....	220	
Omega chrome brown.....		8,003	
Omega chrome brown G conc.....	S.....		
Omega chrome brown PB conc.....	S.....		
Omega chrome claret conc.....	S.....	200	
Palatine chrome brilliant violet B.....	B.....	100	
Pilatus chromate black B.....	B.....	101	
Solochrome brown MO paste.....	BD.....	50	
Ultra corinth B.....	S.....	300	
Ultra cyanol B.....	S.....	1,000	

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED DIRECT DYES

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
Azonine B, G, R, RR, S, SF	C	<i>Pounds</i> 165	\$97
Azonine direct blue B paste	C	230	
Azonine direct red G paste	C	330	
Azonine direct yellow RR paste	C	230	
Benzo bronze E	By	200	
Benzo dark brown extra	By	651	
Benzo fast black L		7,848	6,042
Benzo fast black L	By		
Direct fast black B	L		
Oxamine light black EB	B		
Benzo fast Bordeaux 6 BL	By	1,990	
Benzo fast brown		5,976	6,457
Benzo fast brown 3 GL	By		
Benzo fast brown RL	By		
Benzo light brown 3GL	By		
Benzo fast gray		2,476	2,238
Benzo fast gray BL	By		
Benzo light gray BL	By		
Diamine fast gray BN	C		
Oxamine light gray EB	B		
Benzo fast heliotrope		3,567	5,995
Benzo fast heliotrope BL	By		
Benzo fast heliotrope 4BL	By		
Benzo fast heliotrope 2RL	By		
Benzo fast heliotrope 5RH	By		
Brilliant benzo fast violet BL	By		
Benzo fast light scarlet 4BL	By	6	
Benzo fast orange		1,426	
Benzo fast orange 2RL	By		
Dianil fast orange 2R	M		
Benzo fast rubine		1,111	1,711
Benzo fast rubine BL	By		
Diamine fast rubine FB	C		
Diamine fast rubine RF	C		
Benzo fast scarlet		126	
Benzo fast scarlet 5BL	By		
Benzo fast scarlet 6BSL	By		
Benzo fast yellow 4GL extra	By	10	
Benzo green O	By	6	
Benzo red 12 B		1,841	
Benzo red 12B	By		
Direct safranin RW	L		
Benzo rhoduline red		1,785	1,174
Benzo rhoduline red 3B	By		
Benzo rhodamine red 3B	By		
Columbia red O3B	A		
Benzo rubine SC	By	50	
Benzo sky blue	By	17	
Benzoform blue G extra	By	6	
Benzoform green FFL	By	6	
Benzoform violet 2BF	By	6	
Blue		1,844	1,629
Blue, I, II, III, IV, V	BC		
Blue dye No. 1	Q		
Blue dye No. 2	Q		
Brilliant benzo fast yellow GL	By	82	
Brilliant benzo green B	By	248	
Brilliant benzo violet B		2,648	
Brilliant benzo violet B	By		
Diamine brilliant violet B	C		
Brilliant benzo violet 2R	By	1,193	
Brilliant congo blue 5R	A	100	
Brilliant congo violet R	A	310	
Brilliant cotton blue R conc	K	220	
Brilliant fast blue		689	
Brilliant fast blue 2G	By		
Brilliant fast blue 3BX	By		
Brilliant pure yellow 6G extra	By	1,533	
Brilliant sky blue		4,735	
Brilliant sky blue 8G extra	By		
Brilliant sky blue 2RM	By		
Celatine blue	SD	586	
Celatine orange	SD	20	
Celatine red	SD	150	
Celatine red violet	SD	150	

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
		<i>Pounds</i>	
Celatine yellow	SD	50	
Chloramine fast yellow B	By	6	
Chloramine light gray		901	
Chloramine light gray B cone	S		
Chloramine light gray R cone	S		
Chloramine light violet K cone	S	830	
Chloramine violet FFB	By	911	
Chlorantine fast blue 2GH	L	17,268	
Chlorantine fast brown		30,202	
Chlorantine fast brown 3GH	L		
Chlorantine fast brown 2RL	L		
Chlorantine fast gray B	L	771	
Chlorantine fast green B	L	991	
Chlorantine fast violet		4,849	
Chlorantine fast violet 4BL	L		
Chlorantine fast violet 2RL	L		
Chlorantine fast yellow		7,602	
Chlorantine fast yellow 4GL	L		
Chlorantine fast yellow RL	L		
Chlorazol brown RD	BD	200	
Chlorazol fast brown RK	BD	2,486	
Chlorazol fast orange K, AK	BD	150	
Chlorazol violet R	BD	1,000	
Columbia fast leather brown	A	20	
Cotonerol		640	
Cotonerol A	A		
Cotonerol AV	A		
Cupranil brown R	L	110	
Developing pure blue GL	A	105	
Diamine azo Bordeaux		320	
Diamine azo Bordeaux BL	C		
Diamine azo fast Bordeaux B	C		
Diamine azo fast green G	C	100	
Diamine azo fast violet R	C	100	
Diamine brilliant scarlet S	C	6,000	
Diamine catechine		11,352	\$7,779
Diamine catechine B	C		
Diamine catechine B	L		
Diamine catechine G	C		
Diamine catechine R	C		
Diamine catechine GR	L		
Direct cutch brown GR	L		
Diamine fast blue		2,400	
Diamine fast blue FFB	C		
Diamine fast blue F3G	C		
Diamine fast Bordeaux 6BS	C	520	
Diamine fast brown		2,069	2,167
Diamine fast brown G	C		
Diamine fast brown GB	C		
Diamine fast brown GR	C		
Diamine fast orange		11,763	
Diamine fast orange EG	C		
Diamine fast orange ER	C		
Diamine fast red violet FR	C	100	
Diamine fast rose B, G	C	600	
Diamine fast scarlet GG	C	100	
Diamine steel blue L	C	50	
Diaminogene sky blue N	C	650	
Dianil fast violet BL	M	100	
Dianil light red 12BL	M	100	
Diazanil pink B	M	1,162	
Diazo brilliant blue 2BL extra	By	6	
Diazo brilliant green		5,132	
Developed brilliant green 3G	By		
Diazo brilliant green 3G	By		
Diazo brilliant orange GR, 5G extra	By	935	
Diazo brilliant scarlet		4,601	
Diazo brilliant scarlet G extra	By		
Diazo brilliant scarlet 2BL extra cone	By		
Diazo brown		1,700	2,013
Diazo brown G	By		
Diazo brown 3G	By		
Diazo brown 6G	By		
Diazo brown 3R	By		
Diazo brown 3RB	By		

TABLE 30.—Imports of dyes, calendar year, 1924—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
Diazo fast blue		Pounds	
Diazamine blue 4R	S	1,642	\$4,132
Diazo fast blue 6GW	I		
Diazo fast blue 4RW	I		
Diazo fast bordeaux BL	By	220	
Diazo fast green BL	By	55	
Diazo fast red 3B	By	55	
Diazo fast violet		2,946	4,253
Developed light violet BL	By		
Diazo fast violet BL	By		
Diazo fast violet 3RL	By		
Diazo light violet BL	By		
Diazo fast yellow		2,290	3,111
Developed fast yellow 2G	By		
Developed light yellow 2G	By		
Developed yellow 2G	By		
Diazo yellow G	By		
Diazo yellow 2G	By		
Diazo geranine		559	
Diazo geranine B extra	By		
Zambesi pink B extra	A		
Diazo indigo blue		7,758	18,677
Developed indigo blue 4GL extra	By		
Diazo indigo blue 4GL	By		
Diazo rubine B	By	202	
Diazo sky blue		4,785	
Diazo sky blue 3G	By		
Diazo sky blue 3GL	By		
Diazo solamine I, II, III	BC	39	10
Diazo yellow R	By	100	
Diazophenyl black V	G	6,614	
Diphenyl catechine R supra	G	551	
Diphenyl fast bronze B	G	1,102	
Diphenyl fast gray BC	G	330	
Direct black RMW	C	300	
Direct brown		353	
Direct brown	Q		
Direct brown 3GL	By		
Direct fast orange R	I	110	
Duranol blue G paste	BD	125	
Duranol orange G paste	BD	125	
Duranol red BB, G, GG	BD	358	
Fast cotton gray		1,410	1,341
Fast cotton gray BL	A		
Fast cotton gray GL	A		
Fast cotton gray VL	A		
Fast cotton green B, G	A	20	
Fast cotton orange 2RL	A	100	
Fast cotton rose 2B	A	5	
Fast cotton rubine B, 3B	A	10	
Fast cotton violet 4R	A	5	
Formal fast black G conc	G	100	
Foulard discharge blue B	By	6	
Golden orange I	BC	193	
Golden yellow VIII	BC	463	
Half-wool blue 3R	By	97	
Ionamine A, B, II, L, GA, KA, MA	BD	130	161
Ionamine red GA, KA	BD	70	
Minaxo (oxamine) claret BXX	B	300	
Minaxo (oxamine) light blue G	B	200	
Minaxo (oxamine) light pink	B	300	
Naphthamine fast brown		1,100	
Naphthamine fast brown BL	K		
Naphthamine light brown 2G	K		
Naphthogene blue		1,262	
Developing blue B	A		
Naphthogene blue B	A		
Orange I	BC	466	
Oxydiamine brown G, 3GN, RN	C	42	34
Parasulphon brown		1,330	
Parasulphon brown G	S		
Parasulphon brown V	S		
Polyphenyl blue GS	G	4,982	
Pure yellow I	BC	395	
Pyrazol orange R conc	S	300	
Red I, III, V	BC	1,119	

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
		<i>Pounds</i>	
Rosanthere orange R.....	I.....	4,959	
Rosanthere violet 5R.....	I.....	135	
Solamine I, II, III.....	BC.....	1,087	\$272
Toluylene fast brown 3G, 2R.....	By.....	230	
Universal blue C.....	C.....	5	
Universal brown C.....	C.....	5	
Universal gray C.....	C.....	5	
Universal heliotrope C.....	C.....	10	
Universal leather brown.....	C.....	5	
Zambesi black.....		7,913	4,575
Developing black FFN.....	By.....		
Diazo fast black SD.....	By.....		
Diazophenyl black 3B.....	G.....		
Oxamine black BBNX.....	B.....		
Zambesi black D.....	A.....		
Zambesi black F.....	A.....		
Zambesi black V.....	A.....		
Zambesi red B pdr.....	A.....	220	
Rapid fast dyes—			
Rapid fast Bordeaux B paste.....	Gr-E.....	100	
Rapid fast orange RG paste.....	Gr-E.....	100	
Rapid fast red.....		425	279
Rapid fast red B paste.....	Gr-E.....		
Rapid fast red BB paste.....	Gr-E.....		
Rapid fast red GL paste.....	Gr-E.....		
Rapid fast red GZ paste.....	Gr-E.....		
Rapid fast red 3GL paste.....	Gr-E.....		
Rapid fast yellow G paste.....	Gr-E.....	100	

UNIDENTIFIED SULPHUR DYES

Cross dye green.....		35,246	
Cross dye green B.....	BD.....		
Cross dye green 2G conc.....	BD.....		
Immedial purple C.....	C.....	500	
Immedial violet C.....	C.....	500	
Katigene bronze LX extra.....	By.....	6	
Katigene brown VR extra.....	By.....	6	
Katigene deep black BN, FGC, TN ex.....	By.....	17	\$6
Katigene indigo.....		1,686	
Katigene indigo CLGG ex.....	By.....		
Katigene indigo FR ex.....	By.....		
Katigene orange O.....	By.....	6	
Katigene yellow brown RLX extra, 3RLX extra.....	By.....	11	
Pyrogene brilliant blue 6B.....	I.....	441	
Pyrogene brown G.....	I.....	2,204	
Pyrogene cutch brown RR extra.....	I.....	2,205	
Pyrogene violet brown X.....	I.....	661	
Sulphide black BL extra strong.....	M.....	25	
Sulphide brown S.....	M.....	100	
Sulphide direct blue R conc, G conc.....	M.....	20	
Sulphide green BL extra conc., GL extra conc.....	M.....	20	
Sulphide new blue BL conc., CL conc., JL ex. conc.....	M.....	50	39
Sulphide violet V.....	M.....	700	
Sulphur black TBF.....	A.....	3,000	
Sulphur black brown GL ex. conc.....	A.....	10	
Sulphur brilliant blue.....		2,010	
Sulphur brilliant blue CLB.....	A.....		
Sulphur brilliant blue CL2R.....	A.....		
Sulphur brown.....		1,110	
Sulphur brown CLG.....	A.....		
Sulphur brown CL4R.....	A.....		
Sulphur catechu G.....	A.....	200	
Sulphur corinth CLB.....	A.....	25	
Sulphur olive brown A extra.....	A.....	5	
Sulphur yellow G extra.....	A.....	710	
Thionol brilliant blue 6BS conc.....	S.....	6,001	
Thionol brown.....		16,060	
Thionol brown O.....	BD.....		
Thionol brown R.....	BD.....		

TABLE 30.—Imports of dyes, calendar year 1924—Continued

UNIDENTIFIED BASIC DYES

Name of dye	Manu- facturer	Imports	
		Quantity	Invoice value
		<i>Pounds</i>	
Acridine brown O conc.....	Q	55	
Acridine scarlet J.....	DH	55	
Acridine yellow A O.....	M	20	
Brilliant acridine orange.....		1,045	\$2,340
Brilliant acridine orange R conc.....	Q		
Brilliant acridine orange 3R.....	DH		
Brilliant acridine orange 5R.....	DH		
Brilliant rhodamine blue R.....	By	890	
Chrysoidine BL base.....	B	25	
Chryso phosphine 2G conc.....	Q	55	
Corvoline BT.....	B	661	
Leather black TBO.....	C	300	
Methyl violet 5R.....	M	150	
Methylene blue 3G.....	B	200	
Methylene gray B new.....	B	100	
Rhodamine blue GG extra, 3GO.....	By	57	
Rhodamine sky blue.....		385	666
Rhodamine sky blue 3G.....	By		
Rhodamine sky blue BB.....	By		
Rhoduline sky blue 3G.....	By		
Tannocyanine B.....	M	25	

UNIDENTIFIED SPIRIT-SOLUBLE AND COLOR-LAKE DYES

Brilliant helio blue FFR.....	By	130	
Brilliant helio green GG ex.....	By	30	
Brilliant orange R.....	A	10	
Hansa green G pdr.....	M	10	
Hansa orange R pdr.....	M	5	
Hansa red B pdr.....	M	5	
Hansa yellow G—			
Hansa yellow G paste.....	M	3,000	
Hansa yellow G pdr.....	M	4,480	
Hansa yellow.....			\$385
Hansa yellow 10G paste.....	M	20	
Hansa yellow 10GT paste.....	M		
Hansa yellow 10G pdr.....	M		
Hansa yellow 5G pdr.....	M	430	
Hansa yellow R pdr.....	M		
Hansa yellow 10G lumps.....	M	5	
Helio Bordeaux—			
Helio Bordeaux BL paste.....	By	1,399	
Helio Bordeaux BL pdr.....	By	1,690	
Helio fast rubine LBK pdr.....	By	6	
Helio fast violet.....		226	
Helio fast violet AL.....	By		
Helio fast violet 2RL.....	By		
Helio fast yellow H 10G pdr.....	By	7	
Helio fast yellow H 5G.....	By	39	
Helio marine RL pdr.....	By	110	
Helio red RMT extra pdr.....	By	106	
Japan black extra.....	B	500	
Stone (Lithol) fast yellow.....		317	470
Stone fast yellow 5G.....	B		
Stone fast yellow 10G.....	B		
Stone fast yellow 10GL.....	B		
Stone (Lithol) fast orange R pdr.....	B	500	
Oil red G paste.....	Q	11	
Paper fast Bordeaux B.....	By	1,819	
Permanent red F6R extra, F3R extra.....	A	10	
Spirit fast red 5B.....	B	10	
Sudan AB, OB.....	A	6	
Tero (Typophor) black FB.....	B	400	
Tero (Typophor) carmine FB.....	B	125	
Tero (Typophor) red FG.....	B	7	
Tero (Typophor) yellow FR.....	B	600	

UNIDENTIFIED, UNCLASSIFIED DYES

All other aniline dyes.....		608	\$1,038
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Name of dye	Schultz No.	Page	Name of dye	Schultz No.	Page
Aceto purpurine 8B	358	90	Alizarin blue black B, 3B	862	99
Acid alizarin blue black R		105	Alizarin Bordeaux BP	787	96
Acid alizarin blue BBN	790	97	Alizarin Bordeaux GP		105
Acid alizarin gray G		105	Alizarin brilliant green G	865	99
Acid anthracene brown KE		105	Alizarin brown RD, SW	782	96
Acid anthracene brown PG, WSG	88	88	Alizarin carmine	780	96
Acid anthracene red 3B, 5BL	400	91	Alizarin claret R	797	97
Acid black		102	Alizarin cyanine NS, WRB	788	96
Acid blue BBX		102	Alizarin cyanine green G, 3G	865	99
Acid blue RBF	562	93	Alizarin cyclamine R		105
Acid chrome blue 3G, 3RX		105	Alizarin direct blue A		102
Acid chrome yellow GL, RL		105	Alizarin direct blue B	851	99
Acid cyanine BF	705	95	Alizarin direct blue BGAOO	860	99
Acid green extra conc.	505	92	Alizarin direct violet R	852	99
Acid green G, 2G	505	92	Alizarin direct violet E 2B		102
Acid magenta	524	92	Alizarin emeraldole G		102
Acid milling black B	265	89	Alizarin emeraldole green G		105
Acid milling red G conc	293	90	Alizarin fast brown GL		105
Acid milling red R	400	91	Alizarin fast gray 2 BL		105
Acid phosphine R	606	94	Alizarin fast light red 5G		105
Acid ponceau E	175	89	Alizarin geranole B		102
Acid pure blue R		102	Alizarin green S	808	97
Acid rhodamine 3R		102	Alizarin heliotrope R		105
Acid violet 4BLO	530	92	Alizarin indigo B	894	100
Acid violet 4B	530	92	Alizarin indigo G	893	100
Acid violet 6BNOO	548	93	Alizarin indigo 3R	895	100
Acid violet 7B	534	92	Alizarin indigo 3G, 5R, 7R		103
Acid violet 8B extra	527	92	Alizarin indigo black B		103
Acid violet 10B		102	Alizarin indigo brown R		103
Acid violet C 10B	530	92	Alizarin indigo gray B		103
Acid violet blue	530	92	Alizarin indigo green B	894	100
Acid violet red	526	92	Alizarin indigo green BB, G		103
Acridine brown O		111	Alizarin indigo red B		103
Acridine orange DHE	603	93	Alizarin indigo violet B	894	100
Acridine red 3B	569	93	Alizarin irisol B, R	852	99
Acridine scarlet J		111	Alizarin levelling blue B	851	99
Acridine yellow AO		111	Alizarin levelling blue BBS		102
Azalma black 10 BX	217	89	Alizarin levelling green blue B		102
Algol black CL, RO		103	Alizarin light blue B, SE	858	99
Algol blue FB		103	Alizarin light green GS		102
Algol blue 3G	844	99	Alizarin maroon	798	97
Algol blue 3R, 3RP	821	97	Alizarin orange AO, R, RG, RP, SW	779	96
Algol Bordeaux 3B	829	98	Alizarin pure blue B	855	99
Algol brilliant orange FR	822	98	Alizarin red 2 AB	778	96
Algol brilliant pink FB		103	Alizarin red 1B, D1B	778	96
Algol brilliant pink FF		103	Alizarin red PS		105
Algol brilliant red 2B	819	97	Alizarin red S, W, SW	780	96
Algol brilliant violet 2B	821	97	Alizarin red GI, SDG, XGP, YCA	785	96
Algol brilliant violet R	820	97	Alizarin rubinol 3G, 5G, GW, R		102
Algol brilliant violet RRK	820	97	Alizarin sapphire blue SE	858	99
Algol brown G		103	Alizarin saphirol SE, WS, WSA, SAWSA	858	99
Algol brown R	869	100	Alizarin sky blue B	855	99
Algol corinth R	870	100	Alizarin supra blue A		102
Algol gray 2B	834	98	Alizarin viridine FF	854	99
Algol green B	847	99	Alizarin yellow 2G	48	88
Algol olive R	833	98	Alkali fast green 3G, 10G		102
Algol pink TR		103	Alliance fast brown 5G		105
Algol red B	825	98	Alphanol blue BRN		102
Algol red FF, R	819	97	Amidonaphthol red N2B	66	88
Algol red 2G, 5G	816	97	Anthosine 3B		102
Algol scarlet G	815	97	Antra Bordeaux R	827	98
Algol yellow 3G	811	97	Antra brown B	867	100
Algol yellow WF	814	97	Antra claret R	827	98
Algol yellow R	817	97	Antra pink AN, BN	910	101
Alizarin, synthetic	778	96	Antra pink B		104
Alizarin G	785	96	Antra pink R		104
Alizarin SX	784	96	Antra red B	912	101
Alizarin VI	778	96	Antra red RT	830	98
Alizarin astrol B	856	99	Antra violet B	768	66
Alizarin black S	807	97	Antra wool black 3B, T		103
Alizarin black WR, WX	774	96	Antra wool brown CM		105
Alizarin blue AS	856	99	Antra wool red CB, CR		103
Alizarin blue G, R	803	97	Antra yellow GC	759	95
Alizarin blue JR	852	99	Anthracene acid brown G	221	88
Alizarin blue S, SB, SR	804	97	Anthracene blue WB, WG	860	97
Alizarin blue SAP	858	99	Anthracene blue SWR, SWGG	790	97
Alizarin blue SKY	855	99			
Alizarin blue WS		105			

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Anthracene chromate brown EB		105	Brilliant cochineal 4R	81	88
Anthracene chrome brown DWN		106	Brilliant congo R	370	91
Anthracyanine 3FL		102	Brilliant congo blue 5R		107
Anthracyanine S	627	94	Brilliant congo violet R		107
Anthraflavone GC	759	95	Brilliant cotton blue R		107
Anthraquinone blue SR	861	99	Brilliant cresyl blue, BB	621	94
Anthraquinone blue green BXO	863	99	Brilliant croceine 3BX extra	227	89
Anthraquinone green GXNO	864	99	Brilliant delphine blue B	622	94
Anthraquinone violet	853	99	Brilliant dianil blue 6G	541	92
Auramine G	494	91	Brilliant fast blue 2G, 3BX		107
Auramine N	493	91	Brilliant geranine B	118	88
Aurine	555	93	Brilliant glacier blue	501	91
Autochrome olive brown G		106	Brilliant helio blue FFR		111
Azo acid black B		102	Brilliant helio green GG		111
Azo acid blue B	63	88	Brilliant indigo B	885	100
Azo carmine B	673	95	Brilliant indigo 4B	881	100
Azo carmine GX	672	95	Brilliant indigo G	886	100
Azo flavine FFX		102	Brilliant indigo N, 4BG		103
Azo orseille BB		102	Brilliant milling blue B, FG		102
Azo wool violet 7R		102	Brilliant milling green B	503	91
Azonine B, G, R, RR, S, SF		107	Brilliant milling red R	400	91
Azonine direct blue B		107	Brilliant pure yellow 6G		107
Azonine direct red G		107	Brilliant purpurine 10B	368	90
Azonine direct yellow RR		107	Brilliant rhodamine blue R		111
Basic yellow T, TCN	618	94	Brilliant sky blue 5G	541	92
Benzo bronze E		107	Brilliant sky blue 8G, 2RM		107
Benzo chrome brown G	476	91	Brilliant sulphon red B, 10B	182	89
Benzo dark brown extra		107	Brilliant wool blue B, FFR	562	93
Benzo fast black L		107	Brilliant wool scarlet PG	81	88
Benzo fast blue 4GL	456	91	Brilliant wool scarlet P 3R		102
Benzo fast Bordeaux 6BL		107	Brillianton orange R		111
Benzo fast brown 3GL, RL		107	Brom-indigo FB	881	100
Benzo fast gray BL		107	Brom-indigo FBP	881	100
Benzo fast heliotrope BL, 2RL		107	Cashmere black TN		102
Benzo fast heliotrope 4BL, 5RH		107	Cashmere blue TG		102
Benzo fast light scarlet 4BL		107	Celatine blue		107
Benzo fast orange 2RL		107	Celatine orange		107
Benzo fast red 8BL	332	90	Celatine red		107
Benzo fast rubine BL		107	Celatine red violet		107
Benzo fast scarlet 4BS, 5BS, GS	279	90	Celatine yellow		107
Benzo fast scarlet 5BL, 6BSL		107	Chicago red III	194	89
Benzo fast yellow 4GL		107	Chloramine fast yellow B		108
Benzo fast yellow RL	296	90	Chloramine light gray B, R		108
Benzo green O		107	Chloramine light violet R		108
Benzo light blue 4GL	456	91	Chloramine red SBS	358	90
Benzo light brown 3GL		107	Chloramine violet FFB		108
Benzo light gray BL		107	Chloramine yellow GG	617	94
Benzo red 12B		107	Chlorantine fast blue 2GL		108
Benzo rhodamine red 3B		107	Chlorantine fast brown 3GL, RL		108
Benzo rhoduline red 3B		107	Chlorantine fast gray B		108
Benzo rubine SC		107	Chlorantine fast green B		108
Benzo scarlet BC	319	90	Chlorantine fast violet 2RL, 4BLN		108
Benzo sky blue		107	Chlorantine fast yellow 4GL, RL		108
Benzo violet O	326	90	Chlorazol brown RD		108
Benzoform blue G		107	Chlorazol fast brown RK		108
Benzoform green FFL		107	Chlorazol fast orange K, AK		108
Benzoform violet 2BF		107	Chlorazol violet R		108
Biebrich scarlet R	232	89	Chromacetine blue S	627	94
Black		102	Chromal blue GC	552	93
Black, extra, RR	274	90	Chromanol black RVI		106
Black blue G	698	95	Chromazurine DN, E, G		106
Blue 1900 TCD	635	94	Chromazurol S	554	93
Blue extra	546	92	Chrome brilliant blue G		106
Blue I, II, III, IV, V		107	Chrome brilliant yellow 3G		106
Blue No. 1, No. 2		107	Chrome brown RVV	158	89
Blue NA	273	89	Chrome fast blue FB, BX		106
Brilliant acid blue A, FF	545	92	Chrome fast garnet BL		106
Brilliant acid blue CB, EG		102	Chrome fast phosphine R		106
Brilliant acid blue V	543	92	Chrome fast yellow 5RP		106
Brilliant acid green 6B	503	91	Chrome garnet B		106
Brilliant acridine orange A	603	93	Chrome green BD, GD	509	92
Brilliant acridine orange R, 3R, 5R		111	Chrome olive JCSB		106
Brilliant alizarin blue R	667	95	Chrome printing blue G		106
Brilliant benzo fast violet BL		107	Chrome printing red B, Y		106
Brilliant benzo fast yellow GL		107	Chrome sky blue B		106
Brilliant benzo green B		107	Chrome violet	557	93
Brilliant benzo violet B		107	Chrome yellow CR		106
Brilliant blue G	551	93	Chromocitronine R, V	140	89
Brilliant chrome blue 2B, R		106	Chromocitronine 3R		106
Brilliant chrome violet 4B	549	93	Chromorhodine BB, BN, BR, 6GN		106
Brilliant chrome violet RG, 3R		106	Chromorosamine 2B		106

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Chromoxane azulol BD		106	Diamine azo fast Bordeaux BL		108
Chromoxane brilliant blue G	551	93	Diamine azo fast green G		108
Chromoxane brilliant violet SB		106	Diamine azo fast violet R		108
Chrysoidine BL base		106	Diamine brilliant blue G	418	91
Chrysoosphine 2G		106	Diamine brilliant Bordeaux R	319	90
Ciba blue 2BD	881	100	Diamine brilliant scarlet S		108
Ciba Bordeaux B	919	101	Diamine brilliant violet B		107
Ciba gray B	899	101	Diamine bronze G	448	91
Ciba heliotropic B	897	100	Diamine brown B	349	90
Ciba orange G	911	101	Diamine catechine B, G, GR		108
Ciba pink B	912	101	Diamine fast blue FFB, F3G		108
Ciba pink BG		103	Diamine fast Bordeaux 6BS		108
Ciba printing black B, G		103	Diamine fast brown G, GB, R		107
Ciba red G	906	101	Diamine fast gray BN		108
Ciba red 3B	918	101	Diamine fast orange EG, ER		108
Ciba re-1 R	908	101	Diamine fast pink B, G		108
Ciba scarlet G extra	907	101	Diamine fast red 8BL	343	90
Ciba violet B, R	901	101	Diamine fast red violet FR		108
Cibanone black B, 2G	794	97	Diamine fast rubine FB, RF		107
Cibanone blue G	843	99	Diamine fast scarlet GG		108
Cibanone blue 2G		103	Diamine orange B	339	90
Cibanone brown B	868	100	Diamine orange F	373	91
Cibanone brown R		103	Diamine scarlet 3B	319	90
Cibanone green G		103	Diamine sky blue FF	424	91
Cibanone orange R	792	97	Diamine steel blue L		108
Cibanone orange 3R, 6R		103	Diaminogene extra	274	90
Cibanone red C, G		103	Diaminogene blue NA	273	89
Cibanone yellow R	795	97	Diaminogene sky blue N		108
Cloth fast red GRG		102	Diamond black P 2B		106
Cloth fast yellow G		102	Diamond Bordeaux R		106
Cloth red G	224	89	Diamond phosphine R	609	94
Coerulein S	601	93	Dianil fast orange RR		107
Columbia blue G	387	91	Dianil fast violet BL		108
Columbia blue R	325	90	Dianil light red 12 BL		168
Columbia fast leather brown BX	108		Dianil pure blue PH	424	91
Columbia fast leather brown GX	108		Diazamine blue 4R	273	89
Columbia fast leather brown RX	108		Diazanil blue BB	273	89
Columbia fast leather brown 3R	108		Diazanil pink B		108
Columbia red O 3B	107		Diazine black G	125	88
Congo brown G	477	91	Diazo blue 2R	273	89
Congo orange G	315	90	Diazo brilliant black B	364	90
Congo orange R	373	91	Diazo brilliant blue 2BL		108
Congo rubine B	313	90	Diazo brilliant green 3G		108
Corioflavine GOOO	609	94	Diazo brilliant orange GR, 5G		108
Corioflavine RROOO	609	94	Diazo brilliant scarlet 2BL, G		108
Chrysoosphine OX	606	94	Diazo brown G, 3G, 6G, 3R, 3RB		108
Corviline BT		111	Diazo fast black SD		110
Cotonerol A, V		108	Diazo fast black MG	274	90
Cotton black E	463	91	Diazo fast blue 4RW, 6GW		109
Cotton black RW	462	91	Diazo fast Bordeaux BL		109
Cotton blue No. 2	539	92	Diazo fast green BL		109
Cotton blue R	649	94	Diazo fast red 3B		109
Cotton pink BN	121	88	Diazo fast violet BL, 3RL		109
Cotton pink GN	122	88	Diazo fast yellow G, 2G		109
Cotton red 4BX	363	90	Diazo geranine B		109
Cotton scarlet extra	227	89	Diazo indigo blue 2RL, 3RL	274	90
Cross dye green B		110	Diazo indigo blue 4GL		109
Cross dye green 2G		110	Diazo light green BL		109
Crystal violet, P	516	92	Diazo rubine B		109
Cupranil brown G	476	91	Diazo sky blue 3G, 3GL		109
Cupranil brown R		108	Diazo solamine I, II, III		109
Cutehbrown 2R conc	344	90	Diazo yellow R		109
Cyananthrol BGAOO	860	99	Diazophenyl black 3B		110
Cyanol extra	546	92	Diazophenyl black V		109
Cyanol FF	546	92	Diphene blue B	695	95
Dahlia violet	61	88	Diphene blue R	690	95
Delphine blue B	622	94	Diphenyl brown BBNC, GS	348	90
Deltapurpurine 5B	366	90	Diphenyl catechine G	206	89
Developed brilliant green 3G		108	Diphenyl catechine R supra		109
Developed green 3G		108	Diphenyl chlorine yellow FF	617	94
Developed fast yellow 2G		109	Diphenyl chrysoine RRC	205	89
Developed indigo blue 4GL		109	Diphenyl fast bronze B		109
Developed light violet BL		109	Diphenyl fast brown GNC, GF	207	82
Developed light yellow 2G		109	Diphenyl fast gray BC		109
Developed yellow 2G		109	Direct black RMW		109
Developing black B	274	90	Direct brilliant blue 8B	541	92
Developing black OB, OT	308	90	Direct brown, 3GL		109
Developing black PFN		110	Direct cutch brown GR		108
Developing blue B		109	Direct fast black B		107
Developing blue 2R	273	89	Direct fast orange K	392	97
Developing pure blue GL		108	Direct fast orange R		109

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Direct gray R	681	95	Half wool blue 3R		109
Direct safranin RW		107	Hansa green G		111
Direct yellow CH	304	90	Hansa orange R		111
Duranol blue G		109	Hansa red B		111
Duranol orange G		109	Hansa yellow G		111
Duranol red BB, G, GG		109	Hansa yellow 5G		111
Duranthrene brilliant violet R	820	95	Hansa yellow 10G, R		111
Duranthrene red BN	831	95	Helindone black B		103
Duranthrene golden orange Y	760	96	Helindone black IBB, IBR	765	96
Durindone red 3B	918	101	Helindone blue IBCS		104
Eosine A, NDA	587	93	Helindone blue IGC D	842	99
Erica B	121	88	Helindone blue I 3G	840	98
Erio fast fuchsine BBL		102	Helindone blue I RS	838	98
Erio green B supra	564	93	Helindone blue 3R	896	100
Erio navy blue		102	Helindone brilliant blue IR		104
Erio viridine B	503	91	Helindone brilliant violet IBBK	821	97
Eriochromal gray 5G		106	Helindone brilliant violet IRK	820	97
Eriochrome azuril BC, BX	551	93	Helindone brown AN	873	100
Eriochrome black T	183	89	Helindone brown CM, C 3R		103
Eriochrome blue black G, BC	180	89	Helindone brown G	904	101
Eriochrome cyanine RC	553	93	Helindone brown IG, IGG		105
Eriochrome flavine A cone		106	Helindone brown IR, IRT	869	100
Eriochrome green L		106	Helindone brown 1 3R		105
Eriochrome red G		106	Helindone brown 2R	902	101
Eriocyanine AC	531	92	Helindone claret red B		103
Erioglaucine AP, EP	506	92	Helindone corinth IRK	870	100
Erythrosine extra	592	93	Helindone dark blue IBO	763	96
Ethyl violet	518	92	Helindone fast scarlet C	907	101
Euchrysin G, GRNTN	608	94	Helindone fast scarlet B, G		103
Excelsior brown	283	90	Helindone fast scarlet R	915	101
Fancy black	217	89	Helindone golden orange IG, DIG	760	96
Fast acid eosine G	581	93	Helindone golden orange IRRT	761	96
Fast acid green BB		102	Helindone golden orange 1 3R		105
Fast acid violet B, R	580	93	Helindone green G	892	100
Fast acid violet RGE	582	93	Helindone green IG, IGG		105
Fast chrome green B		106	Helindone olive IR	833	98
Fast cotton gray BL, GL, VL		109	Helindone orange 1 4R	762	96
Fast cotton green B, G		109	Helindone orange R	913	101
Fast cotton orange 2RL		109	Helindone pink AN, BN	910	101
Fast cotton pink 2B		109	Helindone pink B		104
Fast cotton red 8BL	332	90	Helindone pink R		104
Fast cotton rubine B, 3B		109	Helindone pink IB		105
Fast cotton violet 4R		109	Helindone printing black RD		104
Fast cotton yellow RL	296	90	Helindone red B	917	101
Fast green extra bluish	523	92	Helindone red BB, CR		104
Fast light red BL, GL		102	Helindone red IBN	831	98
Fast light yellow, 2G, 3G	19	88	Helindone red DIBN, IRK	831	98
Fast sulphon black F	264	89	Helindone red 3B	918	101
Fast sulphon green 2G		102	Helindone red IGG		104
Fast sulphon violet 5BS	182	89	Helindone red 15 GK		104
Flavophosphine G	609	94	Helindone reddish brown IR	873	100
Formal fast black G		109	Helindone reddish violet IRH	918	101
Foulard discharge blue B		109	Helindone violet B, 2B, R	920	101
French blue		102	Helindone violet IB	768	96
Fuchsine N	512	92	Helindone violet IBN	832	98
Fur black DG	923	101	Helindone yellow AGC	759	95
Fur blue black A, B, SB, SDF	923	101	Helindone yellow CA		104
Fur brown NZ, OP, P, PY, 2R, 4R	923	101	Helindone yellow IG	849	99
Fur brown SK, SKG	923	101	Helindone yellow IGK	817	97
Fur gray ALA, B	923	101	Helindone yellow I 3RT		104
Fur gray brown SLA	923	101	Helindone yellow 3GN, IRK	810	97
Fur red brown 6R	923	101	Helio bordeaux BL		111
Fur yellow 2G, 4G	923	101	Helio fast rubine LBK		111
Furrol yellow brown G	923	101	Helio fast violet AL, 2RL		111
Gallazine #90	645	94	Helio fast yellow H 5G, H 10G		111
Gallo violet DF	635	94	Helio marine EL		111
Gallophenine D, P	658	94	Helio red RMT		111
Geranine G	118	88	Hydron black E		104
Golden orange I		109	Hydron blue G, R	748	95
Golden yellow VII		109	Hydron Bordeaux B, R		104
Grelanone brown RR		103	Hydron brown G, R		104
Grelanone orange RB		103	Hydron green, B, G		104
Grelanone red 2B		103	Hydron navy blue C		104
Grelanone scarlet G		103	Hydron olive GN, R		104
Grelanone violet BR, 3B		103	Hydron orange RF	913	101
Grelanone yellow G		103	Hydron pink FB		104
Guinea brown 2R		102	Hydron pink FF		104
Guinea fast green B	503	91	Hydron scarlet 2B, 3B		104
Guinea fast red BL, 2BL		102	Hydron sky blue FK		104
Guinea fast red 2R	94	88	Hydron violet B, R		104

Name of dye	Schultz No.	Page	Name of dye	Schultz No.	Page
Hydron wool brown D		104	Mandarin yellow	143	89
Hydron wool olive B		104	Mars red ATX		102
Hydron wool yellow G		104	Martius yellow	6	88
Hydron yellow NF		104	Meldola's blue 3R cone	649	94
Immedial brown RR	725	95	Metachrome blue black 2BK		106
Immedial direct blue B	724	95	Metachrome brilliant blue 2BL		106
Immedial indogene GCL	733	95	Metachrome brilliant blue 8RL		106
Immedial purple C		110	Metachrome brown 6G		106
Immedial violet C		110	Metachrome green G, 3G		106
Imperial scarlet 3B	247	89	Metachrome olive B, D, 2G		106
Indanthrene black BB	765	96	Metachrome olive brown G		106
Indanthrene black BGA		104	Metachrome red G		106
Indanthrene blue BCD		104	Metachrome violet B, 2R		106
Indanthrene blue BCS		104	Methyl blue MBS	537	92
Indanthrene blue BGCS		104	Methyl Lyons blue	537	92
Indanthrene blue GCD	842	99	Methyl silk blue new	537	92
Indanthrene blue GGSP	841	98	Methyl violet base	515	92
Indanthrene blue GGSZ		98	Methyl violet NFB	515	92
Indanthrene blue 3G	810	98	Methyl violet 5R		111
Indanthrene blue RS, RSP	838	98	Methylene blue BG, NB	659	94
Indanthrene blue WB	850	99	Methylene blue 3G		111
Indanthrene blue RC, RHZ, RZ		104	Methylene gray B		111
Indanthrene blue green B	765	96	Methylene green G	660	94
Indanthrene Bordeaux B	828	98	Methylene heliotrope	687	95
Indanthrene brilliant blue R		104	Methylene yellow II	618	94
Indanthrene brown B	867	100	Milling orange G		102
Indanthrene brown R	869	100	Milling yellow G, 03G	177	89
Indanthrene brown 3R		105	Milling yellow F 3G, R		102
Indanthrene copper R	813	97	Mikado yellow	10	88
Indanthrene corinth RK	870	100	Minaxo black BBNX		110
Indanthrene dark blue BO	763	96	Minaxo blue 4RX	385	91
Indanthrene golden orange G	760	96	Minaxo claret BXX		109
Indanthrene golden orange RRT	761	96	Minaxo green BX	474	91
Indanthrene golden orange 3R		105	Minaxo light black EB		107
Indanthrene pink B		105	Minaxo light blue G		109
Indanthrene red BN	831	98	Minaxo light gray EB		107
Indanthrene red brown R	873	100	Minaxo light pink BBX		109
Indanthrene red violet RRK, RRN	871	100	Minaxo pure blue 6B	424	91
Indanthrene scarlet GS	762	96	Modern gray RCN		106
Indanthrene violet BN	832	98	Modern green N		106
Indanthrene violet RR	767	96	Modern heliotrope DH	625	94
Indanthrene yellow G	849	99	Modern royal blue	627	94
Indian yellow FF	141	89	Modern violet	635	94
Indigo, synthetic	874	100	Modern violet N	624	94
Indigo 4B	881	100	Mordant yellow G	177	89
Indigo 6B	883	100	Nako B, DR, PS, RH	923	101
Indigosol DII	876	100	Nako black DBB	923	101
Indigosol O, 04B	876	100	Nako gray R	923	101
Indochromine BR, RR	667	95	Naphthalene green V	564	93
Indoeyanine B	705	95	Naphthamine fast brown BL		109
Indoline A	126	89	Naphthamine light brown 2G		109
Induline NN	699	95	Naphthamine yellow BNF	617	94
Ink blue BITN		102	Naphthogene blue B		109
Ionamine A, B, H, L, GA, KA, MA		109	Naphthol black BGN	272	89
Ionamine red GA, KA		109	Naphthol red GR	166	89
Janus brown B	435	91	Naphthylamine black D	266	89
Janus green B	124	88	Neolan blue 2G		102
Japan black		111	Neophosphine G	607	94
Jasmine, high. cone	140	89	Neptune blue BGX	543	92
Katigene bronze LX		110	Neptune blue BR	545	92
Katigene brown VR		110	New acid green 3BX	502	91
Katigene deep black BN, FGC, TN		110	New Bordeaux RX	320	90
Katigene indigo CLGG, FR		110	New methylene blue N, NS	663	95
Katigene orange O		111	New methylene NSS	663	95
Katigene yellow brown RLX, 3RLX		110	New yellow extra cone	139	89
Kiton blue A	545	92	Night blue	560	93
Kiton fast red IBL		102	Nigrosine T	700	95
Kiton fast violet 10B	528	92	Nigrosine wax D	698	95
Kiton fast yellow 3G	19	88	Oil red G		111
Kiton pure blue V	543	92	Omega chrome brown G		106
Kryozene violet 3RX	754	95	Omega chrome brown PB		106
Leather black TBO		111	Omega chrome claret		106
Leather brown A	283	90	Onis 3B		102
Leather yellow A	606	94	Onis violet BB		102
Lithol fast orange R		111	Opal blue	521	92
Lithol fast yellow 5G		111	Orange G	38	88
Lithol fast yellow 10G		111	Orange I		109
Lithol fast yellow 10GL		111	Orseille red V	52	88
Magenta AB, IA, S	512	92	Oxamine black BBNX		110
Malachite green	495	91	Oxamine claret BBX		109
Malta gray J	681	95	Oxamine light blue G		109

Name of dye	Schultz No.	Page	Name of dye	Schultz No.	Page
Oxamine light pink BBX		109	Rosolane O	687	95
Oxydiamine brown G		109	Runic AL	607	94
Oxydiamine brown 3GN		109	Safranin B conc	679	95
Oxydiamine brown KRS	476	91	Salmon red	120	88
Oxydiamine brown RN		109	Scarlet RR	82	88
Oxydiamine violet BF	326	90	Setoglaucline	496	91
Palatine chromate black B		106	Setopaline	500	91
Palatine chrome brilliant violet B		106	Silk blue BT5B		102
Paper fast Bordeaux B		111	Silver gray P	700	95
Parasulphon brown G, V		109	Solamine I, II, III		110
Patent blue A	545	92	Solochrome brown MO		106
Patent blue V	543	92	Soluble blue T	539	92
Patent phosphine G	606	94	Sorrel red X	64	88
Patent phosphine 2G	606	94	Spirit fast red 5B		111
Patent phosphine M	606	94	Stilbene yellow 3GX	10	88
Patent phosphine R (D)	606	94	Stone fast orange R		111
Patent phosphine GRNTN	608	94	Stone fast scarlet RN	73	88
Patent phosphine RRDx	608	94	Stone fast yellow 5G		111
Permanent red F 3R, F 6R		111	Stone fast yellow 10G		111
Phladelphina yellow 2G	606	94	Stone fast yellow 10GL		111
Phosphine O, 3R	606	94	Sudan AB, OB		111
Pilatus black SF	220	89	Sulphide black BL		110
Polar orange R		102	Sulphide brown S		110
Polar red G, 3B		102	Sulphide direct blue GR		110
Polyphenyl blue GC	471	91	Sulphide green BL, GL		110
Polyphenyl blue GS		109	Sulphide new blue BL, CL, JL		110
Poseidon blue BGX	543	92	Sulphide violet V		110
Poseidon blue BRX, BXX	545	92	Sulpho rosazinc B	579	93
Poseidon green SGX	503	91	Sulpho rosazinc G		102
Pure yellow I		109	Sulphon cyanine G	257	89
Purpurine	783	96	Sulphon orange G		102
Pyramine yellow GX	304	90	Sulphon yellow G, 5G, R		102
Pyrazol orange G	392	91	Sulphonine black B	265	89
Pyrazol orange R		109	Sulphur black AWL	720	95
Pyrogene brilliant blue 6B		110	Sulphur black TBF		110
Pyrogene brown G		110	Sulphur black brown GL		110
Pyrogene cutch brown 2R		110	Sulphur brilliant blue CLB		110
Pyrogene direct blue	726	95	Sulphur brilliant blue CL2R		110
Pyrogene green 3G, GK	746	95	Sulphur brown CLG		110
Pyrogene violet brown X		110	Sulphur brown CL4R		110
Pyrogene yellow M	734	95	Sulphur catechu G		110
Pyronine G	568	93	Sulphur corinth CLB		110
Quinoline yellow	612	94	Sulphur olive brown A		110
Quinoline yellow conc	613	94	Sulphur yellow G		110
Quinoline yellow N, KT	613	94	Supra light yellow 2GL	22	88
Radio black SB		102	Supramine black BR		102
Radio brown B		102	Supramine Bordeaux B		102
Radio red VB		102	Supramine brown G, R		102
Radio yellow R		102	Supramine green G		102
Rapid fast Bordeaux B		110	Supramine red B, 2G, 3B		102
Rapid fast orange RG		110	Supramine yellow G		103
Rapid fast red B, BB		110	Supramine yellow R		103
Rapid fast red GL, GZ		110	Tannin heliotrope	685	95
Rapid fast red 3GL		110	Tannin orange R	74	88
Rapid fast yellow G		110	Tannocyanine B		111
Red I, III, V		109	Tero black FB		111
Reddish brown eastor	160	89	Tero carmine FB		111
Resorcin brown F	211	89	Tero red FG		111
Rheonine AL	607	94	Tero yellow FR		111
Rhodamine B extra	573	93	Thioflavine T, TCN	618	94
Rhodamine G	572	93	Thioindigo brown G	904	101
Rhodamine S	570	93	Thioindigo orange R	913	101
Rhodamine 6G	571	93	Thioindigo pink RN		104
Rhodamine 6GDN	571	93	Thioindigo red B	912	101
Rhodamine blue GG, 3GO		111	Thioindigo red 3B	918	101
Rhodamine scarlet G	576	93	Thioindigo scarlet 2G	907	101
Rhodamine sky blue 3G		111	Thioindigo scarlet R	905	101
Rhoduline orange NO	603	93	Thional brilliant blue 6BS		110
Rhoduline sky blue BB		111	Thionine blue G, GO	661	94
Rhoduline sky blue 3G		111	Thionine blue G old	661	94
Rhoduline yellow T, 6G	618	94	Thionol brown O, R		110
Rosanthere orange R		110	Toluylene fast brown 2R		110
Rosanthere violet 5R		110	Toluylene fast brown 3G		110
Rosazinc B extra	573	93	Toluylene fast orange GL	392	91
Rosazinc G extra	572	93	Toluylene orange R	362	90
Rosazinc 6G	571	93	Toluylene red	358	90
Rosazinc 6GD	571	93	Triazogene orange R	26	88
Rosazinc S	570	93	Trident red RXX	194	89
Rose bengale B	597	93	Trisulphon brown B	449	91
Rosinduline 2B bluish	673	95	Trisulphon brown GG	457	91
Rosinduline GXF	672	95	Turquoise blue, BB, G	498	91

Name of dye	Schultz No.	Page	Name of dye	Schultz No.	Page
Typophor black FB		111	Vat olive R	833	98
Typophor carmine FB		111	Vat orange FR	822	98
Typophor red FG		111	Vat orange I 4R, 4R	762	96
Typophor yellow FR		111	Vat orange R, RRK	822	98
Ultra corinth B		106	Vat orange 6RTK	824	98
Ultra cyanine RB	644	94	Vat orange RRT	761	96
Ultra cyanol B		106	Vat pink AN, BN	910	101
Ultra orange R	58	88	Vat pink B		105
Union black S	462	91	Vat printing black BR		105
Universal blue C		110	Vat red FF, R	819	97
Universal Bordeaux C	319	90	Vat red GG		105
Universal brown C		110	Vat red 5G, 5GK	816	97
Universal dark blue C	459	91	Vat red R (B)	830	98
Universal dark brown C	344	90	Vat red BN, RK, RKP	831	98
Universal dark green C	474	91	Vat red 3B	918	101
Universal gray C		110	Vat red violet RH	918	101
Universal heliotrope C		110	Vat red violet RRK	871	100
Universal leather brown C		110	Vat scarlet G	815	97
Universal light blue C	415	91	Vat violet B	765	96
Universal olive blue C	349	90	Vat violet BN	832	98
Universal olive brown C	349	90	Vat violet R	766	96
Universal scarlet C	363	90	Vat violet for lakes		105
Universal steel blue C	423	91	Vat yellow G	849	99
Universal violet C	327	90	Vat yellow GC	759	95
Universal yellow C	617	94	Vat yellow GK	817	97
Vat black BB	765	96	Vat yellow GP		105
Vat blue BCD, BCS		104	Vat yellow 5G	811	97
Vat blue GC, GCN	843	99	Vat yellow 6G, 6GD		105
Vat blue GCD, GCDN	842	99	Vat yellow RK	810	97
Vat blue GGS, GGSZ	841	98	Vat yellow 3RT		105
Vat blue 3G (B)	840	98	Vesuvine BL, BLX	284	90
Vat blue 3G, 3GP, 5G	844	99	Victoria blue B	559	93
Vat blue 1GGSNL, IRL		105	Victoria blue R	558	93
Vat blue RK	839	98	Victoria pure blue BO	559	93
Vat blue RS, RSP	838	98	Water blue	539	92
Vat blue 3GT		103	Wool black GRF	220	89
Vat Bordeaux B	825	98	Wool black 6B	220	89
Vat Bordeaux B extra	827	98	Wool black BR		103
Vat brilliant orange FR	822	98	Wool blue 2B, 5B, G	565	93
Vat brilliant violet BBK	821	97	Wool brown AF		103
Vat brilliant violet BR	820	97	Wool fast blue BL		103
Vat brilliant violet R, RK	820	97	Wool fast scarlet conc.		103
Vat brilliant violet RR	767	96	Wool fast yellow G		103
Vat brilliant violet RRT	767	96	Wool green S	566	93
Vat brown G, GG		105	Wool violet RC		103
Vat brown 3R		105	Xylene blue AE, AS	508	92
Vat brown R, RT, IR	869	100	Xylene blue VS	507	92
Vat corinth R, RK	870	100	Xylene fast green B	564	93
Vat dark blue BO	763	96	Xylene light yellow 2G	22	88
Vat fast scarlet G		103	Xylene light yellow R	22	88
Vat golden orange G	760	96	Xylene milling blue AE		103
Vat golden orange RRT	761	96	Xylene milling orange R		103
Vat golden orange 3G		105	Xylene milling red B		103
Vat golden orange 3R		105	Yellow JG	222	89
Vat gray 3B, BTR, RRH		105	Zambesi black D, F, V		110
Vat gray K, GK, BR	834	98	Zambesi brown 2G, 4R	330	90
Vat green BB	847	99	Zambesi pink B extra		110
Vat green G, GG		105	Zambesi red B		110
Vat khaki C		104			

PART IV

CENSUS OF SYNTHETIC ORGANIC CHEMICALS
OTHER THAN THOSE OF COAL-TAR
ORIGIN, 1924

PART IV

CENSUS OF SYNTHETIC ORGANIC CHEMICALS OTHER THAN THOSE OF COAL-TAR ORIGIN, 1924

INTRODUCTION

Beginning with 1921 the Tariff Commission has compiled an annual census of synthetic organic chemicals other than those of coal-tar origin. This census has shown, in all cases where the figures could be published without disclosing the operations of the individual producer, the quantity of production and the amount and value of sales.

As the Bureau of the Census collects data for the more important noncoal-tar organic compounds the commission has not attempted to collect statistics on such, except on a few compounds where the importance of the industry or the conditions appeared to warrant a departure from this practice.

The production in 1924 of synthetic organic chemicals other than those derived from coal tar was 115,817,865 pounds, compared with 90,597,712 pounds in 1923. Sales in 1924 amounted to 85,933,461 pounds, valued at \$20,604,717.

The present report follows the precedent established in 1921 of omitting certain types of compounds classifiable in three groups: (1) Aliphatic compounds derived from natural sources by isolation, distillation, extraction, hydrolysis, or purification. Examples of these are alkaloids, constituents of essential oils, sugars, and acids such as stearic and tartaric. (2) Cyanides, cyanamides, or carbides of metals or of inorganic radicals. (3) Products obtainable from other sources.

DEVELOPMENTS IN THE INDUSTRY

Before the World War the United States produced only a few synthetic organic chemicals of noncoal-tar origin. Among those manufactured and used in comparatively large quantities were acetone, chloroform, ether, acetic acid, formaldehyde, acetaldehyde, amyl acetate, and vanillin.

During the period from 1914-1924, inclusive, there was a remarkable expansion in this branch of the chemical industry. At present it supplies our entire requirements of many materials used as pharmaceuticals, disinfectants, perfumes, flavors, rubber accelerators, photographic developers, solvents, varnishes, as well as other kinds of products.

Synthetic aromatic chemicals.—The synthetic organic chemicals furnish the basic materials for a large number of perfumes and flavors. Products of this group made on a comparatively large scale show, in general, increased production in 1924. Those made in small amounts, and therefore at a higher cost, show a decrease. By continued research leading to lower costs of production and to the development of new products American manufacturers should be able to make further progress in this field of organic chemistry. As

in the coal-tar industry, some American producers are gaining technical advice and knowledge through their business connections with foreign manufacturers.

Among the synthetic aromatic chemicals showing increased production is vanillin, the output of which in 1924 was 320,242 pounds, as compared with 269,941 pounds in 1923. Sales in 1924 amounted to 301,221 pounds, valued at \$1,964,367. Heliotropin also showed increased production and sales in 1924, the output being 34,436 pounds, and sales 26,703 pounds, valued at \$51,129. Other products produced in relatively large amounts and showing increases over 1923 are aubepine, butyl propionate, ethyl propionate, heptaldehyde, terpinyl acetate, and triacetin.

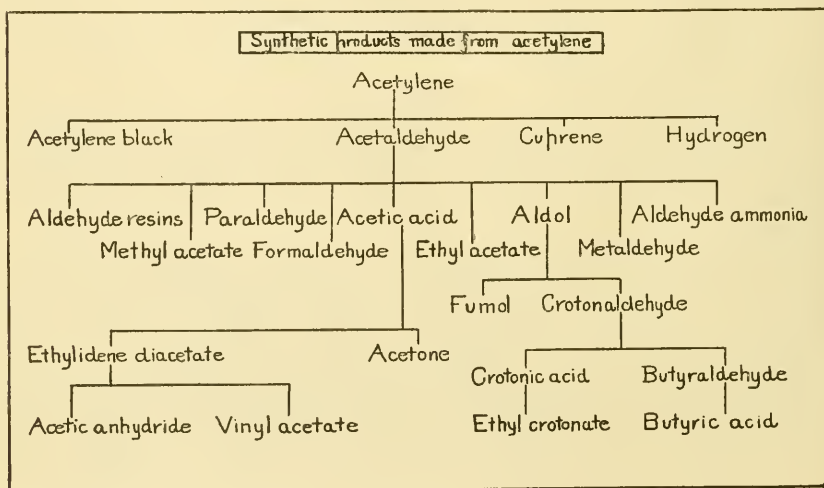
Terpineol was produced in smaller quantity in 1924 than in 1923, the output in the two years being 295,532 pounds and 322,337 pounds, respectively.

Some of the compounds reported in 1924 but not in 1923 are amyl heptoate, ethyl maleate, ethyl myristate, ethyl ricinoleate, furyl acetate, and propyl furoate.

Acetylene derivatives.—Products in this group showing increased production in 1924 are aldehyde-ammonia, used as an accelerator in the vulcanization of rubber, and acetaldehydes. The production of acetylene derivatives is dependent upon a large supply of cheap electric power for the manufacture of calcium carbide from limestone and coke. From the carbide is generated acetylene, which in turn is converted into acetaldehyde in the presence of sulfuric acid and mercury salt. Acetaldehyde may be converted into acetic acid by oxidation in the presence of a catalyst. Acetaldehyde was formerly largely imported, but in 1924 was made in commercial quantities by an American company using methods similar to those developed during the war at Shawinigan Falls, Canada.

Acetylene derivatives showing decreased production in 1924 are aldol and paracetaldehyde.

The following chart modeled on a chart published in "Drug and Chemical Markets," May 6, 1925, shows some of the derivatives that may be made starting with acetylene as the raw material.



Butanol.—The domestic manufacture of butanol by the fermentation of corn is the direct result of a war shortage of acetone needed as a solvent for both nitrocellulose and cellulose acetate. From one bushel of corn approximately 10–14 pounds of combined solvents are obtained in the proportion of 60 per cent butanol, 30 per cent acetone, and 10 per cent ethyl alcohol. Butanol is used as a solvent and vehicle in the varnish, paint, and pyroxylin industries. Butyl acetate, manufactured from butanol, is used in large amounts as a solvent for pyroxylin plastics.

Butanol is reported to be manufactured in the United States by a process using acetylene as the raw material. The production of butanol, acetone, and ethyl alcohol in 1923 and 1924 by the Commercial Solvents Corporation is shown in the following table:

TABLE 31.—*Production of butanol and other solvents by the Commercial Solvents Corporation*

[From Boston News Bureau, February 14, 1925]

	Butanol	Acetone	Ethyl alcohol
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1923			
First quarter.....	1,056,025	385,146	304,616
Second quarter.....	1,293,434	327,533	306,624
Third quarter.....	1,631,705	366,640	385,658
Fourth quarter.....	1,232,232	691,061	202,762
Total.....	4,613,396	1,970,380	1,199,650
1924			
First quarter.....	3,924,491	1,775,954	436,179
Second quarter.....	2,490,517	1,129,375	420,043
Third quarter.....	1,764,903	1,017,555	561,272
Fourth quarter.....	6,070,151	3,206,695	1,105,032
Total.....	14,250,062	7,129,579	2,522,526

Chlorine derivatives.—A chlorine compound showing increased production in 1924 was carbon tetrachloride, the output of which was 14,275,057 pounds, with sales of 11,698,694 pounds, valued at \$757,007. The production of this compound in 1923 was 13,513,644 pounds. The output of chloroform was 1,301,492 pounds, with sales of 1,171,699 pounds, valued at \$316,297. Both sales and production of chloroform declined from the 1923 figures. The production of ethyl chloride was 851,303 pounds with sales of 826,737 pounds, valued at \$181,161.

The following chlorine compounds were also produced in 1924, but neither production nor sales figures are publishable.

- | | |
|---|-----------------------------|
| 1. Chloroacetic acid. | 11. Trichloroethylene. |
| 2. Chloral hydrate. | 12. Dichloromethane. |
| 3. Methyl chloride. | 13. s-Tetrachloroethane. |
| 4. Hexachloroethane. | 14. Chlorodimethyl ether. |
| 5. Ethylene chlorohydrin. | 15. Ethyl chloroacetate. |
| 6. Chlorotone (trichlorotertiarybutyl alcohol). | 16. Ethylene chloride. |
| 7. Ethylene dichloride. | 17. Dichloroacetic acid. |
| 8. Tetrachloroethylene. | 18. Ethyl chloroacetate. |
| 9. Ethyl monochloroacetate. | 19. Trichloroethane. |
| 10. Trichloroacetic acid. | 20. Pentachloroethane. |
| | 21. Propylene chlorohydrin. |

Compounds of the above list for which production was reported in 1924 but not in 1923 are trichloroacetic acid, ethyl chlorocarbonate, and trichloroethane.

Petroleum derivatives.—By cracking methods carried out under very exacting conditions, and in the presence of a catalyzer, it is possible to obtain unsaturated hydrocarbons from which secondary propyl, butyl, amyl, and hexyl alcohols can be prepared. In addition to the alcohols, the higher molecular weight ketones are also obtained. The synthetic alcohols produced by the cracking of petroleum are secondary and tertiary alcohols, in contradistinction to the fermented alcohols which are primary. Increased commercial production of these products is expected within the year.

Esters.—Synthetics of this chemical classification showing large production, are: (1) Ethyl acetate the output of which in 1924 was 27,222,761 pounds, with sales of 19,304,384 pounds, valued at \$2,399,943. (2) Butyl acetate the production of which was 7,095,662 pounds in 1924, as compared with 1,816,086 pounds in 1923. The unit sales price of butyl acetate declined from 43 cents in 1923 to 31 cents in 1924. (3) Amyl acetate with a production of 1,514,123 pounds in 1924, as compared with 3,207,022 pounds in 1923. The unit sales price of amyl acetate declined from 55 cents in 1923 to 42 cents in 1924. Butyl acetate and other esters are important solvents in the production of pyroxylyn plastics and in the varnish industry. These plastic materials and solvent varnishes are used in very large quantities by automobile manufacturers.

Formaldehyde and hexamethylenetetramine.—The production of formaldehyde in 1924 was 26,155,175 pounds and the sales 20,542,428 pounds, valued at \$1,971,053. The largest use of formaldehyde is probably in the manufacture of synthetic phenolic resins. The production of hexamethylenetetramine in 1924 was 1,288,034 pounds, and sales were 1,274,601 pounds, valued at \$932,217. The largest use of hexamethylenetetramine is as an accelerator in rubber manufacture. Small quantities are used in medicinals.

Pharmaceuticals.—Chief among the chemicals in this group showing large production in 1924 is ethyl ether, with a production of 5,314,928 pounds, and sales amounting to 4,678,474 pounds, valued at \$1,226,794. Its largest use is probably as a solvent, but considerable quantities are used as an anaesthetic. Other medicinals showing an increase in production in 1924 over 1923 are chloral hydrate, glycerophosphoric acid and salts, terpin hydrate, iodobehenic acid and its calcium and iron basic compounds.

Medicinals showing a decrease in production from 1923 are chaulmoogric ester and heroin. The latter compound, however, showed an increase in sales, the total sales in 1924 amounting to 1,046 pounds, valued at \$181,087, as compared with 1,000 pounds, valued at \$118,433 in 1923.

Medicinals reported in 1924 but not in 1923 are amytal (isoamyl-ethylbarbituric acid) and isomenthol. The production of isomenthol is one of the achievements of the year, for in the past this country has been dependent upon imports of natural menthol from Japan, American peppermint oil being too high priced to use in menthol manufacture.

Tetraethyl lead.—This product, reported for the first time in 1923, shows a large increase in output in 1924. From July, 1924, up to

the time its manufacture was discontinued in May, 1925, the production of tetraethyl lead was reported to be one and three-fourths million pounds.¹

This compound decreases the reaction velocity of gasoline combustion, which in turn reduces the "knock" of the engine in operation and thereby makes it possible to use engines of a higher compression ratio with a consequent increase in the mileage per gallon of gasoline consumed. Ethyl gasoline is ordinary gasoline which contains about 0.06 per cent of tetraethyl lead and 0.04 per cent of ethylene dibromide (a halogen carrier) by volume.

The use of compounds which reduce the consumption of motor fuel per mile and permit the design and operation of more efficient engines will undoubtedly increase in the future. The general distribution of ethyl gasoline to the public was discontinued early in May, 1925, until a time when the question of the health hazard involved in its use is determined. A conference called for this purpose in Washington, May 20, 1925, under the direction of the Surgeon General of the Public Health Service, adopted a resolution authorizing the Surgeon General to appoint a committee to investigate and report upon its findings as to the health hazard involved in the use of this lead compound.

INVESTIGATION OF OXALIC ACID AND BARBITAL (DIETHYLBARBITURIC ACID) UNDER SECTION 315

Oxalic acid.—The investigation by the Tariff Commission of the foreign and domestic costs of production of oxalic acid was completed in 1924 and the President issued a proclamation December 29, 1924, under the provisions of section 315 of the tariff act of 1922 increasing the duty on oxalic acid from 4 cents per pound to 6 cents per pound, the maximum increase permissible within the limits of section 315 of the tariff act of 1922. It had been found that the differences in costs of production in the United States and Germany, the principal competing country, were greater than the duty of 4 cents a pound and slightly greater than the maximum duty permissible under section 315, namely, 6 cents a pound.

Oxalic acid is used chiefly in laundries as an acid rinse, and to a lesser extent in the dyeing and printing of textiles. Prior to the war it was produced by only one domestic concern, the maximum output being 2,000,000 pounds a year manufactured by the sawdust and caustic potash process. During the war the synthetic process (sodium formate process), which had been previously developed in Germany, was adopted and commercial production is now carried on by this process in the United States as well as in foreign countries.

The production of oxalic acid in 1924 shows a small increase over 1923. Sales increased in quantity in 1924 but decreased in value from 1923 because of the decline in the price per pound.

Barbital (diethylbarbituric acid).—The investigation by the Tariff Commission of the foreign and domestic costs of production of diethylbarbituric acid and its salts and compounds was completed in 1924, and the President issued a proclamation November 14, 1924, under the provisions of section 315 of the tariff act of 1922 changing

¹ Statement made at a conference in Washington, May 20, 1925, under the direction of the Surgeon General of the United States.

the basis of assessment from the foreign market value to the American selling price. The investigation had disclosed the fact that the differences in costs of production in the United States and Switzerland, the principal competing country, could not be equalized by increasing the duty 50 per cent of the existing ad valorem rate of 25 per cent based upon the foreign valuation, in which case the law provides that the duty shall be based upon the American selling price.

Barbital and its salts and compounds are widely used hypnotics. Barbital was not produced in the United States prior to the World War. The 1924 production and sales of diethylbarbituric acid showed a decline from 1923.

FOREIGN DEVELOPMENTS

Methanol.—One of the outstanding developments in the field of synthetic organic chemistry in recent years is Germany's commercial production of methanol in 1924. The United States with its large wood-distillation industry has in the past produced and exported large quantities of methanol, but in February, 1925, 62,971 gallons, valued at \$29,420; in March, 59,894 gallons, valued at \$26,976; and in April, 9,012 gallons, valued at \$5,201, were imported into this country. It has been predicted that increased imports will force many wood distillation plants to close and others to operate on a reduced scale. In 1923 the wood-distillation industry of the United States employed 4,685 persons, and its production was valued at \$29,695,423. In 1919 the capital investment in the wood-distillation industry, as reported by the Bureau of the Census, was \$42,334,503. Synthetic methanol is made in Germany from carbon monoxide and hydrogen under pressure, using zinc oxide as a catalyst. The quality of the product is equal to the best grades produced by wood distillation.

Butyl alcohol.—Considerable amounts of normal butyl alcohol are now being made in Germany by a catalytic process. In January and February, 1925, imports totaled 365,737 pounds, valued at \$76,770. The imported butyl alcohol competes with domestic butyl alcohol made by fermentation.

*Glass substitute.*¹—This material under the trade name "Pollopas," is a condensation product of urea and formaldehyde. It was described by its inventor, before the Union of Austrian Chemists, as being colorless, transparent, capable of being cut and polished, more resistant than glass against breakage, and suitable for lenses, automobile shields, lamp shades, and many other objects.

¹ Chemiker Zeitung, August 14 and 20, 1924.

TABLE 32.—Production and sales of synthetic organic chemicals, 1924

(Not derived from coal tar)

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 211. An X indicates that the manufacturer did not consent to the publication of his name in connection with the particular product. A blank in the third and fourth columns indicates that these sales can not be published without revealing information in regard to the sales of individual firms. A blank in the sixth column indicates that the production can not be published without revealing information in regard to the output of individual firms. The details thus withheld are, however, included in the totals]

Name	Manufacturers' identification number according to list on p. 211	Sales			Total production
		Quantity	Value	Average price per pound	
Total		Pounds 85,933,461	\$20,604,717	\$0.24	Pounds 115,817,865 278,967
Acetaldehyde	31, 70, 108, 150				
Acetamide	66				
Acetin (mono)	177				
Aldehyde ammonia	150				
Aldol (Acetaldol) (b-Hydroxybutyraldehyde)	31				
Allyl alcohol	195				
Allylamine	195				
Allyl bromide	195				
Allyl cyanide	195				
Allyl iodide	195				
Allylthiocyanate	35				
Allyl isosulfoyanate	195				
Alphozone (disuccinyl peroxide)	164				
Aminopropionic acid	183				
Amyl acetate and sec. amyl acetate	11, 60, 70, 74, 98, 107, 131, 177, 179, 191, X, X, X	954,589	399,411	.42	1,514,123
Amyl alcohol and sec. amyl alcohol	74, 98, 151, 177, X, X				149,654
Amyl caproate	74				
Amyl furoate	146				
Amyl heptoate	74				
Amyl oenanthate	70				
Amytal (isoamylethylbarbituric acid)	105				
Anethol	70				
Anisic acid	74				
Aubepine (anisaldehyde)	26, 27, 70, 73, 93, 166, 178	8,676	28,599	3.30	9,878
Barbital (veronal) (diethylbarbituric acid)	1, 17				
Barbital sodium	17				
Borneol	129				
Brometone (tribromotertiarybutyl alcohol)	X				
Bromocamphor	108				
Bromodiethylacetylcarbamide	17				
Butanol (n-butyl alcohol)	X				
Butyl acetate (n and sec.)	11, 60, 66, 70, 74, 98, 107, 120, 177, 179, 191, X, X	2,171,354	674,378	.31	7,095,662
sec.-Butyl alcohol	X				
Butyl aldehyde	31				
n-Butyl bromide	66				
Butyl furoate	146				
n-Butyl iodide	66				
Butyl propionate	188, X				
Butylxanthic disulphide	X				
n-Butyric acid	131, X				
d-Camphoric acid	108				
n-Caproic acid	66, 70, 108, 131	675	2,344	3.47	902
Carbon tetrachloride	59, 130a, 186	11,698,694	757,007	.07	14,275,057
Chaulmoogric ester	17				
Chloral hydrate	116, X				
Chloretone (trichlorotertiarybutyl alcohol)	X				
Chloroacetic acid (mono)	59, 60				
Chloroform	20, 25, 59, X	1,171,669	316,297	.27	1,301,492
Chlorodimethyl ether	17				
Cinnamyl alcohol	70				
Cinnamyl ketone	70				
Cinnamyl valerate	70				
Citronellal	172				
Citronellol	70, 93, 180	536	3,526	6.58	766
Citronellyl acetate	26, 70, 166				95
Crotonic acid	31				

TABLE 32.—Production and sales of synthetic organic chemicals, 1924—Continued

Name	Manufacturers' identification number according to list on p. 211	Sales			Total production Pounds
		Quantity Pounds	Value	Average price per pound	
Cyanacetic acid sodium salt.....	17.....				
Decyl alcohol.....	70.....				
Decyl aldehyde.....	70.....				
Dibromin (dibromomalonylure- ide).....	X.....				
Dibromobehenate of calcium.....	17.....				
n-Dibutylamine.....	1.....				
Dichloroacetic acid.....	59.....				
Dichloroethylether.....	31.....				
Dichloromethane.....	59.....				
Dichloropentanol.....	17.....				
Diethanolamine.....	31.....				
Diethylacetic acid.....	17.....				
Diethylamine. (See Interme- diates.).....					
b-Diethylaminoethyl alcohol. (See Intermediates.).....					
Diethylbromoacetyl bromide.....	17.....				
Diethyl malonate (malonic ester).....	1, 17, 167.....				41,477
Diethyl sulfate.....	31.....				
Dihydrovanillone.....	70.....				
Dihydroxycitronelllic ketone.....	70.....				
Diiodohydroxypropane.....	17.....				
Dihydroxytartaric acid.....	29, 141.....				
Dimethylamine. (See Interme- diates.).....					
Dimethylglyoxime.....	66.....				
1:3-Dimethylxanthine sodium acetate.....	17.....				
Duodecyl alcohol.....	70.....				
Duodecyl aldehyde.....	70.....				
Erucic acid.....	17.....				
Ethanolamine.....	31.....				
Ethhydroxy acetic acid.....	17.....				
Ethyl acetate (85 per cent).....	11, 60, 70, 71, 107, 120, 177, 179, 180, 191, X, X.....	19,304,384	\$2,399,943	\$0.12	27,222,761
Ethyl acetoacetate.....	177.....				
Ethyl bromide.....	17, 59, 60, 108, 192.....				
Ethyl butyrate.....	27, 74, 131, 177, 180, X, X, X.....				
Ethyl carbonate.....	177.....				
Ethyl chloride.....	59, 73, 78, 108, 150, 177, X, X, X.....	826,737	181,161	.22	851,303
Ethyl chloroacetate.....	59.....				
Ethyl chlorocarbonate.....	177.....				
Ethyl ether (U. S. P. and tech- nical).....	60, 108, 111, 143, 163, 177, 191, X.....	4,678,474	1,226,794	.26	5,314,928
Ethyl formate.....	70, 108, 131, 177, X.....	1,767	1,231	.70	1,664
Ethyl furate.....	146.....				
Ethyl glycolic acid ester of menthol.....	17.....				
Ethyl iodide.....	66, 108, 116, 143, 167.....	163	932	5.72	371
Ethyl isobutyrate.....	74.....				
Ethyl isovalerate.....	70, 74, 131, X.....				392
Ethyl lactate.....	70, 74, 177.....				
Ethyl laurate.....	70, 74.....				
Ethyl maleate.....	177.....				
Ethyl malonate (mono).....	1, 70.....				
Ethyl monochloroacetate.....	59, 177.....				
Ethyl myristate.....	74.....				
Ethyl nitrite.....	108, 143, 191, X.....	34,325	26,322	.77	31,877
Ethyl oeanthate.....	70, 131, 180, X.....	4,220	7,176	1.70	4,508
Ethyl oxalate.....	70, 177.....				
Ethyl pelargonate.....	27, 70, X.....				561
Ethyl propionate.....	70, 180, X, X.....	725	1,450	2.00	
Ethyl ricinoleate.....	74.....				
Ethyl n-valerate.....	70, X.....				
Ethylene.....	177.....				
Ethylene bromide.....	108.....				
Ethylene chloride.....	59.....				
Ethylene chlorohydrin.....	31, 59.....				
Ethylene diamine.....	31.....				
Ethylene dibromide.....	59.....				
Ethylene dichloride.....	31, 59.....				
Ethyleneglycol.....	31.....				
Ethylene oxide.....	31.....				

TABLE 32.—Production and sales of synthetic organic chemicals, 1924—Continued

Name	Manufacturers' identification number according to list on p. 211	Sales			Total production Pounds
		Quantity	Value	Average price per pound	
		Pounds			Pounds
Eugenol	74				
Formaldehyde	55, 87, 132, 150, X	20, 542, 428	\$1, 971, 053	\$0. 10	26, 155, 175
Formic acid (65 per cent)	182				
Furfural	146				
Furfuramide	146				
Furfuran (furan)	146				
Furfurin	146				
Furoic acid	146				
Furyl acetate	146				
Furyl alcohol	146				
Gallic acid	66, 108, 194				550, 378
Geranyl acetate	26, 70, 93, 166, X	325	1, 775	5. 46	
Geranyl butyrate	70, 93				
Geranyl formate	70, 93, 166				
Geranyl propionate	70				
Glycerol acetate	98				
Glycerol diacetate	73				
Glycerophosphoric acid and salts	132, X				
Glycol diacetate	31				
Guaiacol acetate	70				
Guanidine sulfate	17				
Heliotropin	26, 70, 73	26, 703	51, 129	1. 92	34, 436
Heptadecyl aldehyde	70				
Heptaldehyde	70, 74, 125				
Heptaldehyde ammonia	X				
Heptoic acid	74				
n-Heptyl alcohol	66, 70				
Heptylideneethylamine	X				
Heroin (diacetylmorphine)	108, 128, 143	1, 046	181, 087	173. 12	848
Hexachloroethane	59				
Hexadecyl alcohol	70				
Hexadecyl aldehyde	70				
Hexadecyl ketone	70				
Hexamethylenetetramine	87, 132, 150	1, 274, 601	932, 217	. 73	1, 288, 034
Hexamethylenetetramineanhydromethylenecitrate	17				
Hydroxycitronellal	172				
Iodobehenate of calcium	17				
Iodobehenate of iron basic	17				
Iodobehenic acid	17				
Iodoform	108, 116, 128, 143	12, 500	68, 658	5. 49	
Ionone	70, 114, 180, X				17, 995
Isoamyl butyrate	27, 70, 74, 131, 177, X, X	7, 411	9, 913	1. 34	7, 284
Isoamyl formate	70				
Isoamyl isovalerate	70, 74, 131, X	620	1, 510	2. 44	764
Isoamyl nitrite	108				
Isobutyl acetate	70, 74, 131, 177	98	185	1. 89	113
Isobutyl alcohol	177				
Isobutyl butyrate	70, 74				
Isobutyl n-butyrate	177				
Isobutyl formate	70				
Isobutyl isobutyrate	74				
Isobutyl propionate	70, 177				
Iso butyraldehyde	70				
Isobutyric acid	74				
Isoeugenol	27, 70, 74, 93, 181				
Isomenthol	128				
Isopropyl acetate	70, 177				
Isopropanol (isopropyl alcohol)	31, 177, 195, X				
Isovaleric acid	74, 131				
Jasmone ketone	70				
Lactic acid	183				
Linalyl acetate	70, 93, 166, 178	463	3, 661	7. 91	461
Linalyl butyrate	70				
Linalyl formate	70, 166, 178	11	126	11. 45	19
Linalyl propionate	70				
Linalyl valerate	70				
Methyl acetate	74, 177, 191				
Methyl n-butyrate	70, 177				
Methyl chloride	150				
Methyl eugenol	70, 166				
Methyl formate	177				
Methyl furoate	146				
Methyl isoeugenol	166				
Methylnonylacetic aldehyde	70				
Methyl oxalate	70				

TABLE 32.—Production and sales of synthetic organic chemicals, 1924—Continued

Name	Manufacturers' identification number according to list on p. 211	Sales			Total production Pounds
		Quantity	Value	Average price per pound	
Methyl propionate	70	<i>Pounds</i>			<i>Pounds</i>
Methyl sulfate	X				
Methylene citric acid	17				
Nerol	180				
Nonyl alcohol	70				
Nonyl aldehyde	70				
Octodecyl alcohol	70				
Octodecyl aldehyde	70				
Octodecyl ketone	70				
sec.-Octyl acetate	70, 178				
Octyl alcohol	166				
n-Octyl alcohol (capryl alcohol)	70				
sec.-Octyl alcohol	70				
Octyl aldehyde	70, 93				
Octyl formate	166				
Oxalic acid	134, 182				
Paracetaldehyde	31, 101				
Paraformaldehyde	87, 150				
Pentachloroethane	31				
Phenylthiocarbamide	35				
Piperone (piperinic ketone)	70				
Piperone vanillone	70				
Propionaldehyde	70				
Propionic acid	X				
n-Propyl acetate	70, 177				
n-Propyl alcohol	177, 195				
Propyl furoate	146				
Propyl oenanthatate	70				
n-Propyl propionate	70				
Propylene chlorohydrin	31				
Propylene glycol	31				
Pyrogallol (pyrogallie acid)	66, 108, 194				238, 587
Pyruvic acid	29				
Research chemicals	66, 161				
Rhodinol	70, 93, 166, 178, 180, X	1, 869	\$34, 443	\$18. 43	3, 779
Rhodinyl acetate	70, 166				
Rhodinyl butyrate	70				
Rhodinyl formate	166				
Sebacic ether	74				
Succinic acid	108, X				
Tannigen (tannyl acetate) (acetic acid ester of tannic acid)	17				
Terpineol	26, 129, 178, X				295, 532
Terpin hydrate	143, 181				
Terpinyl acetate	26, 70, 74, 93, 166, 178, X	12, 905	16, 964	1. 32	15, 068
Terpinyl butyrate	70				
Tetrachloroethylene	59				
s-Tetrachloroethane	31, 59				
Tetradecyl alcohol	70				
Tetradecyl aldehyde	70				
Tetradecyl ketone	70				
Tetraethyl lead	60, 163				
Triacetin	74, 98, 177, X				
Trichloroacetic acid	59				
Trichloroethane	59				
Trichloroethylene	31, 59				
Trichloroamine and hydrochloride	31				
Triethyltrimethylenetriamine	X				
Trimethylene bromide	1				
n-Valeric acid	66, X				
Vanillic acid	70				
Vanillic alcohol	70				
Vanillin	26, 73, 74, 114, 181, X	301, 221	1, 964, 367	6. 52	320, 242
Vanillyl vanillate	70				
Zinc butyl xanthate	X				

TABLE 33.—Comparison of production of synthetic organic chemicals, 1923 and 1924

Name	1923	1924	Name	1923	1924
	<i>Pounds</i>	<i>Pounds</i>		<i>Pounds</i>	<i>Pounds</i>
Amyl acetate.....	3,207,022	1,514,123	Formaldehyde.....	24,081,188	26,155,175
Butyl acetate.....	1,816,086	7,095,662	Gallic acid.....	469,941	550,378
Carbon tetrachloride.....	13,513,644	14,275,057	Heliotropin.....	11,696	34,436
Chloroform.....	1,585,250	1,301,492	Ionone.....	23,255	17,995
Citronellyl acetate.....	99	95	Isoamyl butyrate.....	9,733	7,284
Ethyl acetate (85 per cent.).....	25,887,720	27,222,761	Linalyl acetate.....	238	451
Ethyl chloride.....	270,180	851,303	Rhoygallol.....	235,389	238,587
Ethyl ether.....	5,104,157	5,314,928	Rhodinol.....	5,729	3,779
Ethyl formate.....	1,958	1,664	Terpineol.....	322,337	295,532
Ethyl nitrate.....	35,140	31,877	Terpinyl acetate.....	13,638	15,008
Ethyl oenanthatate.....	3,476	4,508	Vanillin.....	269,941	320,242
Ethyl pelargonate.....	823	561			

TABLE 34.—Imports and production of certain synthetic organic chemicals (non-coal tar) 1923 and 1924

Name	1923			1924		
	Imports		Production	Imports		Production
	Pounds	Value	Pounds	Pounds	Value	Pounds
Acetaldehyde.....	163,913	\$26,338	-----	132,344	\$22,493	278,967
Paraacetaldehyde.....	363,752	63,593	-----	680,870	120,346	-----
Aldehyde ammonia.....	25	13	-----	20	8	-----
Chloral hydrate.....	6,135	1,819	-----	1	5	-----
Formaldehyde solution (not more than 40 per cent.).....	166	67	24,081,188	-----	-----	26,155,175
Hexamethylenetetramine.....	47,373	24,722	1,381,073	3,826	3,998	1,288,034
Acetic or pyrologenous acid, containing by weight not more than 65 per cent acetic acid.....	37,052	4,758	184,888,000	371,732	27,080	-----
More than 65 per cent acetic acid.....	664,034	79,553	225,972,000	1,202,525	143,904	-----
Formic acid.....	1,282,004	96,174	-----	1,532,798	121,431	-----
Gallic acid.....	6,048	2,743	469,941	-----	-----	550,378
Lactic acid, containing by weight 55 per cent or more of lactic acid.....	66,648	16,056	-----	75,018	17,523	-----
Oxalic acid.....	2,621,302	206,100	-----	3,135,664	177,641	-----
Pyrogallic acid.....	342	417	235,389	11	21	238,587
Butyl alcohol.....	969,112	186,352	-----	404,882	97,861	-----
Methanol.....	³ 15,786	12,573	³ 8,593,727	³ 48	29	³ 6,897,589
Carbon tetrachloride.....	1,429	130	13,513,644	-----	-----	14,275,057
Chloroform.....	381	133	1,585,250	88	101	1,301,492
Glycerophosphoric, and salts and compounds.....	28,265	38,100	-----	45,280	57,440	-----
Ethers and esters:						
Containing not more than 10 per cent alcohol—						
Ethyl ether.....	103	75	5,104,157	73	109	5,314,928
Ethyl chloride.....	9,519	11,899	270,180	13,016	16,626	851,303
Amyl acetate.....	26,418	9,612	3,207,022	-----	-----	1,514,123
Amyl nitrite.....	56	114	-----	-----	-----	-----
Ethyl acetate.....	27,202	11,664	25,887,720	253	39	27,222,761
Other, n. s. p. f.....	11,448	6,458	-----	15,892	8,438	-----
Containing more than 50 per cent alcohol.....	668	1,436	-----	22	103	-----
Tetrachloroethane.....	429,303	-----	20,130	216,585	7,079	-----
Trichloroethylene.....	198,522	-----	9,701	254,743	9,958	-----
Urea.....	47,711	5,898	-----	94,307	12,891	-----
Thymol.....	12,136	27,067	-----	13,695	34,424	-----
Vanillin.....	-----	-----	269,941	-----	-----	320,242

1 Dilute acetic acid.

2 Glacial and anhydride.

3 Gallons.

4 Imports from January-April, 1925:

January.....	40 gallons..	\$26.
February.....	62,971.....do	29,420.
March.....	59,894.....do	26,976
April.....	9,012.....do	5,201.
May.....	115,120.....do	52,917.

PART V
—
INTERNATIONAL DYE TRADE

PART V

INTERNATIONAL DYE TRADE

SUMMARY OF WORLD'S PRODUCTION AND TRADE

PRE-WAR SITUATION

Before the war Germany dominated the world's dye trade, for she produced not only three-fourths of all synthetic dyes made but also the intermediates from which more than half the dyes in other countries were manufactured. It may therefore be said that nearly nine-tenths of the world's dye production was controlled by Germany. Switzerland, although without raw materials, ranked second as a dye producer, the value of her exports in 1913 being about one-tenth those of Germany. Great Britain, while possessing an abundant supply of coal-tar crudes and heavy chemicals, produced only one-tenth of her requirements. In the manufacture of alizarin and sulphur black, however, British dye makers before the war held a position that enabled them to enter into national conventions with the Germans.

French-owned and operated dye plants produced about one-tenth of the consumption of France. In order to meet the patent requirements of France and Great Britain, German dye concerns operated plants in those two countries for the final assembling of intermediates produced in Germany, gaining in France thereby the advantage of the tariff preferential for products made in France and exported to the French colonies. In the United States the pre-war dye industry was far from self-contained. Dyes were assembled almost entirely from imported intermediates originating chiefly in Germany.

INCREASE IN PRODUCTIVE CAPACITY

During the war and following the exhaustion of the German stocks on hand in the various dye-consuming countries, there arose an acute dye shortage, threatening the operations of the textile industries and other domestic industries dependent upon dyes. This situation soon resulted in unprecedented dye prices, and many colors were not obtainable at any price. Ultimately it led to the establishment of the manufacture of intermediates and dyes on a large scale in the United States, Great Britain, and France, and on a smaller scale in Italy and Japan, and to the expansion of the established industry in Switzerland. Poland, Czechoslovakia, Holland, Sweden, and Spain manufacture dyes, but their output can hardly be considered important in the international dye trade.

The following table shows the production of coal-tar dyes in the principal producing countries from 1920 to 1924, inclusive.

TABLE 35.—*Production of dyes by the chief producing countries, 1920–1924*

Country	1924	1923	1922	1921	1920
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Germany ¹	159,549,096	144,859,572	192,806,564	116,442,116	103,368,804
United States ²	68,679,000	93,667,524	64,632,187	39,008,690	88,263,776
Great Britain ³			21,000,000		45,000,000
Switzerland ⁴	21,000,000	20,000,000	18,000,000	12,000,000	26,000,000
France ⁵	33,020,499	24,180,052	17,782,303	12,938,797	15,555,657
Italy ⁶			10,812,824	7,918,972	4,458,692
Japan ⁷		13,457,735		12,606,452	8,016,879

¹ From the monthly reports containing the one-quarter monthly German production of dyes made to the Reparation Commission. These reports covered the period February, 1920, to December, 1924, inclusive.

² From annual *Census of Dyes and Other Synthetic Organic Chemicals*, by United States Tariff Commission.

³ Estimates for year 1920, Report on Dyes and Dyestuffs subcommittee appointed by the Standing Committee on Trusts, printed and published by His Majesty's Stationery Office, London, 1921.

⁴ Production figures are calculated on the basis that the home market consumes 10 per cent of the output of Swiss dyes; exports consequently equal 90 per cent of the production.

⁵ *L'Industrie Chimique* April, 1924. Does not include output of Swiss plant at St. Fous.

⁶ *Trade Information Bulletin* No. 234, Department of Commerce.

⁷ *Trade Information Bulletin* No. 217, Department of Commerce.

As a result of this phenomenal development during and shortly after the war, the existing capacity of the world's synthetic dye plants is estimated to exceed 600,000,000 pounds per year, or nearly double the pre-war capacity.¹ In consequence of this excess capacity an era of competition has set in in the international markets as well as in certain of the home markets, and this ability to produce beyond normal requirements can not fail to eliminate many of the plants now manufacturing dyes. The finding of a market for its output is a problem of vital interest to every nation possessing a dye industry.

The dye industries of all countries operated in 1924 far below their capacity. This means not only higher costs of production but that many firms will cease to compete in the international dye trade and that many of the higher-cost firms operating exclusively within the home markets of the new producing nations will entirely cease production. It is therefore probable that within the next 5 or 10 years there will be a gradual reduction in potential world production, which is now nearly double the pre-war figure, to proportions nearer meeting normal requirements. It is not probable, however, that there will be a return to pre-war capacity because of the sentiment for a home industry of sufficient size to insure national security.

GERMANY'S EXPORT TRADE

To what extent has Germany's dominant place in the world's dye trade been affected by remarkable expansion of dye production in other countries? A comparison of exports of German dyes in post-war years with those in 1913 may throw some light on this question. In 1924, when the effect of the Ruhr occupation may be said to have disappeared, total exports were 25 per cent by quantity and 60 per cent by value of the 1913 figure. The disproportionate value in 1924 may be largely accounted for by the fact that Germany is supplying many of the higher-cost specialties not produced in most of the other countries. The price levels for such products are generally far above the 1913 levels.

¹ The Census of Dyes, 1923, p. 124, contained a tabulation of the estimated capacity of each of the principal dye-producing nations.

TABLE 36.—*Exports of coal-tar dyes from Germany, 1913 and 1920-1924*

Year	Pounds	Value
1913.....	239,598,133	\$51,666,168
1920.....	61,140,171	53,002,407
1921 ¹	48,304,991	15,935,585
1922.....	115,974,900	80,781,892
1923.....	73,974,473	41,580,742
1924.....	61,033,911	30,933,368

¹ May to December.

The 1924 export of synthetic dyes from Germany—61,033,911 pounds—represents a 17 per cent decrease in quantity from the previous year. The reduction may be attributed to the establishment of industries in United States, Great Britain, France, Italy, and Japan. These countries have not only supplied a large part of their own requirements, but several of them have exported indigo, sulphur black, and other dyes to Far East markets with the net result that Germany has lost a part of her dye trade in nonproducing countries where her former supremacy was unquestioned.

The decline in the German export trade in dyes has been in part offset by the development of several noncoal-tar products, chief of which are synthetic nitrogen derivatives. Progress in this phase of the industry tends to make up for a temporary loss in her export trade.

There is little likelihood that Germany will ever regain her former position of almost complete control of the world's dye trade. Especially hard will it be for her to recover the markets of Great Britain, the United States, and France.

The declared policy of the new dye-producing countries to retain at least the nucleus of a dye industry in order to supply the bulk dyes in time of peace as well as in time of emergency and the relation of the dye industry to national security in the event of war are obstacles to a return to the pre-war status.

There is no doubt, however, of Germany's determination to recover as large a part of her former markets as is possible, even at a high cost and over a long period of time. To-day the vast markets of the Far East, namely, China and Japan, as well as India, South America, and Russia, are again very largely dominated by German products. In addition there are many countries which, although consuming small quantities individually, are in the aggregate an important factor in maintaining the German dye industry. As a net result Germany has to-day a large share of the consuming markets which are not producers of dyes.

EXPORTS FROM PRODUCING COUNTRIES

Comparing exports of coal-tar dyes from the principal producing countries, as shown in Table 37, it will be seen that in 1924 Germany was by far the largest exporting nation. Switzerland ranked second; the United States was a close third; Great Britain and France, with about equal quantities, ranked next.

TABLE 37.—Exports of coal-tar dyes from chief producing countries, 1913, 1921-1924

Exported from—	1913		1921	
	Pounds	Value	Pounds	Value
Germany.....	239,598,133	\$51,689,400	148,304,991	¹ \$15,935,585
United States.....				² 6,270,139
Great Britain.....	5,451,376	862,566	7,621,600	5,033,828
Switzerland.....	19,458,902	5,549,752	10,779,612	11,634,516
France.....	1,152,134	275,716	5,947,131	1,608,308
Italy.....	117,725	22,458	607,812	274,128

Exported from—	1922		1923	
	Pounds	Value	Pounds	Value
Germany.....	114,213,300	\$79,826,618	73,974,473	³ \$41,580,742
United States.....	⁴ 8,344,187	⁵ 3,996,443	⁵ 17,924,200	⁴ 17,125,528
Great Britain.....	3,860,416	2,300,298	9,247,504	⁵ 5,565,267
Switzerland.....	16,167,655	13,042,635	18,282,967	12,253,711
France.....	1,502,431	1,586,492	4,650,382	3,749,442
Italy.....			647,712	548,481
Japan.....	372,578	254,250	2,296,327	396,397

Exported from—	1924		Exported from—	1924	
	Pounds	Value		Pounds	Value
Germany.....	61,033,911	\$30,933,368	France.....	10,793,282	\$7,675,181
United States.....	15,713,428	5,636,244	Italy.....	541,009	276,793
Great Britain.....	(⁶)	(⁶)	Japan.....	⁷ 1,664,672	⁷ 253,020
Switzerland.....	19,015,998	12,138,346			

¹ May to December, 1921.² Includes natural and coal-tar dyes, with exception of logwood extract.³ 1923 basis.⁴ 1913 basis.⁵ New classification adopted in 1922 for coal-tar colors was "Color lakes and other colors, dyes, and stains."⁶ Accounts Relating to the Trade and Navigation of the United Kingdom, give the 1924 exports of "Dyes and dyestuffs (except dyewoods and raw dyeing substances) and extracts for dyeing and tanning—Products of coal tar," as 11,811,072 pounds, valued at \$4,156,367.⁷ First nine months.

IMPORTS INTO CONSUMING COUNTRIES

Imports of coal-tar dyes into the important consuming countries are summarized in Table 38. Imports into China are three times as great as those into any other country. British India ranks second in importance and Japan third. With the exception of Japan these countries have no dye industry. Of the important dye-producing countries, Great Britain imported the largest quantity in 1924.

TABLE 38.—Imports of dyes into chief consuming countries, 1913, 1921-1924

Imported into—	1913		1921	
	Pounds	Value	Pounds	Value
China.....	¹ 60,696,533	\$11,673,779	46,939,187	\$19,283,019
United States.....	² 45,950,895	7,537,870	4,252,911	5,156,779
Great Britain.....	41,203,008	9,207,684	6,686,288	5,930,054
Austria-Hungary.....	17,168,764	3,616,199	3,439,837	931,610
British India ³	16,923,607	3,741,031	11,731,237	11,798,262
Italy.....	15,542,429	3,611,705	⁴ 7,450,665	2,556,457
Japan.....	⁵ 9,755,260	2,100,255	7,752,896	9,858,807
Germany.....	7,138,495	1,682,422	⁶ 291,457	33,497
Russia.....	4,835,647	3,701,186	-----	-----
France.....	4,706,601	1,416,316	2,531,320	1,539,907
Canada ³	2,633,516	594,414	2,366,855	1,692,873
Turkey.....	2,631,703	641,321	-----	-----
Sweden.....	2,376,166	699,737	984,028	851,265
Spain.....	⁷ 2,303,709	1,021,368	3,178,365	1,264,929
Switzerland.....	2,201,292	431,197	1,084,337	668,843
Dutch East Indies.....	⁸ 2,073,434	890,366	2,166,053	1,385,364
Czechoslovakia.....	-----	-----	10,854,128	6,901,737
Netherlands.....	-----	-----	2,666,518	1,937,097

Imported into—	1922		1923		1924	
	Pounds	Value	Pounds	Value	Pounds	Value
China.....	56,300,385	\$17,788,624	61,099,581	\$17,713,420	-----	-----
United States.....	3,982,631	5,243,257	3,098,193	3,151,363	3,022,539	\$2,908,778
Great Britain.....	6,450,192	5,873,160	6,289,696	4,594,501	7,966,784	5,919,057
Austria.....	2,760,380	817,737	1,975,101	803,713	2,784,851	2,752,321
British India.....	14,119,822	-----	14,119,822	-----	⁹ 20,718,450	⁹ 9,169,688
Italy.....	¹⁰ 5,484,383	2,751,374	7,150,620	2,737,288	6,033,770	2,373,288
Japan.....	12,526,817	9,025,223	13,953,137	6,689,322	¹¹ 15,088,902	¹¹ 5,643,117
Germany.....	1,003,300	111,906	466,494	123,522	786,160	429,713
Russia.....	-----	-----	-----	-----	-----	-----
France.....	3,983,044	3,131,613	3,056,235	3,013,818	5,399,725	5,438,154
Canada.....	3,290,349	2,287,159	3,290,349	2,287,149	3,502,621	2,121,705
Turkey.....	-----	-----	-----	-----	-----	-----
Sweden.....	1,905,469	1,514,892	2,854,382	2,025,349	-----	-----
Spain.....	2,115,627	1,777,938	1,444,401	1,170,600	¹² 509,483	(¹²)
Switzerland.....	1,290,793	672,769	1,980,171	974,518	1,938,725	1,155,876
Dutch East Indies.....	2,091,122	-----	2,238,238	-----	3,008,426	-----
Czechoslovakia.....	7,826,302	5,765,175	5,118,676	2,688,780	-----	-----
Netherlands.....	3,816,162	2,124,263	5,130,124	2,234,565	-----	-----

¹ Exports to China, 1913, from France, Germany, and Switzerland amounted to 69,181,230 pounds, valued at \$11,516,567. Chinese statistics show value but not quantity of aniline dyes, and include "unclassified dyes," which may contain other than coal-tar dyes.

² Fiscal year 1914—quantity from Special Agents Series No. 121, value from Commerce and Navigation Reports.

³ Years ended Mar. 31, 1914, and 1922 and 1923.

⁴ Figures include 3,493,275 pounds of reparation dyes for which no value is shown.

⁵ Aniline only, in 1913.

⁶ 1921 imports, May to December.

⁷ 1914.

⁸ Quantity of synthetic indigo not shown, 1913.

⁹ Calendar year.

¹⁰ Figures include 1,666,237 pounds of reparation dyes for which no value is shown.

¹¹ First nine months.

¹² First six months.

COMPETITION IN EXPORT MARKETS

The attempts of Great Britain and the United States and other new dye-producing countries to place certain dyes on an export basis will be met with strong and continued resistance from the German dye cartel. In international markets, such as China, Japan, and India, Germany has already lost a part of the trade in indigo and sulphur black, and a smaller part of her trade in other dyes. Competition from the United States, Great Britain, and to a lesser extent

from France, has tended to prevent complete German domination in those markets and arbitrary price fixing. The export trade of a country is an important balance in stabilizing production by offsetting the fluctuations of the home market and results in lower production costs by permitting operation on a larger scale. Exports comprise the greater part of the dye trade of both Germany and Switzerland, whereas home markets represent the bulk of it in the United States, Great Britain, France, Italy, and Japan. The problem of placing these newly created dye industries, or at least certain of their products, on an international basis is an important one.

The struggle between the dye-producing nations for export markets promises to be a long and severe one and in the end can only result in the elimination from an export basis of those dyes which can not be produced by other countries at a cost sufficiently low to compete with the German and Swiss products. This will in turn depend upon such fundamental factors as (1) production costs; (2) raw materials; (3) capital; (4) selling organization; (5) technical service offered to the consumer; and (6) adequate capital without excessive capitalization. The strongest of the new producing nations in this competitive field promise to be the United States, Great Britain, and to a less extent, France. Italy and Japan do not bid fair to be important in export markets.

In lack of raw materials the Swiss suffer the greatest disadvantage. The United States, Great Britain, Germany, and France are well situated in this respect. Japan and Spain are less favorably placed.

In the cost of labor and of technicians the United States is probably at the greatest disadvantage. The Germans and Swiss possess an experienced executive selling and technical staff, but the United States and Great Britain are making rapid gains in this respect. Through the service of German and Swiss chemists some of the United States firms have effected economy in production. The building up of a complete and well-trained organization for dye making and selling requires a long time, and it can not be expected that the disadvantages of the new producing countries will be overcome within a few years.

The German dye industry with its close-knit organization possesses several advantages over the industries in other countries, among which are: (1) Cumulative experience; (2) lower manufacturing costs in plants built before the war and paid for by pre-war profits; (3) the established reputation of German products among consumers; (4) highly developed selling organization in all the world's markets; (5) availability of raw materials; and (6) a wide diversity of products. One significant development by the I. G. in 1924 has been a further consolidation of companies. This is discussed in more detail in later pages. Amalgamation of the selling agencies of the German dye firms in Japan and Czechoslovakia is only one of the results of such a movement, and will tend to increase the competitive strength of the I. G. in the export markets. As exports comprised nearly nine-tenths of the total dye output in Germany before the war, the industry has almost from its infancy been organized on an international basis.

Switzerland occupies a position of greater prominence in the world trade than the relative size of her industry would indicate, its capacity being only about 9 per cent of that of the German industry. Because

of the lack of raw materials, the Swiss industry is not economically independent, but it enjoys an open competitive market on coal-tar crudes and other raw materials.

The Swiss firms produce an excellent variety of the higher cost dyes and also indigo, an important low-price bulk color. In proportion to their normal pre-war trade they have suffered less than Germany in the loss of markets to the newly created dye industries, as the markets for the specialties have declined less in the big industrial countries than the markets for the bulk dyes, formerly a large factor in the German export trade. The new producing nations, Great Britain and the United States, are, however, each year increasing their output of high-cost dyes such as are produced by the Swiss. This is being reflected by their reduced imports of many Swiss types. Factors which are favorable to the Swiss dye interests in the maintenance of their position in the world trade are their progressive and experienced manufacturing personnel, their technical service, and their distributing organization for sales. Although the production and development of new special products will help them to maintain their trade, in the long run they are likely to find the lack of raw materials a serious handicap in maintaining their industry on an international basis.

Price reductions.—The United States and Great Britain, were, before the war, among the largest consumers of German dyes. The loss of a large part of the trade in these markets has been a severe blow to Germany. Reports from Great Britain show reduced prices of German dyes in 1925, some of them to 25 per cent below the current rates and others even more markedly. As the export prices of most of the German dyes are far above the pre-war levels, it is probable that they will be further reduced.

In the United States, price reductions have been made on many of the higher-priced German dyes, increasing the competition with the American producer of these products. If the German firms do not establish branch plants in Great Britain and the United States, they may adopt two methods of commercial warfare against the dye industries of these two countries: (1) By an attack on the export trade, and (2) by price cutting in the home markets on certain lines of products such as the vat dyes, alizarin, and other specialty dyes. Both methods of procedure are reported to have been adopted in 1925. Since the tariff reduction of 15 per cent on September 22, 1924, in the United States, imports of the higher class dyes have recorded a sharp increase.

PROTECTIVE MEASURES ADOPTED BY DYE-PRODUCING COUNTRIES

For the encouragement and stimulation of dye production, Great Britain, the United States, France, Italy, Japan, and Spain, have adopted special tariff measures, and in Great Britain and Japan financial aid has been granted by the Government to the domestic industries. A license system of dye-import control is in force in Great Britain, Germany, and Japan. Preferential tariff treatment for the imports of dyes from Great Britain has been granted by her colonies; this tends to increase the export market of dyes produced by the mother country.¹

¹ For detailed information on rates of duty on coal-tar dyes when imported into 26 different countries see pp. 173-186.

These protective measures tend to retain a large part of the home market for the domestic dye industry and have enabled the industries to organize on a more efficient and permanent basis than existed during the latter part of the war and shortly after. In the next 5 to 10 years protective measures will play an important part in the maintenance of dye production in countries other than Germany and Switzerland and will in turn affect the export trade of these two countries.

Affiliations and branch plants.—These tariff measures will probably result in the German producers affiliating with producers in other countries or in establishing branch factories, which last will in part compensate the Germans and Swiss for the loss of their export trade.

One of the first steps of the German Cartel toward recovering such markets has been to gain foothold therein by affiliating with the new dye-producing industries in order to share in the dye trade and to exercise influence favorable to German interests.

Negotiations between the British dye corporations and the I. G. were discussed during 1923, although no working agreement has yet been announced. In the United States reports have been frequent of affiliations with certain existing firms; but no authoritative statement concerning details has been available. It appears possible, however, that such arrangements, if not already effected, will be made in the near future, affecting one or more individual firms.

The establishment of branch factories has been a natural consequence of the tariff measures adopted by the new producing countries. Although the Germans appear to have been less successful than the Swiss in the establishment of branch plants, they have firmly established themselves in Italy.

The Swiss now operate branch factories in the United States, Great Britain, France, and Italy, and are consequently enabled to share in the trade of those markets farther than is indicated by actual exports to them. In the production of dyes in foreign countries the Swiss have been far more successful than the Germans.

In Switzerland the three principal dye makers have formed a union of interests similar to that of the German firms. Such consolidation gives to the Germans and Swiss an advantage lacking in many other countries. In the United States it would be a violation of the anti-trust laws. In sharp contrast to the German situation is the severe competition between the different firms in some of the new dye-producing countries, particularly in the United States. This competitive situation is likely to result in the amalgamation of some of the small firms.

The effect of this competition on the price of bulk dyes is of interest. The price of indigo in the United States, April, 1925, was 14 cents per pound, less than the selling price of German indigo in this country in 1913, and probably the lowest selling price in the world for this dye in the spring of 1925. The price of indigo (20 per cent paste) in Great Britain in March, 1925, was 29.8 cents per pound, according to a statement of the President of the British Board of Trade, compared with 28 cents in France, 18.5 cents in Italy, 26 cents in India, and 21.6 cents in Germany. Later reports state that the export price of German indigo was subsequently reduced to 16 cents per pound.

TREND IN DYE MANUFACTURE

A review of the developments by the world's dye producers shows a distinct trend toward the production of dyes, (1) of superior fastness, (2) adapted for special uses, (3) of lower cost of application, and (4) of identical character produced by an increasing number of different firms. On the other hand many types which are in small demand or for which satisfactory substitutes are available are being eliminated.

New dyes for acetate silk.—Manufacturers of Germany, Switzerland, and Great Britain added many new dyes to their manufacturing lists in 1924. One conspicuous advance was in the development by British dye firms of special dyes for dyeing artificial silks, more particularly acetate silks.

The S. R. A. dyes manufactured by the British Celanese Co. are made in a fair range of colors and possess good fastness to light. They are insoluble in water and have good resistance to washing. They are dyed in a partly colloidal and partly fine suspension by the use of sulphonated castor oil (sulpho ricinoleic acid).

Dyes for use on acetate silk have also been produced by the British Dyes (Ltd.)² (known as the duranol dyes); and by the Scottish Dyes (Ltd.) (known as Celatene dyes). Those produced by the Scottish Dyes are anthraquinone derivatives. This group consists of 8 dyes and is said to possess excellent fastness to light and can be applied by simple methods not requiring saponification nor special preliminary treatment of the silk fiber.

New water-soluble vat dyes.—In 1924 stable water-soluble derivatives of vat dyes (the leuco forms of enolic ethereal salts) were placed on the market. The leuco derivative of indigo, known as indigosol, was first produced by Durand & Huguenin & Co. of Switzerland, and more recently by a German company. The leuco derivative of Caledon jade green manufactured by the Scottish Dyes (Ltd.) of Great Britain is known as Soledon jade green.

The vat dyes, characterized by their high fastness, are of very great importance for the production of fast shades on cotton. Formerly all vat dyes were insoluble in water and their application involved a reduction to a soluble form with sodium hydrosulphite in an alkaline solution. The application of these insoluble vat dyes requires more skill and supervision than many other classes of dyes. Consequently the water-soluble vat dyes, which can be applied "directly" on the fiber, with a subsequent oxidation treatment to yield the insoluble color, represents marked progress in the production and application of dyes. These new water-soluble derivatives do not require the addition of caustic alkali, commonly used in the application of vat dyes, and for that reason can be used on animal fibers, such as wool and silk, without injury to the fiber. There are, however, certain insoluble vat dyes which can be successfully used on animal fibers. German dye producers have developed a number of new vat dyes adapted to wool dyeing.

These water-soluble vat-dye derivatives, because of their simplicity of application and their suitability for animal fibers as well as vegetable fibers have great promise. Their extensive substitution for the original vat dyes will probably depend upon costs. When the original

² Some notes on dyestuffs progress in 1924, Chemical Age, Jan. 3, 1925, Sir E. A. Brotherton.

vat dyes were introduced their high cost was believed by many to be unfavorable to their extensive use; their consumption, however, has steadily increased year by year.

Other developments.—In connection with the manufacture of new dyes a review of the progress of dye-making since the discovery of the first coal-tar dye in 1856 brings out a point of interest in the trend in this field. Eighty years ago coal-tar dyes were not in use, and the dyer had available only a small variety of vegetable and mineral dyes, the application of which was difficult and surrounded with much secrecy and empirical methods: furthermore, the resultant shades were of wide variation in fastness. This is in sharp contrast to present times, when the number of synthetic dyes on the market exceeds 1,500, and when there are dyes of practically any degree of fastness desired for any particular purpose. Manufacturers of to-day universally supply technical assistance to the dyer to facilitate the correct and proper application of their products. From the commercial manufacture of mauvine in 1856 to the manufacture of vat dyes after 1900 the outstanding feature was the continuous addition annually to the number of dyes and dye patents.

During this era of discovery and development the general progress, by class of application, was first the basic dyes, then the mordant acid, and direct azo dyes, sulphur dyes, and finally vat dyes. The dyes of the last group have been, since their discovery, of constantly increasing value on account of their high fastness and variety of shade. Each year has witnessed the addition of faster members to each of these groups as well as colors of greater purity of shade. The trend has been definitely toward fast dyes and dyes of simpler application, together with dyes possessing properties which adapt them to special uses. As an illustration of this trend may be mentioned the new direct dyes and acid dyes of far greater fastness than the early members of these groups. The range of sulphur dyes has been extended and the purity of shade and strength greatly increased. With such intermediates as naphthol AS and the different bases for use with this product, the direct production of dyes on the cotton fiber becomes of greater importance; some of the resulting shades are of sufficient fastness to offer competition with the vat dyes. Closely related to the above group are the "rapid fast dyes."

It is of interest to note that the German firms have since the war reduced the number of types on their production program by eliminating those for which the demand was small and for which there were already available satisfactory or better substitutes. The trend in world production has been to lay greater emphasis on the output of dyes in greater demand and of greater fastness, it appears that a point has now been reached where the number of new dyes annually placed upon the market will be far below the additions made from 1880 to 1905. The fact that many of the dye patents are running out increases the number of dyes which can be made by any concern and reduces the number of products which can be sold at very high prices, while other colors not covered by patents are frequently sold at prices below their cost of production.

The dye manufacturers of the various countries are making an increasing number of identical dyes, the demand for which is general. This is resulting in an era of keen competition on these products in both the export and home markets.

Research.—The maintenance of research for the progressive development of new dyes and allied products and for improvement in the existing methods of manufacture is a factor not to be overlooked by any nation seeking to retain its position in the international dye trade. Merely to copy and produce the products already on the market is a policy which will ultimately end in an industry being distanced by those able to produce new and special products with marked advantages as to fastness, special use, and economy of application.

THE GERMAN DYE INDUSTRY

The position of supremacy in the world's trade held by the German dye and synthetic organic chemical industry has been altered by developments during and since the World War. Both production and exports for the post-war years have recorded conspicuous declines. In former reports detailed statistics on the pre-war dye trade were published, and the important developments of the German industry up to and including 1923 were discussed. The present discussion deals particularly with changes occurring in 1924 and the first half of 1925, and their relation to previous years.

German dye output in 1924 increases.—The production of coal-tar dyes in Germany in 1924, on the basis of monthly repatriation lists, was 159,549,096 pounds, an increase of 14,689,524 pounds as compared with 1923. In the latter year the occupation of the Ruhr by the French reduced the production of dyes in Germany, especially in the Höchst and the Badische plants, the two largest producers in the occupied zone. The output in 1924 was about 57 per cent of that in the pre-war year 1913. The maximum post-war output was in 1922, totaling 192,806,564 pounds, or about 68 per cent of the pre-war. Exports since the war reached a maximum in 1922.

Table 39 shows the production of coal-tar dyes in Germany for 1913 and 1920 to 1924, inclusive, and Table 40 one-fourth of the German production from 1920 to 1924, reserved under the Treaty of Versailles for purchases of the allied and associated governments.

TABLE 39.—*Production of coal-tar dyes in Germany, 1913 and 1920-1924*¹

Year	Pounds	Year	Pounds
1913 ²	280,000,000	1922.....	192,806,564
1920 ³	112,766,000	1923.....	144,859,572
1921.....	116,442,116	1924.....	159,549,096

¹ From monthly reports to the Reparation Commission, showing one-quarter production in German plants of dyes reserved for the purchase of allied and associated Governments, 1920 to 1924.

² For the year 1913 exports totalled 239,598,133 pounds and home consumption is estimated at 40,000,000 pounds.

³ Estimated from the actual production for eleven months.

TABLE 40.—*One-quarter of production in German dye plants¹ reserved for purchase of allied and associated Governments, 1920-1924*

Group	Classification of colors	1920 (11 months)	1921	1922	1923	1924
		<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
I	Alizarin red.....	1, 830, 721	1, 729, 148	2, 244, 654	2, 151, 520	3, 550, 912
II	Indigo paste.....	4, 493, 515	6, 147, 286	10, 343, 963	5, 926, 123	14, 809, 980
III	Vat colors, except indanthrene blue GCD.....	578, 028	992, 579	1, 128, 912	1, 080, 121	1, 954, 208
IV	Indanthrene blue GCD.....	93, 645	61, 203	6, 985	39, 794	92, 913
V	Alizarin colors other than red.....	609, 514	300, 009	492, 930	568, 569	654, 151
VI	Direct colors for cotton.....	5, 778, 166	5, 526, 280	9, 609, 616	8, 086, 063	2, 998, 349
VII	Direct colors for diazotization.....	977, 320	962, 859	1, 424, 471	916, 212	630, 317
VIII	Acid colors for wool.....	4, 364, 034	5, 068, 823	7, 754, 534	5, 161, 691	3, 071, 874
IX	Chrome colors for wool.....	1, 771, 252	1, 673, 215	3, 154, 705	2, 068, 071	824, 551
X	Basic colors.....	1, 257, 301	1, 525, 610	2, 289, 557	1, 713, 854	1, 848, 099
XI	Sulphur colors.....	2, 805, 910	4, 103, 034	8, 047, 949	7, 261, 348	8, 405, 355
XII	Lake colors.....	1, 282, 795	1, 020, 508	1, 703, 365	1, 241, 527	1, 046, 565
	Total.....	25, 842, 201	29, 110, 554	48, 201, 641	36, 214, 893	39, 887, 274

¹ Peace Treaty, Annex VI, Part II.

CONSOLIDATIONS WITHIN THE I. G.

The decline in the German export trade due to the development of dye production in other countries has reduced the operation of the German factories far below capacity, which, in turn, tends to increase production costs. In order to offset the unfavorable developments since the war, the German Cartel (I. G.) has adopted a program designed to reduce costs.

The highest salaried members of the directors' boards, the attorneys, and the superfluous specialists are being removed, and even a reduction in the number of laborers is reported. Of greater significance in its effect on foreign competition, however, is the merger of the constituent firms of the I. G. now under consideration. This step is in line with other consolidations already effected in other branches of German industry. In place of the separate sales departments maintained by each concern in the I. G. a consolidated sales agency for the home and foreign markets is planned. Competition between the same dyes and pharmaceuticals produced by different firms of the I. G. is being eliminated, and it is intended to assign the manufacture of each product to the firm best fitted for its production. The elimination of duplication, the centralization of the directorate for research, for production, and purchases, can only result in greater efficiency in certain departments and reduce production and sales costs.

The proposed amalgamation involves certain difficulties as the 8 associated concerns have 8 managing directors and 84 full-time directors, few of whom can be entirely dropped without loss. In addition, there are such problems as to the allocation of manufacture and the redistribution of profits. The future, however, of these firms is intimately bound together, and it is probable that the obstacles to such a merger will ultimately be overcome. One of the principal difficulties is the high Government tax attending such a consolidation. Negotiations have been conducted between the I. G. and the German Government to obtain a reduction in the rate of taxation. If these negotiations are not successful, it is possible that a reduction in the capitalization might take place in order to lower

the reorganization tax, and that there will be an increase in capitalization after the amalgamation has been effected.

The Chemische Fabrik Greisheim-Elektron of Frankfort-on-Main and the Aktien Gesellschaft Für Anilin Fabrikation of Berlin were consolidated in the spring of 1925. The dye plants of the Berlin company as well as the main offices are to be moved to the Griesheim plants near Frankfort. The new arrangement gives the two companies concerned 14.146 per cent of the total earnings of the cartel, as compared with slightly more than 25 per cent, for the Bayer, Höchst, and Badische.

In 1924 the I. G. acquired the Rhiensahl of Dusseldorf, which controls a number of mines, the coal of which yields a tar suitable for distillation into crudes for dyes and other coal-tar derivatives. This acquisition is in addition to the Auguste Victoria mines bought by the Badische, the Bayer, and the Berlin dye concerns in 1907.

NEW PRODUCTS MADE BY THE I. G.

Extensive developments have been made by the plants of the I. G. in the manufacture of noncoal-tar products. Conspicuous among these new items are synthetic ammonia, nitrogenous fertilizer materials, and synthetic methanol. The manufacture of the last is closely associated with work on other synthetic organic chemicals such as butyl and propyl alcohol and also synthetic motor fuel.

AGREEMENTS WITH FOREIGN INDUSTRIES

German-Russian dyestuff agreement.—The Berliner Tageblatt³ states that under the contract which the German-Russian Trading Co. ("Russgertorg") concluded in the autumn of 1924 with the German Aniline Dye Concern for the delivery of dyestuffs for the Soviet industry and for the holding of up to 500,000 kilograms of goods in the consignment warehouses of the "Russgertorg," 200,000 kilograms of dyestuffs for the Russian Textile Syndicate have, so far, been imported. The total quantity of dyestuffs to be imported in the course of one year amounts to about 2,000,000 kilograms. Eight chemists have been sent by the German chemical works to Russian factories. The German dye concern has granted Russian chemists the right to improve their technical knowledge in German aniline-dye factories, and chemists who are working in the Russian textile industry will soon be sent to Germany for this purpose.

Other agreements.—The Farwerke, vormals Meister Lucius & Brunig,⁴ Höchst-on-the-Main, made an arrangement with the Philana A. G., Basle, Switzerland, presumably for exploiting one of its new processes to impart a wool finish to cotton fibers.

In the spring of 1924 the Badische Co. was negotiating with the Norsk Hydro of Norway for the joint operation of a nitrate plant, utilizing the cheap water power of that concern.

The Franco-German potash pact concluded August 19, 1924, divided the American potash market between German and Alsatian

³ *The Chemical Age*, Feb. 28, 1925, p. 202.

⁴ *Commerce Reports*, Mar. 9, 1925.

producers in the ratio of 62½ and 37½, with certain preferences for sulphate of potash of German origin. This agreement covers a period of three years.

AMERICAN LOANS TO GERMAN DYE INDUSTRY

During 1924 loans aggregating \$6,500,000 were made by American bankers to German dye companies, according to information collected by the Tariff Commission. These included the following:

Badische Anilin und Soda-Fabrik.....	\$1,000,000
Actien-Gesellschaft für Anilin-Fabrikation.....	3,000,000
I. G. loan.....	2,500,000

For joint use of—

- (a) Actien-Gesellschaft für Anilin-Fabrikation.
- (b) Farben fabrikriken vorm. Friedr. Bayer & Cie.
- (c) Chemische Fabrik Griesheim-Elektron, Frankfurt.

Negotiations for other loans were under consideration, but no announcements were made as to their completion up to May, 1925. In addition to these, loans were made to other branches of the chemical industry, including one of \$6,000,000 to the potash syndicate.

BALANCE SHEETS OF I. G. COMPANIES

The following table presents a summary of the assets and liabilities of the I. G. companies as shown by their balance sheets for the pre-war year 1913 and as of January 1, 1924.¹

TABLE 41.—Balance sheets of constituent concerns of the *Interessen Gemeinschaft* as of January 1, 1924¹

(Millions of gold marks)

Company	Assets					
	Year	Real estate and plant	Stock on hand	Owued in other concerns	Debts due plus cash	Total assets
Badische Anilin.....	1924	127.86	55.93	48.52	69.13	301.61
	1913	54.14	25.42	11.53	35.17	126.26
Hoechst Farbw.....	1924	58.66	44.25	74.14	49.51	226.56
	1913	29.28	29.75	6.99	34.90	114.32
Bayer Leverk.....	1924	64.28	64.63	64.64	49.30	244.04
	1913	49.52	22.00	13.03	42.97	127.52
Berlin Anilinf.....	1924	32.54	23.27	8.03	18.03	82.19
	1913	14.84	9.61	.75	19.32	44.64
Griesheim Elektron.....	1924	28.59	18.04	4.05	16.28	67.20
	1913	25.31	12.53	.40	12.48	51.34
Weiler-ter-Meer.....	1924	5.41	8.56	.67	3.98	18.77
	1913	7.61	3.66	.43	4.49	16.43
Total.....	1924	317.34	214.65	200.05	197.40	940.37
	1913	180.70	102.97	33.13	149.33	480.51

¹ From the Frankfurter Zeitung.

TABLE 41.—Balance sheets of constituent concerns of the *Interessen Gemeinschaft* as of January 1, 1924—Continued

Company	Liabilities					
	Year	Bills payable	Bonds and mortgages	To balance	Preferred stock	Common stock
Badische Anilin.....	1924	52.62	4.32	67.47	1.20	176.00
	1913	11.52	21.67	53.09	00	36.00
Hoechst Farbw.....	1924	19.80	1.84	27.72	1.20	176.00
	1913	5.19	7.05	49.69	00	36.00
Bayer Leverk.....	1924	34.08	1.35	28.07	1.20	176.00
	1913	18.91	25.00	34.74	00	36.00
Berlin Anilin.....	1924	11.90	.69	11.60	.40	57.60
	1913	4.95	8.83	12.82	00	14.00
Griesheim Elektron.....	1924	13.71	.77	8.40	.32	44.00
	1913	12.61	5.12	14.11	00	16.00
Weiler-ter-Meer.....	1924	4.59	.26	1.81	.08	12.00
	1913	4.86	2.81	1.89	00	6.00

GERMANY'S FOREIGN TRADE IN DYES

The following table presents the coal-tar dye imports and exports of Germany during 1924. This table shows that Germany is predominantly an exporting country.

TABLE 42.—Germany: Imports and exports of coal-tar dyes, 1924¹

Class and country	Imports		Exports	
	Pounds	Value	Pounds	Value
Aniline and other coal-tar dyes not elsewhere mentioned, sulphur dyes:				
Italy.....			1,099,434	
Netherlands.....			1,107,591	
Czechoslovakia.....			5,888,266	
East Poland.....			525,356	
North Russia.....			3,116,423	
Sweden.....			1,027,344	
Switzerland.....			1,607,815	
British India.....			4,324,764	
China.....			15,136,783	
Japan.....			3,389,132	
Other countries.....			11,342,005	
Total.....	728,179	\$391,839	48,564,913	\$25,446,430
Alizarin (alizarin red).....			1,364,427	401,367
Alizarin colors, variegated, from anthracene.....			1,569,896	1,486,130
Total alizarin dyes.....	17,857	9,290	2,934,323	1,887,497
Indigo, natural and synthetic:				
Austria.....			307,762	
Czechoslovakia.....			547,182	
China.....			6,536,639	
Other countries.....			1,992,738	
Total.....	32,408	25,249	9,384,321	3,454,615
Indigo carmine, color lakes and new blues, from indigo and indigo carmine.....	7,716	3,335	150,354	144,826

¹ German foreign trade, official monthly report; issue of December, 1924. 1,000 Reichs marks=\$238.20.

DYE TRADE OF GREAT BRITAIN

Imports.—The total imports of dyes into Great Britain in 1924 were 7,966,784 pounds, valued at \$5,919,057; of this amount alizarin made up 3,377,472 pounds, valued at \$999,741. In 1923 imports of alizarin amounted to 941,808 pounds, valued at \$332,809.

Alizarin has been manufactured in Great Britain since about 1882 and has been for many years on an export basis. The heavy imports originated largely, if not entirely, from the dyes, alizarin and indigo, seized by the French and Belgian authorities in the spring of 1923 during the occupation of the Ruhr. Large amounts were purchased by the British Alizarin Co. to prevent the demoralization of prices by preventing the dumping of dyes on the market.

In 1923 imports of indigo, probably from the same source, were 926,688 pounds, valued at \$64,004. The imports of other coal-tar dyes were 4,421,200 pounds, valued at \$4,197,688, of which 64 per cent by weight was from Germany and 33 per cent from Switzerland.

Exports.—The post-war exports of dyes from Great Britain have recorded wide fluctuations, as shown in Table 43. In 1923, as a result of the Ruhr occupation, exports reached 9,247,504 pounds, valued at \$3,635,058. Of this total, 2,480,800 pounds, valued at \$674,102, was alizarin, of which nearly 88 per cent by quantity was shipped to India. Exports of indigo amounted to 2,195,648 pounds, valued at \$604,335, over 88 per cent of which was exported to China. "Other coal-tar dyes," totaling 4,571,056 pounds, valued at \$2,356,621, were shipped chiefly to Switzerland, Victoria, Belgium, China, and New South Wales.

TABLE 43.—*The United Kingdom: Imports of coal-tar dyes, 1923*¹

Imported from—	1923	
	Pounds ²	Value
Alizarin:		
Germany.....	918, 176	\$319, 581
Netherlands.....	784	1, 894
Other foreign countries.....	22, 848	11, 334
Total from foreign countries.....	941, 808	332, 809
Total imported.....	941, 808	332, 809
Synthetic indigo:		
Germany.....	926, 688	64, 004
Total imported.....	926, 688	64, 004
Other coal-tar dyes:		
Germany.....	2, 820, 160	2, 038, 238
Netherlands.....	6, 720	9, 153
Belgium.....	22, 960	25, 180
Switzerland.....	1, 464, 624	2, 006, 829
United States.....	4, 368	5, 100
Other foreign countries.....	69, 216	73, 156
Total from foreign countries.....	4, 388, 048	4, 157, 656
Canada.....	28, 784	37, 365
Other British possessions.....	4, 368	2, 667
Total from British possessions.....	33, 152	40, 032
Total imported.....	4, 421, 200	4, 197, 688
Grand total.....	6, 289, 696	4, 594, 501

¹ Annual statement of the trade of the United Kingdom with foreign countries and British possessions converted at average exchange rate, 1923, £1=\$4.574.

² British cwt. = 112 lbs.

TABLE 44.—*The United Kingdom: Exports of coal-tar dyes, 1923*¹

Exported to—	1923		Exported to—	1923	
	Pounds	Value		Pounds	Value
Alizarin:			Other coal-tar dyes—Con.		
Java.....	196, 448	\$68, 596	Belgium.....	412, 944	\$96, 005
France.....	59, 136	30, 888	France.....	183, 008	99, 480
United States.....	22, 960	9, 294	Switzerland.....	970, 256	241, 713
Brazil.....	3, 808	3, 613	Portugal.....	22, 288	14, 705
Other foreign countries.....	11, 760	3, 737	Spain.....	55, 552	38, 019
Total to foreign countries.....	294, 112	116, 129	Italy.....	11, 088	5, 667
British India.....	2, 177, 952	549, 571	Egypt.....	15, 680	8, 590
Other British possessions.....	8, 736	8, 402	China.....	247, 408	107, 782
Total British possessions.....	2, 186, 688	557, 973	Japan.....	56, 448	27, 476
Total exported.....	2, 480, 800	674, 102	United States.....	141, 120	69, 058
Indigo, synthetic:			Brazil.....	19, 824	20, 542
Netherlands.....	1, 680	380	Other foreign countries.....	83, 216	48, 379
China.....	1, 949, 360	529, 875	Total to foreign countries.....	2, 690, 464	1, 044, 473
Other foreign countries.....	125, 104	39, 213	Irish Free State.....	203, 280	80, 859
Total to foreign countries.....	2, 076, 144	569, 468	Union of S. Africa.....	101, 136	77, 721
Hongkong.....	13, 440	3, 449	Bombay.....	220, 080	147, 557
Australia.....	42, 672	14, 060	Madras.....	53, 984	50, 826
Canada.....	63, 392	17, 340	Bengal, Assam, Bihar, and Orissa.....	31, 808	26, 076
Other British possessions.....	63, 392	17, 340	Burmah.....	4, 144	3, 243
Total to British possessions.....	119, 504	34, 868	Hongkong.....	2, 576	2, 406
Total exported.....	2, 195, 648	604, 335	West Australia.....	1, 120	974
Other coal-tar dyes:			South Australia.....	12, 320	9, 697
Sweden.....	119, 616	92, 312	Victoria.....	529, 424	440, 418
Norway.....	77, 616	49, 568	New South Wales.....	255, 136	193, 028
Denmark.....	29, 792	23, 702	Queensland.....	12, 992	10, 250
Germany.....	121, 968	33, 537	Tasmania.....	3, 696	2, 292
Netherlands.....	122, 640	67, 938	New Zealand.....	148, 400	107, 155
			Canada.....	261, 744	125, 076
			Other British possessions.....	38, 752	34, 570
			Total to British possessions.....	1, 880, 592	1, 312, 148
			Total exported.....	4, 571, 056	2, 356, 621
			Grand total.....	9, 247, 504	3, 635, 058

¹ Annual statement of the trade of the United Kingdom with foreign countries and British possessions; converted at average exchange rate, 1923, £1=\$4.574.

TABLE 45.—*The United Kingdom: Imports and exports of coal-tar dyes, 1924*¹

	Pounds	Value
Imports and consumption:²		
Alizarin.....	3, 377, 472	\$999, 741
Indigo, synthetic.....		
Other coal-tar dyes.....	4, 589, 312	4, 919, 316
Total.....	7, 966, 784	5, 919, 057
Exports:		
Dyes and dyestuffs (except dyewoods and raw dyeing substances) and extracts for dyeing and tanning—		
Products of coal tar.....	11, 811, 072	4, 156, 367

Average exchange rate, 1924, £1=\$4.4181.

British cwt.=112 lbs.

¹ Accounts relating to the trade and navigation of the United Kingdom, issue for December, 1924.

² An account of the imports of the principal and other articles of foreign and colonial merchandise, showing the consumption of certain dutiable articles, in the year ended Dec. 31, 1924.

TABLE 46.—*Weight of dyestuffs imported into the United Kingdom, by countries, 1924*¹

Description	Total imports	Consigned from—				
		Germany	France	Switzerland	United States	Other countries
Intermediate coal tar products.....	<i>Pounds</i> 72,576	<i>Pounds</i> 51,072	<i>Pounds</i> 18,928	<i>Pounds</i> 2,576	<i>Pounds</i> -----	<i>Pounds</i> -----
Finished dyestuffs obtained from coal tar—						
Alizarin.....	3,377,472	1,888,096	1,464,288	20,384	-----	4,704
Indigo.....	-----	-----	-----	-----	-----	-----
Other sorts.....	4,589,312	3,125,360	41,104	1,174,320	2,688	245,840
Total.....	8,039,360	5,064,528	1,524,320	1,197,280	2,688	250,544

¹ *The Chemical Trade Journal and Chemical Engineer*, March 13, 1925, p. 337. The quantity of dyestuffs received from Germany during 1924 on reparation account and included in the above table was 3,796,352 pounds.

DYE INDUSTRY OF FRANCE

Production.—The total output of dyes in France in 1924 was 33,020,499 pounds as compared with 24,180,052 pounds in 1923, an increase of 36 per cent. This does not include the output of the Swiss-owned plant at St. Fons, France, which is reported to have produced approximately 3,300,000 pounds in 1924. The outstanding feature in 1924 was an increase of over 100 per cent in the tonnage of indigo and its sulfonic derivatives (10,326,346 pounds), while the production of sulphur colors (5,105,854 pounds) was practically the same as in 1923. As in the past two years the azo group of dyes showed the largest production with a total of 12,744,793 pounds. The following table gives the output of coal-tar dyes in France from 1920 to 1924, inclusive.

TABLE 47.—*France: Production of coal-tar dyes, 1920-1924*¹

(Report of Trade Commissioner, Apr. 25, 1925, Paris, France)

Year	Azo dyes	Indigo and sulfonated derivatives	Sulphur dyes	Diphenyl and triphenyl methane	Alizarin and other oxyketone	Indophenols, oxazines, and thiazines	Unspecified	Total
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
1920.....	4,975,782	6,571,913	3,452,404	141,094	19,841	19,841	374,782	15,555,657
1921.....	4,204,172	5,839,985	1,814,386	403,442	211,642	136,685	328,485	12,938,737
1922.....	7,881,445	3,075,417	3,769,866	1,234,576	731,927	191,800	897,272	17,782,303
1923.....	11,296,370	4,700,207	5,024,283	1,483,696	570,991	145,504	959,001	24,180,052
1924.....	12,744,793	10,326,346	5,105,854	2,072,324	804,679	174,163	1,792,340	33,020,499

¹ Does not include data for Swiss plant at St. Fons, France.

Imports and exports.—According to preliminary data, imports of dyes into France in 1924 amounted to 5,396,861 pounds. The principal sources of imports were Switzerland with 2,665,361 pounds and Germany with 2,123,030 pounds. The imports of dyes from Switzerland were especially heavy during the last few months of the year, owing to the proposal at that time of an early increase in the French tariff on these products. A large part of the imports from Switzer-

land are in highly concentrated form and are converted into commercial products in the French branches of the Swiss manufacturers.

Reports of an agreement between the French and German dye manufacturers have not only been denied, but it is reported that the French dye manufacturers will endeavor to have their Government control all dye imports from Germany under the Dawes plan, by which France is to receive dyestuffs from Germany until 1928. The Compagnie Nationale des Matieres Colorantes had an agreement with the German dye manufacturers whereby they made use of German patents, but when the Compagnie Nationale was taken over by Kuhlmann in July, 1924, this agreement was abruptly terminated. It is not likely that German manufacturers could conclude any satisfactory agreement in France without the participation of the large Kuhlmann interests.

The exports of dyestuffs from France in 1924 amounted to 8,761,080 pounds, of which 4,911,849 pounds were indigo. French statistics do not give the countries of destination for these products.

Tables 48 to 52 show the coal-tar dye imports and exports of France for 1922 by countries and for 1924 by classes.

TABLE 48.—France: Imports of coal-tar dyes, 1922 ¹

Dry			Paste		
Class and country	Pounds	Value	Class and country	Pounds	Value
Nitroso:			Nitroso:		
Great Britain.....	2,646		United States.....	441	\$164
Germany.....	220				
Belgium.....	220				
Switzerland.....	1,102				
Total.....	4,188	\$2,376			
Nitro:			Nitro.....		
Great Britain.....	220				
Germany.....	441				
Netherlands.....	441				
Switzerland.....	220				
Czechoslovakia.....	1,323				
Total.....	2,645	2,622			
Pyrazolone:			Pyrazolone:		
Germany.....	2,646		Germany.....	220	82
Switzerland.....	118,828				
Other countries.....	220				
Total.....	121,694	162,795			
Stilbene:			Stilbene.....		
Germany.....	1,323				
Switzerland.....	55,556				
Other countries.....	1,323				
Total.....	58,202	49,732			
Monoazo:			Monoazo:		
Great Britain.....	14,109		Great Britain.....	5,070	
Germany.....	45,194		Germany.....	16,314	
Netherlands.....	3,527		Switzerland.....	5,732	
Switzerland.....	716,495		Other countries.....	882	
Italy.....	3,748				
Other countries.....	1,764				
Total.....	784,837	568,758	Total.....	27,998	8,848

¹ General tables of the foreign commerce and navigation of France, official; converted at average exchange rate, 1922, 1,000 francs = \$81.93.

TABLE 48.—France: Imports of coal-tar dyes, 1922—Continued

Dry			Paste		
Class and country	Pounds	Value	Class and country	Pounds	Value
Polyazo:			Polyazo:		
Great Britain.....	16, 975		Germany.....	18, 078	
Germany.....	700, 401		Switzerland.....	1, 984	
Switzerland.....	380, 073				
United States.....	40, 124				
Other countries.....	27, 778				
Total.....	1, 165, 351	\$866, 164	Total.....	20, 062	\$3, 769
Thiobenzoyl:			Thiobenzoyl.....		
Great Britain.....	10, 803				
Germany.....	5, 732				
Switzerland.....	16, 975				
Other countries.....	1, 102				
Total.....	34, 612	38, 589			
Sulphur:			Sulphur.....		
Germany.....	11, 023				
Switzerland.....	141, 315				
Italy.....	17, 416				
Other countries.....	3, 086				
Total.....	172, 840	128, 466			
Indophenols:			Indophenols:		
Germany.....	504, 853		Great Britain.....	3, 086	
Switzerland.....	42, 108		Germany.....	71, 870	
Other countries.....	3, 968		Switzerland.....	16, 314	
Total.....	550, 929	245, 708	Total.....	91, 270	33, 919
Azines:			Azines:		
Great Britain.....	35, 494		Great Britain.....	1, 102	
Germany.....	6, 173		Germany.....	11, 243	
Switzerland.....	30, 865		United States.....	2, 646	
United States.....	10, 141				
Other countries.....	3, 527				
Total.....	86, 200	89, 713	Total.....	14, 991	3, 769
Pyronines:			Pyronines.....		
Germany.....	12, 787				
Switzerland.....	20, 723				
Other countries.....	2, 425				
Total.....	35, 935	80, 128			
Eosines:			Eosines:		
Great Britain.....	882		Great Britain.....	441	246
Switzerland.....	10, 802				
Other countries.....	882				
Total.....	12, 566	28, 020			
Diphenylmethane:			Diphenylmethane:		
Germany.....	11, 023		United States.....	220	164
Netherlands.....	7, 275				
Switzerland.....	377, 648				
Other countries.....	10, 141				
Total.....	406, 087	452, 745			
Acridines:			Acridines.....		
Germany.....	7, 716				
Switzerland.....	35, 714				
Other countries.....	1, 323				
Total.....	44, 753	90, 533			
Hydroquinones:			Hydroquinones:		
Great Britain.....	9, 921		Great Britain.....	48, 722	
Germany.....	27, 337		Germany.....	18, 519	
Switzerland.....	20, 062		Switzerland.....	1, 102	
Total.....	57, 320	80, 947	Total.....	68, 343	27, 938

TABLE 48.—France: Imports of coal-tar dyes, 1922—Continued

Dry			Paste		
Class and country	Pounds	Value	Class and country	Pounds	Value
Indigotines:			Indigotines:		
Germany.....	5,732		Germany.....	4,409	
Switzerland.....	9,480		Switzerland.....	2,646	
Italy.....	4,409		China.....	220	
Other countries.....	220				
Total.....	19,841	\$22,121	Total.....	7,275	\$4,834
Insoluble vat dyes other than indigo:			Insoluble vat dyes other than indigo:		
Germany.....	34,612		Great Britain.....	441	
Switzerland.....	3,748		Germany.....	70,988	
Other countries.....	220		Switzerland.....	27,337	
Total.....	38,580	34,411	Total.....	98,766	36,705
Cibanones:			Cibanones:		
Great Britain.....	10,803		Switzerland.....	25,573	28,512
Switzerland.....	1,763				
Total.....	12,566	23,350			
Grand total.....	3,609,146	2,967,178	Grand total.....	355,600	148,950

TABLE 49.—France: Exports of coal-tar dyes, 1922¹

Dry			Paste		
Class and country	Pounds	Value	Class and country	Pounds	Value
Nitroso:			Nitroso:		
Belgium.....	4,409		Germany.....	441	
Switzerland.....	1,323		Belgium.....	661	
Spain.....	24,250		Luxemburg.....	2,866	
Other foreign.....	4,189		Other foreign.....	441	
French colonies.....	882		Algeria.....	3,086	
Total.....	35,053	\$19,581	Total.....	7,495	\$1,639
Nitro:			Nitro:		
Belgium.....	220		Italy.....	441	164
Argentina.....	221				
Total.....	441	328			
Pyrazolone:			Pyrazolone:		
Switzerland.....	220		Netherlands.....	2,205	819
Portugal.....	221				
Guadeloupe.....	441				
Total.....	882	655			
Stilbene:			Stilbene.....		
Switzerland.....	220	164			
Monoazo:			Monoazo:		
Belgium.....	1,984		Switzerland.....	1,102	328
Switzerland.....	882				
Egypt.....	441				
French colonies.....	882				
Total.....	4,189	1,884			
Polyazo:			Polyazo:		
Belgium.....	441		Germany.....	220	82
Switzerland.....	220				
Portugal.....	221				
Total.....	882	492			
Thiobenzoyl.....			Thiobenzoyl.....		

¹ General tables of the foreign commerce and navigation of France, official; converted at average exchange rate, 1922, 1,000 francs=\$81.93.

TABLE 49.—France: Exports of coal-tar dyes, 1922—Continued

Dry			Paste		
Class and country	Pounds	Value	Class and country	Pounds	Value
Sulphur:			Sulphur:		
Great Britain.....	220		Switzerland.....	1,102	\$246
Belgium.....	3,748				
Switzerland.....	220				
Indo-China.....	7,055				
Total.....	11,243	\$3,359			
Indophenols:			Indophenols.....		
Germany.....	441				
Belgium.....	2,425				
Switzerland.....	3,527				
Total.....	6,393	\$8,111			
Azines:			Azines:		
Belgium.....	1,102		Luxemburg.....	441	246
Switzerland.....	441				
Brazil.....	441				
Morocco.....	220				
Total.....	2,204	2,294			
Pyronines:			Pyronines.....		
Netherlands.....	1,323				
Belgium.....	36,817				
Switzerland.....	2,425				
Other foreign.....	661				
Total.....	41,226	122,567			
Eosines:			Eosines.....		
Brazil.....	661	1,475			
Diphenylmethane:			Diphenylmethane:		
Belgium.....	66,358		Germany.....	3,307	
Switzerland.....	22,046		Belgium.....	4,630	
Portugal.....	4,189		Italy.....	1,102	
Spain.....	11,243		United States.....	2,205	
Turkey.....	4,630		Other foreign.....	661	
China.....	14,330		Indo-China.....	43,871	
Japan.....	11,464				
Other foreign.....	14,771				
Tunis.....	35,274				
Morocco.....	55,556				
Indo-China.....	321,431				
Other French colonies.....	2,645				
Total.....	563,937	628,731	Total.....	55,776	31,133
Acridine					
Hydroquinones:			Hydroquinones:		
Spain.....	2,645	4,916	Great Britain.....	220	
			Belgium.....	4,630	
			Total.....	4,850	1,966
Indigotines:			Indigotines:		
Siam.....	661		Belgium.....	7,275	
Japan.....	156,968		Egypt.....	6,614	
Other foreign.....	1,543		Japan.....	91,050	
Algeria.....	661		Other foreign.....	661	
Tunis.....	2,205		Tunis.....	6,173	
Morocco.....	220		Indo-China.....	2,866	
Total.....	162,258	150,751	Total.....	114,639	76,686
Insoluble vat dyes other than indigo:			Insoluble vat dyes other than indigo:		
United States.....	7,275		Great Britain.....	16,975	
Other foreign.....	1,984		Spain.....	8,378	
Algeria.....	6,173				
Total.....	15,432	26,381	Total.....	25,353	9,422
Cibanones			Cibanones		
Grand total.....	847,666	971,689	Grand total.....	213,624	122,731

TABLE 50.—*France: Imports and exports of indigo, 1922*¹

Imports			Exports		
Country	Pounds	Value	Country	Pounds	Value
Great Britain.....	4, 189	-----	Italy.....	2, 645	-----
Greece.....	1, 984	-----	Japan.....	97, 664	-----
British India.....	3, 086	-----	United States.....	308, 203	-----
San Salvador.....	4, 409	-----	Other foreign countries.....	882	-----
Other foreign countries.....	441	-----	Algeria.....	5, 071	-----
French India.....	1, 543	-----	Tunis.....	1, 543	-----
			Morocco.....	882	-----
			Indo-China.....	24, 471	-----
Total.....	15, 652	\$14, 584	Total.....	441, 361	\$492, 072

¹ From general tables of the foreign commerce and navigation of France, official; converted at average exchange rate for 1922, 1,000 francs=\$81.93.

TABLE 51.—*France: Imports and exports of coal-tar dyes, 1924*¹

Class	Imports				Exports			
	Dry		Paste		Dry		Paste	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Nitrozo.....	4, 850	\$3, 033	-----	\$52	226, 412	\$92, 623	8, 157	\$1, 046
Nitro.....	9, 921	10, 303	-----	-----	5, 512	2, 563	-----	-----
Pyrazolone.....	148, 811	133, 313	-----	-----	441	314	-----	-----
Stilbene.....	51, 367	39, 643	441	262	2, 425	1, 308	11, 905	2, 615
Monoazo.....	752, 650	495, 333	23, 589	11, 297	35, 715	10, 251	441	105
Polyazo.....	1, 254, 418	1, 552, 526	36, 817	24, 006	801, 372	293, 500	1, 543	209
Thiobenzoyl.....	35, 935	49, 790	441	262	3, 086	1, 300	882	523
Sulphur.....	99, 427	82, 216	2, 866	680	22, 046	4, 602	-----	-----
Indophenol.....	1, 346, 790	1, 180, 620	92, 373	55, 856	6, 173	5, 435	-----	-----
Azines.....	89, 286	81, 954	1, 102	366	441	314	661	209
Pyronines.....	88, 404	196, 805	4, 189	1, 569	1, 198, 641	2, 235, 773	-----	-----
Eosines.....	11, 243	17, 677	220	262	15, 212	23, 169	441	157
Diphenylmethane.....	613, 981	659, 712	1, 543	1, 045	876, 549	710, 339	143, 519	47, 802
Acridines.....	69, 665	106, 640	-----	52	1, 323	1, 569	-----	-----
Hydroquinones.....	101, 412	165, 686	90, 168	38, 859	12, 125	14, 434	210, 980	50, 574
Indigotines.....	82, 673	73, 952	7, 276	4, 550	1, 994, 061	1, 568, 634	2, 918, 449	546, 744
Insoluble vat colors other than indigo.....	102, 734	169, 034	185, 627	199, 002	253, 749	402, 919	7, 055	5, 387
Cibanones.....	31, 305	40, 271	48, 060	33, 890	2, 205	2, 458	1, 324	837
Indigo ²	10, 141	7, 636	-----	-----	2, 030, 437	1, 647, 345	-----	-----
Total.....	4, 905, 013	5, 066, 144	494, 712	372, 010	7, 487, 925	7, 018, 973	3, 305, 357	656, 208

¹ From December, 1924, issue of monthly foreign commerce statistics of France, official, converted at average exchange rate for 1924, 1,000 francs=\$52.30.

² Does not state whether dry or paste.

TABLE 52.—*France: Imports and exports of indigo, 1922, 1923, and 1924*¹

Year	Imports		Exports	
	Pounds	Value	Pounds	Value
1922.....	18, 298	\$15, 485	519, 183	\$492, 072
1923.....	33, 730	27, 618	1, 223, 994	1, 185, 896
1924.....	10, 141	7, 636	2, 030, 437	1, 647, 345

¹ From December, 1924, issue of monthly foreign commerce statistics of France, official. Weights are gross.

DYE INDUSTRY OF JAPAN

Subsidy to dye industry.—The Japanese Diet, before its adjournment on March 31, 1925, passed an act subsidizing the Japanese dye industry to the extent of 4,000,000 yen to be distributed over a period of six years, the maximum amount to be paid out in one year not to exceed 1,000,000 yen. The principal manufacturers are the Nippon Senryo Seiyo Kaisha (Japan Dye Manufacturing Co.), and the Mitsui Koyan Kabrechiki (Mitsui Mining Co.) of Tokyo. On the stock of the former concern the Government has been guaranteeing an 8 per cent dividend, which may now have to be reduced. It is reported that both firms⁵ are qualified by capacity and personnel to receive this protection, and that the amount paid will be in proportion to the dye production, the Nippon Senryo Kaisha receiving 80 per cent and the Mitsui 20 per cent. The Nippon allotment will total 3,200,000 yen, or a little over 530,000 yen per year, as against about 2,000,000 yen per year, which it has received under the former law. To maintain the 8 per cent dividend dye prices must be increased or funds must be found elsewhere.

Consolidation of the German dye agencies in Japan.—Shortly after the adoption of the license-control system of regulating imports of dyes into Japan, a merger of all German dye-sales agencies in Japan was reported to be in progress, the plan being to consolidate the present offices and laboratories under the direction of one head to be assisted by five commercial directors, two technical directors, and two directors specializing on indigo sales. It is further reported that technical laboratories will be established in the different textile districts for furnishing technical aid to the dyers and mills. The following firms with about 100 Germans on the staff have offices or selling agencies in Japan, and are probably included in the merger: Badische, Bayer, Casella, Berlin, A. Leonhardt, Meister Lucius and Brunig, and Kalle.

Certain of the chemical side lines handled by German firms will not be controlled by the merger, as for example, the Badische's business in ammonium sulfate and compressed ammonia. The new consolidation should effect considerable economy and with a uniform sales policy and should be a powerful factor in the dye trade of Japan. Many Japanese distributors connected with the firms to be merged are said to be seriously concerned about their future status.

⁵ *World Trade Notes on Coal-Tar Products, No. 61-B, No. 2, Department of Commerce.*

IMPORTS AND EXPORTS

TABLE 53.—*Japan: Imports and exports of coal-tar dyes, by classes, 1923 and 1924 (first 9 months)*¹

	Imports		Exports	
	Pounds	Value	Pounds	Value
1923				
Aniline dyes.....	10,554,189	\$4,754,203	-----	-----
Indigo, artificial.....	8,169,517	1,724,843	-----	-----
Other coal-tar dyes.....	94,073	95,071	-----	-----
Indigo, natural, dry.....	135,579	115,205	-----	-----
Coal-tar dyes.....	13,953,137	6,689,322	2,296,327	\$396,397
1924 (first 9 months)				
Aniline dyes.....	12,497,675	4,288,894	-----	-----
Indigo, artificial.....	2,340,947	1,120,698	-----	-----
Other coal-tar dyes.....	146,391	141,060	-----	-----
Indigo, natural, dry.....	103,889	92,465	-----	-----
Coal-tar dyes.....	15,088,902	5,643,117	1,664,672	253,020

¹ From October, November, and December, 1923, and September, 1924, issues of monthly returns of the foreign trade of the Empire of Japan; converted at average exchange rate, 1923, one yen=\$0.4858; and for first 9 months of 1924, one yen=\$0.4207.

TABLE 54.—*Japan: Imports of coal-tar dyes (exclusive of indigo), by countries, 1923 and 1924 (first 9 months)*¹

Country—	1923		1924 (first 9 months)	
	Pounds	Value	Pounds	Value
Great Britain.....	48,150	\$37,300	10,164	\$6,098
France.....	114,208	70,946	81,131	30,468
Germany.....	9,093,770	4,082,452	11,268,565	3,927,688
Switzerland.....	641,461	409,528	577,674	274,503
United States.....	540,230	179,385	682,659	178,784
Other.....	210,442	69,664	23,873	12,414
Total.....	10,648,261	4,849,275	12,644,066	4,429,955

¹ From the October, November, and December, 1923, issue and the December, 1924, issue, respectively, of monthly returns of the foreign trade of the Empire of Japan. Values converted at average exchange rate for 1923, 1 yen=\$0.4858 and for first 9 months of 1924, 1 yen=\$0.4207.

DYE INDUSTRY OF POLAND ⁶

Introduction.—Under the treaty of Versailles, Poland was restored as an independent State composed of Provinces that it formerly comprised but that had been partitioned by conquest by Russia, Austria, and Germany; and in 1921 Polish Upper Silesia was added to the new Poland by a decision of the League Council. Two of these four Provinces, Russian Poland and Upper Silesia, had coal-tar chemical industries prior to 1914. At present (1924) most of the production of coal-tar crudes is in Upper Silesia and the manufacture of the dyes is carried out in Russian Poland.

Owing to the extensive development of the textile and tanning industries, Poland was a large consumer of dyes before the war and an exporter of finished textiles.

Pre-war production.—Most of the pre-war dye requirements were furnished by Germany, a significant part being supplied by the

⁶ From American Consulate General, Warsaw, Poland, Oct. 6, 1924.

Polish dye industry only during the period immediately before the war. Two of the four existing dye plants began dye making in 1899: the Polish Chemical Industry of Zgierz in a small plant at Lodz, and the Pabjanice Chemical Industry Corporation with a capital stock of 3,000,000 rubles at Pabjanice. Both of these sites were near Lodz, the Polish textile center. A third plant was established later at Wola Krzysztoperska.

The dye production consisted of a few simple dyes, many of the azo type, produced from imported German intermediates. The Polish coal of Dombrowa basin was noncoking, and coking plants were not operated in Russian Poland. The products of the coke and gas plants were collected and utilized only to a small extent and at best were recovered in a crude form and not refined. The four tar distilleries were operated for the production of certain basic tar derivatives. The tar products of the Upper Silesian plants were largely sold to Germany.

Post-war developments.—The great World War completely changed the industrial situation in Poland on account of (1) the loss of Russian export markets; (2) the destruction of the dye plants by the Germans; and (3) the addition of Upper Silesia to the new Poland. After the war the production of dyes ceased, not entirely because of the lack of demand but largely owing to the thorough destruction of the plants by the Germans, who either carried off or destroyed the apparatus. The Zgierz plant (Polish Chemical Industry) was reorganized with expanded investment. This firm produces dyes, drugs, and intermediates and employs 213 men. A new plant established at Zawierecie in 1920 (Zaglebie Chemical Plants Corporation) produces intermediates and dyes. The other two plants include the Pabjanice Chemical Industry Corporation, producing dyes and drugs and employing 300 men, and the Chemical Plant Wola Krzysztoperska, producing dyes and employing 35 men. The production of dyes and intermediates developed and soon resulted in an increased quantity and variety of products.

Tar production.—The Upper Silesian coal mines give a supply of coking coal. Eleven coking plants were in operation, and four tar-distilling plants; these insure a home supply of crudes. The reported production of the 11 coking plants in 1913 was as follows:

	Metric tons
Consumption of coal.....	1, 600, 000
Production of:	
Tar.....	75, 000
Raw benzene.....	12, 000
Ammonium sulfate.....	25, 000

Crudes.—The postwar annual production of three tar-distilling plants in Upper Silesia is reported as follows:

	Metric tons
Benzene.....	5, 500
Toluene.....	1, 400
Phenol.....	750
Naphthalene.....	2, 250
Heavy oils.....	11, 000
Hard pitch.....	19, 000

The production of by-products at 93 coal-gas works in 1923 was as follows:

	Metric tons
Crude tar.....	25, 200
Refined tar.....	3, 652
Pitch.....	2, 879
Tar oils.....	2, 237
Naphthalene.....	142
Phenol and carbolic acid.....	157
Benzene.....	453
Toluene.....	38
Xylene.....	127
Ammonium sulfate.....	767
Ammonia 24°.....	1, 132
Liquid ammonia.....	27

Intermediates production.—The Zgierz and Zaglebie plants are producers of intermediates, which include derivatives from benzene, toluene, and naphthalene. It is reported that they supply 65 per cent of their requirements.

Most of the dyes produced are direct cotton, acid, and sulphur dyes with a smaller proportion of the basic and chrome dyes. The home market production is estimated to supply about 35 per cent of the consumption and is reported to be on the increase.

The Chemical Industry of Poland placed upon the market over 30 direct dyes for cotton, 6 sulphur dyes, 12 acid dyes, about 10 basic dyes, and nearly a dozen wool-chrome dyes, and in addition a variety of dyes for union goods.

Coal-tar dyes:	Pounds
1922.....	2, 142, 871
1923.....	4, 303, 379

Consumption of dyes.—The pre-war consumption of dyes by the textile industry of Poland is estimated at 12,037,116 pounds, divided by classes of application as follows:

	Pounds
Acid dyes.....	5, 952, 420
Direct dyes.....	4, 100, 556
Sulphur dyes.....	1, 763, 680
Special dyes, mostly of the alizarin and indigo group.....	220, 460
Total.....	12, 037, 116

Dye-consuming industries.—The cotton industry consumes about 300,000 bales of cotton per year, operating in 1923 more than 2,000,000 spindles and 45,000 looms. The woolen mills used 25,000 tons of wool and operated 800,000 spindles and about 15,000 looms. The jute and the linen industry have a combined total of about 1,000 looms. The output of cotton piece goods in 1923 is estimated to be 79,000 tons and of woolen goods 27,000 tons.

The tanning industry is a heavy dye consumer. In 1922, the production by 153 tanneries was sole leather, 6,012 tons; belting harness, and Russia leather, 1,904 tons; all other leather about 5,300 tons.

The paper industry comprises 19 mills producing about 48,000 tons of paper per year.

DYE INDUSTRY OF SPAIN

Before the war the firm of Vero Vidal, Barcelona, was the only important dye manufacturer in Spain. The import duties then in effect did not afford sufficient protection, and little advancement in the industry was made until the war shut off imports of dye-stuffs. The shortage of raw materials during the war prevented the Spanish dye industry from expanding as much as it might have done, but after the war an increase in the import duty to 1.20 gold pesetas per kilo enabled manufacturers to expand their business. The increased duty was so effective in restricting imports that on petition the Government levied 4 gold pesetas per kilo on aniline powders and 2 gold pesetas per kilo on paste. These new duties with the gold surcharge at present in force amount to a duty of 6 and 3 paper pesetas per kilo, respectively, on aniline powders and pastes.

A combination of Spanish dye manufacturers known as the "Fabricacion Nacional de Colorantes y Explosivos," formed two years ago, manufactures Sulphur black, Aniline oil, Acid black, Orange II, Benzo blue 4 B, Direct blue 2 B, Chrome black (F type only), Chrysoidine, Bismarck brown, Acid red, and a few other direct and acid colors. This company purchases a large part of its raw materials, such as dinitrochlorobenzol, H acid, paranitraniline, and beta naphthol.

The Fabricacion Nacional de Colorantes y Explosivos is important only to that part of the Spanish dye business using Sulphur black, Acid black, and Aniline oil. German, British, and Swiss manufacturers are all represented by selling agencies in Spain.

TABLE 55.—Spain: Imports of coal-tar dyes 1923 and first six months of 1924¹

Class	1923		1924 (first 6 months)	
	Pounds	Value	Pounds	Value
Coal-tar dyes:				
Powder or crystals.....	1, 282, 268	\$1, 092, 598	425, 267	
Paste.....	52, 320	24, 005	27, 558	
Indigo, synthetic.....	109, 813	53, 997	56, 658	
Total.....	1, 444, 401	1, 170, 600	509, 483	

¹ From December, 1923, and June, 1924, issues of monthly *Review of Foreign Trade Statistics of Spain*, official; values converted at average exchange rate, 1923, 1 peseta=\$0.1445.

DYE TRADE OF OTHER COUNTRIES

Tables 56 to 72 show the coal-tar trade of other foreign countries in recent years. Similar data for earlier years have been published in the Census of Dyes and Other Synthetic Organic Chemicals for 1922 and 1923.

TABLE 56.—*Argentina: Imports of coal-tar dyes, 1922 and 1923*¹

Dyes	1922		1923	
	Pounds	Value	Pounds	Value
Aniline dyes.....	1, 043, 799	\$401, 574	1, 151, 262	\$27, 169
Indigo.....	741	468	1, 351	860
Total.....	1, 044, 540	402, 042	1, 152, 613	28, 029

¹ From the foreign commerce of Argentina, official; value converted at average exchange rate, 1923, one gold peso=\$0.7355.

TABLE 57.—*Austria: Imports and exports of coal-tar dyes, 1923 and 1924*¹

Class and country	1923		1924		
	Imports	Exports	Imports	Exports	
Alizarin dyes:	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	
Germany.....	105, 159		104, 498		
Italy.....		661			
Rumania.....		441			
Switzerland.....	8, 377		3, 748	1, 102	
Serbia, etc.....		883		441	
Trieste.....		220			
Czechoslovakia.....	882	1, 102	1, 984		
Hungary.....		1, 543			
Other countries.....				220	
Total.....	founds.....	114, 418	4, 850	110, 230	1, 763
	{value.....	\$49, 434	\$2, 431	\$111, 430	\$1, 823
Indigo, synthetic:					
Belgium.....			7, 055		
Germany.....	102, 955	5, 512	415, 567		
France.....			3, 968		
Switzerland.....	182, 982		80, 468	3, 086	
Serbia, etc.....		5, 071		1, 704	
Czechoslovakia.....	13, 228		882		
Hungary.....		3, 086		5, 732	
Other countries.....			882		
Total.....	founds.....	299, 165	13, 669	508, 822	10, 582
	{value.....	\$79, 824	\$4, 052	\$252, 440	\$6, 078
Other coal-tar dyes:					
Bulgaria.....		4, 189		1, 323	
Denmark.....	3, 968				
Germany.....	1, 391, 544	19, 621	1, 902, 129	51, 367	
Italy.....		4, 409	4, 409	1, 704	
Netherlands.....		1, 764			
Poland.....		3, 968		5, 070	
Rumania.....		31, 306		25, 132	
Switzerland.....	147, 267	661	229, 719	882	
Serbia, etc.....		52, 690		48, 281	
Czechoslovakia.....	16, 535	17, 416	18, 078	36, 596	
Hungary.....	1, 543	36, 376	1, 543	50, 706	
Other countries.....	661	8, 818	9, 921	3, 307	
Total.....	founds.....	1, 561, 518	181, 218	2, 165, 799	224, 428
	{value.....	\$674, 455	\$57, 336	\$2, 388, 451	\$268, 040
Grand total.....	founds.....	1, 975, 101	199, 737	2, 784, 851	236, 773
	{value.....	\$803, 713	\$63, 819	\$2, 742, 321	\$275, 941

¹ From official statistics of Austrian foreign trade; value converted at exchange rate of 1 gold crown=\$0.2026.

TABLE 58.—*Belgium: Imports and exports of indigo, natural and artificial, 1924*¹

Country	Imports		Exports	
	Pounds	Value	Pounds	Value
France.....	49,414	\$8,370		
Great Britain.....	1,926	494		
Other countries.....	23,250	5,352	12,019	\$2,327
Total.....	74,590	14,216	12,019	2,327

¹ From official bulletins of the foreign trade of Belgium; value converted at average exchange rate 1924, 1 Belgian franc=\$0.0464.

TABLE 59.—*Brazil: Imports of coal-tar dyes, 1922, and 1923*¹

Class	1922		1923	
	Pounds	Value	Pounds	Value
Aniline or fuchsine dyes.....	1,541,952	\$702,835	1,224,743	\$833,674
Indigo and ultramarine blue.....	1,142,025	248,145	1,108,211	213,108
Total.....	2,683,977	950,980	2,332,954	1,046,782

¹ From *Foreign Trade of Brazil*; values converted at average exchange; 1922, 1 milreis, paper, =\$0.12935 and 1923=\$0.1023.

TABLE 60.—*Canada: Imports of coal-tar dyes, 12 months ended March, 1924*¹

Class and country	Pounds	Value
Aniline and coal-tar dyes, soluble in water, including alizarin and artificial alizarin:		
United Kingdom.....	272,968	\$130,206
United States.....	1,803,020	1,079,129
Germany.....	617,501	430,276
Netherlands.....	245,532	195,496
Sweden.....	180,970	96,807
Switzerland.....	223,352	151,505
Other countries.....	4,956	2,159
Total.....	3,348,299	2,085,578
Aniline and coal-tar dyes, n. o. p.:		
United Kingdom.....	2,352	856
United States.....	20,930	10,152
Other countries.....	1,242	1,102
Total.....	24,524	12,110
Indigo:		
United Kingdom.....		
United States.....	347	400
Other countries.....		
Total.....	347	400
Indigo paste and extract:		
United States.....	85,516	16,494
Other countries.....	43,935	7,123
Total.....	129,451	23,617
Grand total.....	3,502,621	2,121,705

¹ From March, 1924, issue of Monthly Report of the Trade of Canada, value converted at average exchange rate, year ended March, 1924, one Canadian dollar=\$0.9761.

TABLE 61.—China: Imports of dyes, colors, and paints, 1923 ¹

Imported from—	Aniline		Indigo, artificial		Dyes and colors, unclassified ²	
	Value	Pounds	Value	Pounds	Value	
Hongkong.....	\$1,016,538	1,579,729	\$573,196	11,051,172	\$436,229	
French Indo-China.....	22,686			81,333	2,478	
Siam.....	363	267	72	11,467	1,030	
Singapore, Straits, etc.....	78			916,665	44,858	
Dutch Indies.....	3,457			27,200	1,358	
British India.....	6,305			21,333	2,895	
Great Britain.....	90,986	1,829,062	514,962	293,866	54,818	
Norway.....	22,425					
Sweden.....	27,426			133	52	
Denmark.....	24,718			13,333	1,760	
Germany.....	3,844,278	10,938,239	3,523,870	1,622,929	549,488	
Netherlands.....	1,115,352	389,066	169,407	469,599	67,062	
Belgium.....	110,010	45,600	10,308	478,132	52,510	
France.....	43,622	1,461,196	466,242	853,732	81,443	
Switzerland.....	41,865	6,239,584	1,777,092		2,442	
Italy.....	2,265				5,170	
Korea.....	8,253	8,267	996	3,335,592	56,126	
Japan and Formosa.....	166,310	14,933	9,684	7,561,048	520,151	
Philippine Islands.....	1,902	2,667	1,066			
Canada.....	2,400			4,133	2,188	
United States of America and Hawaii.....	276,530	12,021,037	2,548,023	337,599	43,612	
Russia, Pacific ports.....		2,733	2,554			
Macao.....				84,800	2,455	
Turkey, Persia, Egypt, Aden, etc.....				1,333	141	
Russia and Siberia, by land frontier.....				3,600	648	
Russia and Siberia, by Pacific ports.....				10,933	2,450	
Total.....	6,827,768	34,535,380	9,597,473	27,179,932	1,934,365	
Reexports.....	473,111	388,532	143,938	227,199	29,136	
Total net imports.....	6,354,657	34,146,848	9,453,534	26,952,733	1,905,229	

¹ From Foreign Trade of China. Value converted at average exchange in 1923, "haikwan tael" = \$0.80.

² Probably includes colors other than coal-tar dyes.

TABLE 62.—Czechoslovakia: Imports and exports of coal-tar dyes, calendar year 1923 ¹

Class and country	Imports		Class and country	Exports	
	Pounds	Value		Pounds	Value
Alizarin, alizarin colors and synthetic indigo:			Alizarin, alizarin colors and synthetic indigo:		
Germany.....	96,162	\$33,720	British India and Ceylon.....	167,371	\$30,378
France.....	30,628	9,401	Netherlands.....	110,525	17,940
Switzerland.....	14,098	3,457	Germany.....	73,173	25,990
Poland.....	3,527	2,412	Switzerland.....	54,105	24,057
Austria.....	522	314	France.....	50,241	22,230
Belgium.....	450	1,310	Japan.....	4,171	3,480
			Denmark.....	4,017	1,251
			Austria.....	2,928	864
			Hungary.....	2,491	668
			Poland.....	2,480	1,824
			Italy.....	525	275
			Persia.....	478	209
			Danzig.....	408	326
			Dutch East Indies.....	406	72
			Norway.....	313	237
			Other countries.....	64	59
Total.....	145,357	50,614	Total.....	473,696	129,860

¹ From foreign commerce of the Republic of Czechoslovakia, official. Value converted at average exchange rate, 1923, one crown = \$0.02946.

TABLE 62.—Czechoslovakia: Imports and exports of coal-tar dyes, calendar year 1923—Continued

Class and country	Imports		Class and country	Exports	
	Pounds	Value		Pounds	Value
Azo and sulphur dyes:			Azo and sulphur dyes:		
Germany.....	552,034	\$239,920	Germany.....	52,646	\$4,375
Switzerland.....	85,444	55,901	Austria.....	12,522	4,918
Austria.....	3,137	1,342	Netherlands.....	3,300	2,626
Netherlands.....	388	121	Hungary.....	2,945	1,638
Hungary.....	77	32	Jugoslavia.....	2,562	922
			Italy.....	1,565	594
			Sweden.....	1,210	1,343
			Finland.....	753	414
			Poland.....	392	476
			Norway.....	284	220
			Belgium.....	243	156
			Rumania.....	124	35
			Great Britain and Ireland.....	68	62
			Denmark.....	29	44
Total.....	641,080	297,316	Total.....	78,673	17,823
All other coal-tar dyes:			All other coal-tar dyes:		
Germany.....	3,700,650	1,979,833	Germany.....	100,276	24,973
Switzerland.....	473,482	303,371	Austria.....	51,019	23,341
France.....	90,556	32,630	Poland.....	21,074	4,758
United States.....	26,288	2,708	Hungary.....	14,930	5,681
Austria.....	21,962	12,562	Netherlands.....	10,695	6,640
Poland.....	10,245	4,989	Sweden.....	7,185	3,840
Hungary.....	2,906	1,063	Rumania.....	6,717	3,726
Italy.....	2,313	750	Italy.....	6,468	3,871
Netherlands.....	2,105	1,010	Jugoslavia.....	5,560	2,548
Great Britain and Ireland.....	1,543	1,890	France.....	3,082	2,478
Other countries.....	159	44	Finland.....	1,863	1,258
			Switzerland.....	1,446	1,666
			Norway.....	752	634
			Canada.....	661	608
			Belgium.....	489	233
			Trieste.....	456	389
			Latvia.....	408	39
			Great Britain and Ireland.....	375	322
			French possessions in Africa.....	328	79
			Denmark.....	234	223
			Other countries.....	492	563
Total.....	4,332,209	2,340,850	Total.....	234,510	87,870
Grand total.....	5,118,676	2,688,780	Grand total.....	786,879	235,553

TABLE 63.—*Dutch East Indies: Imports of coal-tar dyes, 1922, 1923, and 1924*¹

	1922				1923	1924
	Wet		Dry		Wet and dry	
	Pounds	Value	Pounds	Value	Pounds	Pounds
Alizarin dyes:						
Netherlands.....	250,398	\$134,613	21,054	\$21,211	206,836	291,062
Great Britain.....	56,416	24,526	110	88	246,430	106,348
Germany.....	180,006	85,584	33,962	36,055	250,471	637,524
Switzerland.....						8,598
Czechoslovakia.....						298
Belgium.....					7,936	
Japan.....					45,770	4,017
Other countries.....						
Total.....	486,820	244,723	55,126	57,354	757,443	1,047,847
Aniline dyes:						
Netherlands.....	4,674		125,742		98,579	131,194
Great Britain.....					2,130	4,400
Germany.....	2,888		196,176		373,153	531,209
France.....						631
Belgium.....			14,037		11,072	5,595
Italy.....					6,107	562
Switzerland.....			7,793		49,626	46,429
Singapore.....			4,852		260	320
China.....						734
Hongkong.....					244	
Other countries.....	110		10,723		440	7
Total.....	7,672		359,323		541,611	721,081
Synthetic indigo:						
Netherlands.....	591,505	357,507	5,558		214,012	485,814
Great Britain.....					30,093	6,614
Germany.....	499,322	282,527	1,462		194,911	554,031
France.....					142,285	109,525
Belgium.....	6,614	2,887				29,762
Italy.....	51,632	19,012	4,189		71,947	5,952
Switzerland.....	19,841	7,044			153,793	47,730
Singapore.....						4
Hongkong.....					43,651	
China.....					86,112	
Japan.....					2,248	66
Other countries.....			2,039		132	
Total.....	1,168,914	668,977	13,248		939,184	1,239,498
Grand total.....	1,663,406	913,700	427,697	57,354	2,238,238	3,008,426

¹ From imports and exports of the principal articles of commerce entering into the free traffic of Java and Madura; value converted at average exchange rate, 1922, one gulden=\$0.3849; 1923=\$0.3910; 1924=\$0.3822.

TABLE 64.—*Dutch East Indies: Exports of natural indigo, 1920-1924*¹

Java and Madura	1920	1921	1922	1923	1924
Indigo, dry:	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Netherlands.....	586	2,363	7,394		
Singapore.....	58,510	97,399	11,023		5,952
Great Britain.....					3,267
China.....				441	
Japan.....	9,963	54,068	10,582	8,457	15,644
Total.....	69,059	153,830	28,999	8,898	24,863
Indigo, wet:					
British India.....			5,445		
Singapore.....	346,299	13,779	4,409	2,646	
Other countries.....	127				
Total.....	346,426	13,779	9,854	2,646	
Grand total.....	415,485	167,609	38,853	11,544	24,863

¹ From imports and exports of the principal articles of commerce entering into the free traffic of Java and Madura, value converted at average exchange rate 1920, one gulden=\$0.3407; 1921=\$0.3367; 1922=\$0.3849; 1923=\$0.3910; 1924=\$0.3822.

TABLE 65.—*Egypt: Imports of coal-tar dyes, 1924*¹

Class and country	Pounds	Value
Indigo, synthetic:		
United Kingdom.....		
Belgium.....	24, 703	\$16, 896
France.....	147, 821	42, 991
Germany.....	560, 627	347, 295
Switzerland.....	214, 572	77, 178
Other countries.....	26	27
Total.....	947, 749	484, 387
Other coal-tar dyes:		
United Kingdom.....	3, 510	2, 939
Belgium.....	9, 374	2, 585
France.....	7, 423	2, 675
Germany.....	562, 091	223, 523
Switzerland.....	17, 769	13, 014
Syria.....		
Other countries.....	7, 712	2, 352
Total.....	607, 879	247, 088
Indigo, natural:		
British India.....	109, 893	87, 943
Total.....	109, 893	87, 943
Other dyes:		
United Kingdom.....	5, 531	4, 564
France.....	2, 967	1, 177
Germany.....	5, 860	2, 111
Italy.....	4, 398	1, 111
United States.....	1, 653	1, 111
Other countries.....	1, 581	633
Total.....	21, 990	12, 381
Grand total.....	1, 687, 511	831, 799

¹ From annual statement of the foreign trade of Egypt, value converted at average exchange rate, 1924, one Egyptian pound=\$4.4876.

TABLE 66.—*Egypt: Reexports of coal-tar dyes, 1924*¹

Class and country	Pounds	Value
Indigo, synthetic.....	5, 732	\$3, 442
Other coal-tar dyes:		
Syria.....	172	99
Other countries.....	1, 623	1, 095
Total.....	1, 795	1, 194
Indigo, natural.....	29	22

¹ From annual statement of the foreign trade of Egypt; value converted at average exchange rate, 1924, one Egyptian pound=\$4.4876.

TABLE 67.—India: Imports of coal-tar dyes and exports of natural indigo, 1923 and 1924¹

Imports of coal-tar dyes				Exports of natural indigo			
	Year ended Mar. 31, 1923	Calendar year 1924			Year ended Mar. 31, 1923	Calendar year 1924	
	Pounds	Pounds	Value		Pounds	Pounds	Value
Alizarin dyes.....	5,285,661	9,269,626	\$2,102,031				
Aniline dyes.....	8,741,929	11,301,298	6,926,897				
Indigo, synthetic.....		145,936	139,418				
Other coal tar dyes.....	92,232	1,590	1,342				
Total.....	14,119,822	20,718,450	9,169,688				
From—				To—			
United Kingdom..	1,326,261	1,513,106	443,281	United Kingdom..	86,128	68,096	\$65,973
Germany.....	9,922,018	14,810,512	6,787,968	Asiatic Turkey...	129,808		
Belgium.....	1,002,955	1,402,175	522,222	Persia.....	63,728	31,360	28,452
Switzerland.....	53,259	253,642	192,352	Japan.....	41,216	99,680	85,370
United States.....	726,391	405,084	198,238	Egypt.....	129,136	88,704	60,811
Netherlands.....		2,056,417	807,828	Mesopotamia.....		87,136	95,066
Other countries....	1,088,938	131,578	78,381	Other countries ..	57,904	60,032	62,749
Total.....	14,119,822	20,572,514	9,030,270	Total.....	507,920	435,008	398,421

¹ From accounts relating to the sea-borne trade and navigation of British India, value converted at average exchange rate, 1924, one rupee=\$0.3179.

TABLE 68.—Italy: Imports and exports of synthetic organic dyes, 1923 and 1924¹

Class	1923				1924			
	Imports		Exports		Imports		Exports	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Sulphur black.....	10,141	\$3,517	27,558	\$4,569	48,501	\$9,019	161,818	\$25,626
Account of German reparations.....					1,323			
Other sulphur dyes.....	464,950	239,864	34,833	22,396	200,839	104,188	28,660	15,434
Account of German reparations.....					7,716			
Other synthetic organic dyes dry or containing less than 50 per cent of water.....	3,187,851	2,321,541	480,823	485,345	2,546,533	1,932,237	327,163	313,639
Account of German reparations.....	2,299,839				867,290			
In paste or containing 50 per cent or more of water.....	571,653	172,366	104,498	36,171	1,138,455	327,844	23,368	22,094
Account of German reparations.....	616,186				1,223,112			
Total.....	7,150,620	2,737,288	647,712	548,481	6,033,770	2,373,288	541,009	376,793

¹ From official statistics of domestic exports and imports for consumption, Jan. 1 to Dec. 31, 1923 and 1924, respectively; value converted at average exchange rate, 1923, one lira=\$0.0460, and 1924, one lira=\$0.0436.

TABLE 68a.—Italy: Imports of synthetic organic dyes by countries, 1923 and 1924

Imported from—	1923	1924
	Pounds	Pounds
France.....		964,733
Germany.....	3,329,387	2,025,366
Account of reparations.....		2,099,440
Switzerland.....	662,482	771,390
Other countries.....	242,506	172,841
Total.....	7,150,399	6,033,770

TABLE 69.—Netherlands: Imports and exports of synthetic organic dyes, calendar year 1923¹

Class and country	Imports		Class and country	Exports	
	Pounds	Value		Pounds	Value
Anilin and other coal-tar dyes:			Anilin and other coal-tar dyes:		
Germany.....	3,428,153	\$1,563,609	Germany.....	52,910	\$39,491
Belgium.....	94,798	35,581	Belgium.....	310,849	73,899
France.....	608,470	242,811	Great Britain.....	37,478	24,633
Switzerland.....	354,941	251,413	United States.....	33,069	28,543
Great Britain.....	30,864	15,640	Dutch East Indies.....	15,432	7,429
United States.....	4,409	3,910	Sweden.....	28,660	17,500
Sweden.....	6,614	4,692	Denmark and Iceland.....	108,025	4,000
Denmark and Iceland.....	6,614	3,910	Italy and Fiume.....	24,251	1,000
Italy and Fiume.....	8,818	5,083	Portugal.....	35,274	1,000
Czechoslovakia.....	6,614	3,128	France.....	4,409	4,692
Other countries.....	8,838	7,038	Norway.....	17,637	8,211
Total.....	4,559,133	2,136,815	Serbia.....	6,614	3,128
			Spain.....	4,409	2,346
Indigo, synthetic:			Switzerland.....	6,614	3,519
Germany.....	361,554	76,636	Egypt.....	6,614	2,346
France.....	57,320	10,166	Luxemburg.....	8,818	5,082
Switzerland.....	24,251	4,692	Hongkong.....	13,228	2,346
Other countries.....	2,204	1,173	Japan and Korea.....	6,614	4,301
Total.....	445,329	92,667	India Empire.....	41,887	9,775
			Mexico.....	4,409	2,346
Other synthetic organic dyes:			Esthonia.....	6,614	3,519
Germany.....	123,458	4,692	China.....	57,320	12,512
Other countries.....	2,204	391	Other countries.....	26,454	13,295
Total.....	125,662	5,083	Total.....	857,589	335,478
Grand total.....	5,130,124	2,234,565	Indigo, synthetic:		
			Belgium.....	26,455	5,083
			Greece.....	39,683	26,197
			Czechoslovakia.....	26,455	4,692
			China.....	114,639	21,114
			Mexico.....	6,614	1,955
			Other countries.....	6,614	1,955
			Total.....	220,460	60,996
			Grand total.....	1,078,049	396,474

¹ From annual statistics of the foreign trade of the Netherlands, value converted at average exchange rate, 1923, 1,000 florin=\$391.

TABLE 70.—Sweden: Imports of coal-tar dyes, 1922 and 1923 ¹

Class and country	1922		1923	
	Pounds	Value	Pounds	Value
Alizarin dyes:				
Denmark.....	377	\$537	672	\$729
Finland.....			337	366
Danzig.....			1,003	1,087
Germany.....	95,539	136,092	150,255	162,869
Belgium.....			15,657	16,971
France.....			9,810	10,634
Switzerland.....			450	487
Other countries.....	154	220	146	158
Total.....	96,070	136,849	178,330	193,301
Anilin and other coal-tar dyes:				
Norway.....	11,067	8,539	17,524	12,136
Denmark.....	21,757	16,788	22,917	15,870
Finland.....			4,866	3,369
Latvia.....			1,543	1,069
Danzig.....			1,845	1,278
Netherlands.....	3,931	3,033	99,388	68,829
Belgium.....	10,064	7,765	127,911	88,581
Great Britain.....	22,308	17,213	59,002	40,860
France.....	4,083	3,150	40,629	28,136
Switzerland.....	151,681	117,036	318,814	220,787
United States.....	1,129	871	7,127	4,936
Germany.....	1,523,603	1,175,599	1,891,262	1,309,746
Austria.....	1,065	822		
Other countries.....	434	335	439	304
Total.....	1,751,122	1,351,151	2,593,267	1,795,901
Indigo, synthetic:				
Germany.....	42,110	22,737	81,859	34,758
Great Britain.....			11	5
Switzerland.....	331	366	761	1,241
Total.....	42,441	23,103	82,631	36,004
Other indigo dyes:				
Germany.....	15,825	3,757		
Total.....	15,825	3,757	110	17
Indigo, natural:				
Total.....	11	32	44	126
Grand total.....	1,905,469	1,514,892	2,854,382	2,025,349

¹ From official trade statistics of the Swedish Department of Commerce; value converted at average exchange rate of one kronor=\$0.2617 in 1922 and \$0.2655 in 1923.

TABLE 71.—Sweden: Exports of coal-tar dyes, 1922 and 1923 ¹

Class and country	1922		1923	
	Pounds	Value	Pounds	Value
Alizarin dyes:				
Denmark.....	220	\$366		
Other countries.....	24	89		
Total.....	244	455	194	\$347
Anilin and other coal-tar dyes:				
Norway.....	8,993	11,905	29,815	31,932
Denmark.....	19,068	14,259	27,165	20,530
Finland.....	1,622	2,477	15,461	16,107
Russia.....	7,165	2,979	14,330	4,779
Esthonia.....	11	26		
Latvia.....	1,830	811		
Netherlands.....	961	636	2,436	2,777
Great Britain.....			10,053	6,240

¹ From official trade statistics of the Swedish Department of Commerce; value converted at average exchange rate of one kronor=\$0.2617 in 1922 and \$0.2655 in 1923.

TABLE 71.—Sweden: Exports of coal-tar dyes, 1922 and 1923—Continued

Class and country	1922		1923	
	Pounds	Value	Pounds	Value
British East India			1,378	\$1,487
Other countries			62	172
Total	39,650	33,093	100,700	84,026
Indigo, synthetic:				
Norway	220	290	377	503
Netherlands			463	265
Total	220	290	840	768
Grand total	40,114	33,838	101,734	85,141

TABLE 72.—Switzerland: Imports and exports of coal-tar dyes, 1924¹

	Aniline and other coal-tar dyes		Indigo, indigo solution		Alizarin, synthetic	
	Pounds	Value	Pounds	Value	Pounds	Value
IMPORTS						
Germany	1,309,973	\$969,304	105,600	\$37,351	307,321	\$55,935
Austria					882	182
France	30,423	22,411	129,190	40,448	1,102	729
Italy	19,401	7,834				
Great Britain	32,628	19,860				
Other countries	1,764	1,822			441	
Total	1,394,189	1,021,231	234,790	77,799	309,746	56,846
EXPORTS						
Germany	139,992	107,498				
Austria	175,707	143,027	72,752	17,491		
France	2,714,744	2,737,737	10,362	7,106		
Italy	493,169	534,210	181,439	49,741		
Belgium	699,961	406,124	16,975	4,919		
Holland	277,780	236,860				
Great Britain	1,082,679	1,246,795				
Spain	115,080	158,332	26,455	32,796		
Portugal	70,988	52,474				
Denmark	135,583	122,074				
Norway	36,155	35,893				
Sweden	314,817	284,232				
Finland	35,935	41,906				
Latvia, Esthonia	65,036	79,986				
Poland	87,302	95,291				
Czechoslovakia	1,095,025	799,494				
Hungary	35,494	41,177	14,771	9,657		
Jugoslavia	24,471	14,758				
Greece	20,723	15,305				
Bulgaria	81,791	51,745	4,189	2,733		
Rumania	55,997	38,080				
Russia	32,849	43,364				
Egypt	11,905	9,292	204,587	77,617		
British India	290,346	208,072	43,431	30,427		
Indo-China	9,700	9,839				
Dutch East Indies	61,288	46,097	88,404	30,063		
China	103,396	75,431	7,690,527	1,971,222		
Japan	819,890	691,085	253,309	256,355		
Canada	139,772	88,731	99,647	21,317		
United States	551,370	687,076				
Mexico	121,032	96,748				
Brazil	207,232	282,592				
Argentina	110,010	72,515				
Chile	24,692	22,228				
Australia	11,243	7,835				
Other countries	18,298	17,673	37,698	25,326		
Total	10,271,452	9,601,576	8,744,546	2,536,770		

¹ From official statistics of the foreign trade of Switzerland, value converted at average exchange rate, 1924, 1 franc=\$0.1822.

EARNINGS OF SWISS DYE MANUFACTURERS IN 1924¹

The combined net earnings of the four firms engaged in the manufacture of aniline dyes in Basel were approximately 10,500,000 francs for the year 1924.

The largest firm, Gesellschaft fuer Chemische Industrie, has a capital stock of 20,000,000 francs and total assets of 66,143,553 francs. The net earnings of this firm for 1924 were 3,558,522 francs which was a decrease from 1923, said to be caused by the sharp competition in the Chinese market, particularly in indigo. The directors were able, however, to declare a 15 per cent dividend after making liberal allowances for the amortization and pension funds.

The financial statement of the Chemische Fabrik vormals Sandoz shows the largest profit of any dye firm in Basel during 1924. This firm is capitalized at 7,500,000 francs, and its net earnings in 1924, 3,360,582 francs, were equivalent to 44 per cent of its capital stock. Its board of directors declared a dividend of 25 per cent and in addition recommended to the stockholders the issuance of one bond of 1,000 francs, bearing 5½ per cent interest, for every three shares of stock held. The total assets of the company, according to its annual statement as of December 31, 1924, amounted to 26,284,611 francs.

The firm of J. R. Geigy, S. A., has a capital of 7,500,000 francs and assets of approximately 16,000,000 francs. As this firm is owned exclusively by the Geigy family, it does not publish its statement, but it is known that its earnings for 1924 were very large, approximating 3,000,000 francs, or about 40 per cent of its capital stock.

The firm of Durand & Huguenin, S. A., has recuperated to a very large extent from the effects of the war, and its net earnings were larger in 1924 than in the preceding year. This firm, which is capitalized at 2,000,000 francs, showed net earnings of 567,809 francs, and declared a dividend of 10 per cent.

IMPORT TARIFF RATES AND REGULATIONS OF THE WORLD'S CHIEF
DYE PRODUCING AND CONSUMING NATIONS

INTRODUCTION

A compilation of the tariff rates of 26 of the world's principal dye consuming and producing countries, together with information on the license control of the imports of dyes into Great Britain, Germany, Australia, Japan, and Persia, is given on pages 174-186. This compilation has been checked by the foreign tariffs division of the Bureau of Foreign and Domestic Commerce, with the official text of foreign tariff laws on file in that division as of May, 1925. In addition to the current rates for foreign countries the tariff rates on coal-tar dyes for the United States have been compiled for this period, 1864 to 1922.

In view of the frequent changes in tariff rates, the compilation should not be relied on in making actual shipments. Precise information as to rates in force at any given date may be obtained on application to the foreign tariffs division of the Department of Commerce.

¹ World Trade Notes on Coal-Tar Products, No. 65-B. Department of Commerce.

ARGENTINA

(Law No. 11281 of November 29, 1923; Boletín Oficial, December 3, 1923)

9. Aniline dyes. Ad valorem 5 per cent.

ART. 8. All goods or products subject to import duties are to pay a surtax of 2 per cent when the duty amounts to from 10 to 20 per cent and a surtax of 7 per cent when the duty exceeds 20 per cent. These surtaxes are to be calculated on the values laid down by the valuation tariff, or on the actual value of goods or products not enumerated in the tariff.

ART. 11. The valuations laid down in the valuation tariff and the laws amending it are to be increased by 60 per cent, and the specific duties fixed by this law are to be increased by 25 per cent.

ART. 12. * * * products of any kind whatsoever which are imported or exported, whether dutiable or not, and those in transit for other countries are to pay the statistical service tax of 3 per cent of the values stated in the customs papers. The customs of the Republic are to include the amount of the statistical tax in the liquidation of the documents for the various operations of the Customs, and are to collect it in conjunction with them.

ART. 76. Minimum tariff equals import duties established.

Maximum tariff: (a) Minimum tariff plus surtax of 50 per cent. (b) Ad valorem rate of 15 per cent is imposed on free goods.

The following tabulation shows the official valuation and percentage to be applied against these valuations to obtain the actual rate on dyes imported into Argentina.

Tariff number	Kind of dye	Valuation (pesos per gross kilo) ¹	Rate (per cent of valuation)
487.....	Special dyes for leather (gross).....	0.128	25
2849.....	Aniline, liquid, and its salts.....	.64	5
2850.....	Aniline, black.....	1.20	5
2851.....	Aniline of other colors.....	1.60	5
2853.....	Indigo of all kinds.....	2.40	25
2854.....	Purple, liquid, or in paste.....	1.20	25
2902.....	Bronze powder.....	1.60	25
2978.....	Coloring for butter and cheese.....	1.60	25
N. O. S.....	Package dyes.....	Ad valorem	25

¹ These valuations include the 60 per cent increase of 1923.

AUSTRALIA

Under authority of the customs act of 1901-1916, the governor general of Australia issued a proclamation¹ prohibiting the importation of dyes, other than those of British origin, except with the written consent of the minister of state for trade and customs. This action had for its object the fostering of the newly expanded British dyestuffs industry.

Representations by Australian importers that dyes of a quality possessed by certain of those made in America were not obtainable in adequate quantities from British sources led to the granting, for the time being, of licenses for the importation of certain American dyes. By the end of 1923, however, the Australian officials had decided on a more stringent enforcement of the 1919 proclamation and had prohibited the import of any dye obtainable in Great Britain. The sentiment for establishing closer trade relations among the various countries of the British Empire, aroused by the Imperial Economic

¹ Australian Government Gazette of Feb. 27, 1919.

Conference in London in 1923, is believed to have been the reason for stricter enforcement of measures for the control of dye importations into Australia.

Australian tariff of December 16, 1921

	British preferential	Intermediate	General
231 Paints and colors: (a) * * * Dyes, ¹ dry or in paste form for manufacturing purposes.....ad valorem.....	Free.....	5 per cent.....	10 per cent.

¹ Licensing system, similar to that of United Kingdom.

BELGIUM

(Law of May 8, 1924, which became effective November 10, 1924)

	Maximum	Minimum
396 C tar dyes, dry or in paste: Alizarin.....	<i>Ad valorem</i> 15 per cent.....	Free.
Alizarin dyes.....	15 per cent.....	Do.
Aniline dyes.....	15 per cent.....	Do.
(a) Indigo, artificial.....	15 per cent.....	Do.
(e) Others.....	15 per cent.....	Do.

The minimum rates apply to imports from the United States. The ad valorem duties are levied on the c. i. f. value at the port of entry.

BOLIVIA

Bolivianos
per gross kilo

166 Indigo.....	1. 00
1919 Alizarin, aniline, fuchsine and their imitations.....	. 85
1943 Coal-tar colors.....	. 15

There is a surtax of 10 per cent of the import duty. Duties on all goods except sugar, flour, and rice, imported into Bolivia, were increased by 10 per cent for one year from January 8, 1925:

BRAZIL

(January 1, 1924)

	Duty, reis per kilo	Tare allowance
146 Aniline or fuschine colors of all kinds, etc., solid or liquid.....	2, 000	(1)
154 Pastes or extracts for dyeing, liquid or solid, not specially mentioned.....	1, 000	(2)
156 Coloring materials, alizarin, anschuchine, bixine, garancine, curcumine, indigotine, hematine, braziline, carthamine (safflower carmine) and others not specially mentioned.....	1, 800	(1)
328 Amino-naphthalene.....net weight.....	1, 500	
Anthracene, in paste or in powder for the manufacture of dyestuffs.....do.....	1, 500	
Benzidine and homologous acids, for the manufacture of aniline.....do.....	1, 500	
Dimethylaminobenzol.....do.....	1, 500	
Dinitrochlorobenzene.....do.....	1, 500	
Dinitrophenol.....do.....	1, 500	
Metaphenylenediamine.....do.....	1, 500	
Perchlorate of ammonia, nitronaphthalene, and trinitrotoluol.....gross.....	40	

¹ See footnotes on p. 176.

The actual rates at present (May, 1925) paid by the importer are about four times those given above, due to the payment of 60 per cent of the duty in gold plus 2 per cent gold surtax.

BULGARIA

1923

	Gold leva per 100 kilos
178 (c) Indigo, natural and synthetic.....	200
180 Artificial organic colors, not prepared.....	160
181 Colors of all kinds, cakes, tablets, balls or other shapes: (c) Other than stove polish, ultramarine blues and other mineral blues (including charges for immediate packing).....	250
182 Colors of all kinds, prepared with oil, spirit, water, glue, etc. (including charges for immediate packing):	
(a) In tubes or receptacles containing less than 500 grams.....	200
(b) In receptacles containing 500 grams or more.....	60

If payment is made in paper currency, the duties are multiplied by 15.

CHILE

(Law No. 3066, March 1, 1916, amended by Law No. 3734 of February 23, 1921, and by Law No. 3852 of February 10, 1922, levying taxes)

	Pesos per kilo
1399 Anthracene (net weight).....	2. 25
1100 Alizarin and imitations thereof; fuschine.....	1. 80
Aniline and other colors from coal, not specified, legal weight.....	1. 20
1101 Indigo, natural or synthetic, gross weight.....	2. 70

ARTICLE I. Goods shipped into the ports of the Republic for foreign countries as well as those exported overland shall pay a tax of 10 centavos per metric quintal gross weight or fraction.

The same tax shall be payable on foreign goods landed in large or small trading ports or imported overland.

CHINA

342 Aniline dyes not otherwise enumerated.....	5 per cent ad valorem.
356 Dyes and colors unclassified.....	5 per cent ad valorem.
360 Indigo, artificial, containing not more than 20 per cent indigotin (higher strengths in proportion).....	2.20 Haikwan taels per picul.
363 Indoine.....	5 per cent ad valorem.

¹ Tare: Glass receptacles capable of containing water—	Per cent
Up to 15 grams.....	80
More than 15 grams and up to 125 grams.....	70
More than 125 grams and up to 500 grams.....	50
More than 500 grams and up to 2 kilos.....	40
More than 2 kilos and up to 4 kilos.....	20
More than 4 kilos.....	10
Pots (botijas) or other receptacles of earthenware or faience, 30 per cent; hogsheads or cases, 10 per cent; tins, 5 per cent; iron barrels or receptacles, 12½ per cent; small cases of cardboard or wood, gross weight.	
² Tare: Glass receptacles containing water—	Per cent
Up to 125 grams.....	60
More than 125 grams and up to 250 grams.....	50
More than 250 grams and up to 500 grams.....	40
More than 500 grams and up to 2 kilos.....	30
More than 2 kilos.....	20
Other receptacles of earthenware or faience.....	40
Hogsheads.....	10
Tins or cases of tin or zinc.....	5
Small cases or boxes of cardboard or wood, gross weight.	

COLOMBIA

	Pesos per gross kilo
177 Alizarin, natural or artificial.....	0.08
178 Anilines.....	.03
179 Indigo, archil, and vegetable dyes not specified.....	.03

There is a surtax of 17.7 per cent of the duty.

CZECHOSLOVAKIA

(December, 1921)

Derivatives of dry distillation of coal tar used in the manufacture of coal-tar dyes by permission and under control..... (Free).

(January 1, 1922)

	Crowns per 100 kilos	
	General	Conven- tional
625 Tar dyes.....	Free.	
626 Colors, not elsewhere specified.....	720	500
627 All colors in cakes, small bags, paste, tubes, bladders, cups, glasses, shells, and boxes.....	1,625	

These duties include the coefficients of increase. Conventional rates, where provided, apply to products of the United States.

Tare deductions from gross weight are as follows:

- 12 per cent in cases and barrels.
- 6 per cent in baskets, paper barrels, and barrels lined with paper.
- 3 per cent in bales.
- 9 per cent in double barrels.

ECUADOR

	Suces
17 Indigo, per gross kilo.....	0.225
25 Chemical products, not specified, per net kilo.....	.45
27 Aniline and cochineal per gross kilo.....	.565
27 Vegetable dyes, not specified, per gross kilo.....	.565

Surtax: 4 per cent ad valorem. At Guayaquil, 10 per cent of import duty.

EGYPT

The import duty on general merchandise is (with few exceptions) 8 per cent ad valorem, based on the value of the article in the country where it was purchased at the date of its clearance for consumption in Egypt, plus all charges for freight, insurance, packing, etc., to the Egyptian port of landing. The values of certain articles are, by agreement between the customs administration and importers, fixed for a period not to exceed one year, and the ad valorem duty is collected on these values, which are regularly published in the Journal Officiel.

Import quay dues, excepting tobacco—

- 0.45 per cent ad valorem in Alexandria and Suez.
- 0.7 per cent ad valorem at Port Said.

Import municipal or paving dues, excepting tobacco—

- 0.5 per cent ad valorem at Alexandria.
- 1 per cent ad valorem at Port Said (this tax is optional).
- 2 per cent ad valorem at Damietta.

FRANCE

(Decrees of March 28, 1921, and (April 3, 1921))

	General	Francs per 100 kilos (gross weight)		
		Inter- mediate	Mini- mum	Coeffi- cient of increase
294 Dyes derived from coal tar: Dry—				
Nitrosated coloring materials.....	400	200	100	3
Nitrated coloring materials except picric acid.....	400	200	100	3
Coloring materials derived from pyrazolone.....	400	200	100	3
Coloring materials derived from stilbene.....	400	200	100	3
Monoazoic coloring materials.....	400	200	100	3
Polyazoic coloring materials primary, secondary and tertiary.....	400	200	100	3
Thiobenzenylic coloring materials.....	400	200	100	3
Sulphur coloring materials.....	600	300	150	3
Indophenols, oxazines and thiazines.....	600	300	150	3
Azines, safranines, indulines.....	600	300	150	3
Pyronines and phthaleines.....	600	300	150	3
Eosines, erythrosines, phloxines, cyanozines.....	800	400	200	3
Coloring materials derived from diphenylmethane, and triphenylmethane and their homologues.....	600	300	150	3
Coloring materials derived from acridine and quinoline.....	600	300	150	3
Oxyquinonic coloring materials or alizarin colors.....	600	300	150	3
Indigotine and its sulphonic derivatives.....	600	300	150	3
Insoluble coloring materials, capable of vat dyeing, except indigo.....	800	400	200	3
Cibanones.....	1,000	500	250	3
Dyes derived from coal tar, in paste containing at least 50 per cent of water:				
Nitrosated coloring materials.....	220	110	55	3
Nitrated coloring materials, except picric acid.....	220	110	55	3
Coloring materials derived from pyrazolone.....	220	110	55	3
Coloring materials derived from stilbene.....	220	110	55	3
Monoazoic coloring materials.....	220	110	55	3
Polyazoic coloring materials, primary, secondary and tertiary.....	220	110	55	3
Thiobenzenylic coloring materials.....	220	110	55	3
Sulphur colors.....	330	165	82.5	3
Indophenols, oxazines, and thiazines.....	330	165	82.5	3
Azines, safranines, indulines.....	330	165	82.5	3
Pyronines and phthaleines.....	330	165	82.5	3
Eosines, erythrosines, phloxines, cyanozines.....	440	220	110	3
Coloring materials derived from diphenylmethane and from triphenylmethane and their homologues.....	330	165	82.5	3
Coloring materials derived from acridine and quinoline.....	330	165	82.5	3
Oxyquinonic coloring materials, or alizarin colors.....	330	165	82.5	3
Indigotine and its sulphonic derivatives.....	330	165	82.5	3
Insoluble coloring materials, capable of dyeing in the vat, except indigo.....	440	220	110	3
Cibanones.....	550	275	137.5	3

The general tariff applies to Germany and to certain other countries not having the most-favored-nation status. The intermediate tariff applies to the United States and certain other countries. The minimum tariff applies to England and other countries having most-favored-nation treatment.

GERMANY

On January 16, 1917, the German Government enacted a law subjecting the shipment of goods into and out of Germany to license control. The regulation of foreign commerce under the provisions of this law is vested in a Government official known as the commissioner for import and export licenses. The actual granting of licenses was at first carried on through committees made up of business men representing the various industries and was subject to the commissioner's approval. Within the past year or two, how-

ever, most of these committees have been dispensed with, and licenses are now issued direct by the commissioner.

While the law of 1917 has had different classes of commodities exempted from its provisions and the rules governing its enforcement have been somewhat modified from time to time, the importation of coal-tar dyes remains subject to license control. This group comprises the following:

Alizarin dyes, dry or in the form of paste:

Indigo, natural or artificial, including indigo carmine, pure or admixed with mineral matter, starch, etc., either dry or in the form of paste;

Aniline, and other coal-tar dyes not otherwise mentioned.

INDIA

SERIAL NO. 81; STATUTORY SCHEDULE 92

(Effective January 1, 1925)

	Tariff valuation per pound		Duty (percentage of valuation)
	Rupees	Annas	
Dyeing and tanning substances:			
Alizarin dye—			
Dry—			
Not exceeding 40 per cent.....	1	12	15
Over 40 per cent but not exceeding 50 per cent.....	2	4	15
Over 50 per cent but not exceeding 60 per cent.....	2	4	15
Over 60 per cent but not exceeding 70 per cent.....	2	8	15
Over 70 per cent but not exceeding 80 per cent.....	2	12	15
Over 80 per cent.....	3	4	15
Moist—			
Not exceeding 10 per cent.....		7	15
Over 10 per cent but not exceeding 16 per cent.....		8	15
Over 16 per cent but not exceeding 20 per cent.....		10	15
Exceeding 20 per cent.....	1		15
Aniline dyes—			
Moist.....	2		15
Black, of sulphur series.....		12	15
Congo red.....	1	4	15
All other dry.....	2	8	15
Aniline salts.....			15

ITALY

(Law of July 27, 1923)

	Gold lire per quintal	
	General	Conventional
BenzoI, toluol, and xylol:		
Crude..... gross weight.....	2	
Refined..... do..... (Refined benzoI, toluol, and xylol, destined for use in the manufacture of synthetic organic colors, etc., are admitted at 4 lire per quintal, in accordance with the conditions established by ministerial decree of Mar. 10, 1923.)	8	
Aniline and toluidine, crude and hydrochloride..... legal weight.....	40	
Other aniline salts..... net weight.....	60	
NitrobenzoI..... legal weight.....	40	
Derivatives of aniline, not elsewhere mentioned..... net weight.....	240	
Naphthalene:		
Crude..... gross weight.....	2	
Refined..... do.....	8	
Derivatives..... net weight.....	240	
Anthracene gross weight.....	10	
Benzidine net weight.....	240	
Toluidine, dianisidine, ortho, and para toluidine do.....	240	
Xylidine do.....	240	
Phenylenediamine, phenetidine, and anisidine do.....	240	
Derivatives of benzidine, toluidine, and similar products, not elsewhere mentioned net weight.....	240	
Anthraquinone do.....	75	30
Resorcin do.....	240	
Alpha and beta naphthol do.....	240	
Derivatives of naphthol and naphthyl-amine, not elsewhere mentioned do.....	240	
Benzaldehyde and derivatives do.....	240	
Derivatives of benzoI, toluol, and xylol, not elsewhere mentioned do.....	240	
Synthetic colors:		
Sulphur colors—		
Black..... do.....	96	
Other..... do.....	140	
Other—		
All dry or with less than 50 per cent water..... do.....	300	
Indigo vat colors and gallo-cyanine colors..... do.....		Free.
Other..... net weight.....		300
In paste with 50 per cent or more of water..... do.....	150	
Indigo vat colors and gallo-cyanine colors..... do.....		Free.
Other..... net weight.....		150

Coefficients of increase are included in above rates. Duties paid in paper lire are multiplied by a variable exchange factor (fixed weekly by the Government), recently about 4.75. Where provided, conventional rates apply to United States products.

JAPAN

	General tariff
215 Coal-tar derivatives (except carbolic acid, salicylic acid, bakelite, and medicines and essences other than benzaldehyde, nitrobenzoI, and nitrotoluol)..... per cent ad valorem.....	35
237 Artificial indigo..... do.....	20
243 Coal-tar dyestuffs, n. o. p. f..... do.....	35

DYE LICENSE CONTROL

On June 7, 1924, the Japanese Government adopted a license system for the importation of dye and coal-tar derivatives, except carbolic acid and medicinals, in order to stop the flooding of the markets with German dyes. Licenses are issued by the minister of agriculture and commerce.

According to the terms of article 2 (below) the provisions of article 1 do not apply if they conflict with any treaty of commerce and navigation. Nor do they apply to consignments originating in the United States, Great Britain, France, Italy, and in countries enjoying the most favored nation treatment. The importation of colors produced in Japan is prohibited, but that of other dyes may be licensed. Imports of synthetic indigo are not interfered with.

REGULATIONS RESTRICTING THE IMPORTATION OF DYES

(Department of Commerce Ordinance No. 8)

ARTICLE 1. In accordance with procedure elsewhere prescribed those desiring to import articles (a) and (b), specified below, shall, for the present, first secure the consent of the minister of agriculture and commerce.

These regulations, however, shall not be applicable to commodities received from Germany in accordance with the terms of the treaty of Versailles.

(a) Coal-tar dyes.

(b) Articles chemically derived from coal-tar derivatives (exclusive of medicinal chemicals and carbolic acid).

ART. 2. The provisions of the foregoing article shall be void if they conflict with any treaty of commerce and navigation.

In cases referred to in the foregoing paragraph the importer shall submit to the customhouse through which the shipment is being passed a document setting forth the name and address of the manufacturer, the country of manufacture, the name of the article, the quantity of the shipment.

Documents referred to in the foregoing paragraph shall be authenticated by the Japanese consular officer stationed in the country of manufacture or at the point of shipment; should there be no such consular officer, they may be authenticated by a customs or other Government officer or by the chamber of commerce.

ART. 3. Those making importations under license, as provided for by article 1, shall, without delay, so notify the minister of agriculture and commerce.

ART. 4. Those making importations in accordance with the provisions of paragraph 2 of article 2 shall immediately notify the minister of agriculture and commerce in regard to the commercial, or the usual name of the article imported, its scientific name, specific gravity, quantity, date of importation and customs clearance, value, and the name of the manufacturer.

ART. 5. Those receiving licenses referred to in article 1 shall import the articles described not later than three months after the date of the issuance of the license.

Under certain circumstances, to be determined by the minister of agriculture and commerce, the period specified in the foregoing paragraph may be extended.

Should importations not be made within the periods referred to in the two preceding paragraphs, licenses issued under the terms specified in article 1 shall become invalid.

ART. 6. Importers violating the provisions of article 1 shall be condemned to penal servitude for not more than three months or subjected to a fine of not more than 100 yen.

Supplementary provisions.—This provision shall become effective on the date of its promulgation.

Licenses shall be regarded as having been granted on the date of the promulgation of this ordinance to those who dispatched orders for commodities requiring a license before the date on which this ordinance is promulgated: *Provided, however,* That such persons so notify the minister of agriculture and commerce in accordance with procedure elsewhere prescribed.

Certificates, issued by the minister of agriculture and commerce, of the receipt of notification may be substituted for documents prescribed by article 2 only when those who have dispatched orders for commodities requiring a license before the date on which this ordinance is issued have, not more than two weeks after such date, notified the minister of agriculture and commerce in regard to the commercial, or usual, name of the article to be imported, its scientific name, specific gravity, quantity, probable date of importation and customs clearance, value, and the name of the manufacturer: *Provided, however,* That such certification shall be applicable only to shipments imported within three months after the date of the promulgation of this ordinance.

The provisions of the two preceding paragraphs shall be applicable to commodities referred to in paragraphs 1 or 2 of article 1 that are stored in customs areas on the date of the promulgation of this ordinance, and to articles that are, on such date, en route to Japan.

MEXICO

(Tariff of April 6, 1922, revised to March 1, 1923)

	Centavos per gross kilo
537 Colors, in powder or crystals.....	10
538 Prepared colors.....	18
510 Aniline oil, natural or artificial alizarin and anthracene.....	10

Surcharge, 12 per cent of the duties.

PERSIA

Rate of duty—Coal-tar dyes—15 per cent ad valorem

In contrast to the primary purpose of the license control adopted by other countries for the protection of the dye-producing industry, Persia adopted a control system for excluding fugitive dyes in order to preserve the reputation of the Persian rugs, a leading industry of that country. The Persian customs regulations of 1906 prohibited the importation of aniline dyes. When synthetic dyes of high fastness were perfected, the Government appointed a chemical expert to prepare and keep up to date a list of the dyes permitted for entry as suitable for the dyeing of rug materials, all other dyes remaining on the prohibited list. The Persian customs reserves the right to authorize the importation of small quantities of dyes to be utilized exclusively in special industries, such as candy, soap, leather, and ink manufacture, or pharmaceutical products.

The dyes¹ permitted entry into Persia are the mordant dyes—derivatives of alizarin, anthracene, and anthraquinone—vat dyes, and certain sulphur dyes for cotton. According to reports from Persia, the rug manufacturers are rapidly substituting coal-tar dyes for natural dyes.

POLAND

(Decree of the President of the Republic, dated June 26, 1924)

	Zlotys per 100 kilos
112 Benzol, toluol, xylol, anthracene.....	9. 00
135 Synthetic organic coloring combinations purified and their bases; combinations of leuco acid; pigments; pigment lakes; mixtures of naphthol with nitrosoamine.....	400. 00
Pigment lakes for the manufacture of artists' colors, under permit from the minister of finance.....	60. 00

RUMANIA

	Gold lei per 100 kilo
835 Synthetic indigo.....	12. 00
837 Aniline colors and other colors derived from coal tar, even when bearing the name of vegetable or mineral colors.....	8. 50
838 Colors of all kinds, finely prepared, in tin tubes, bottles, shells, tablets, or pastilles.....	43. 50

Rumanian Government (official valuation of April 4, 1925, 1 gold leu equals 40 paper lei).

¹ See Special Circular 29, Chemical Division, United States Department of Commerce.

RUSSIA

UNION OF SOVIET SOCIALIST REPUBLICS

(Tariff of March 4, 1924)

	Gold rubles per 100 kilos (gross)
135. Indigo, natural and artificial, artificial organic dyes, their leuco compounds and bases:	
(1) Sulphur dyes.....	244
(2) Alizarin and alizarin lake.....	213
(3) Indigo, natural and artificial, in any form, and its leuco compounds, indoxyl, thioindoxyl (oxythio naphthene).....	152
(4) Azo dyes, and all artificial organic dyes not otherwise mentioned; their leuco compounds and bases.....	274
NOTE.—Coloring matters included in this section (135), when the customs declaration on the accompanying documents, invoices, or specifications fails to give definite information as to which class of organic dye-stuffs they belong, are dutiable at.....	305

All importation into Russia is controlled by the Soviet Government.

SPAIN

(Royal decree of February 12, 1922, modified by royal decrees of March 24, May 12 and 13, 1922.)

	Pesetas per 100 kilos net		
	First tariff	Second tariff	Conven- tional ³
Artificial coloring materials derived from coal and the like: ¹			
795 In powder or crystals ²	8.00	4.00	-----
796 In paste or solid form, containing at least 50 per cent of water ²	4.00	2.00	-----
797 Synthetic indigo.....	2.00	1.00	0.75

¹ A certificate of origin is required on all of the products listed below.² Artificial coloring materials which in neutral, acid, or alkaline bath, dye textile fibers, with or without the addition of mordant, are included. All are destroyed by the action of heat. Duties established by the royal decree of Feb. 14, 1920.³ Conventional rate when given applies to United States goods; otherwise second tariff applies. Conventional rate established on item 797 in treaty with Switzerland, May 15, 1922.

SWITZERLAND

(1921)

	Francs per 100 kilos ¹
Colors derived from coal tar:	
1097 Artificial alizarin, dry or in paste.....	2
1098 Colors from aniline, anthracene, naphthalene and coal-tar colors.....	20
1099 Indigo, natural or artificial: Solution of indigo Ad. 1099; dry indigo and indigo in paste.....	10

UNITED KINGDOM

The importation of coal-tar dyes into Great Britain is regulated by the British dyestuffs (import regulations) act of 1920, which prohibits the entry of all synthetic organic dyestuffs, colors, and coloring matters, and all organic intermediate products used in the manufacture of any such dyestuffs, colors, and coloring matters. The board of trade, however, has authority to license the importation of any of these goods.

¹ These duties are levied on the net weight increased by 20 per cent.

It has been the policy of the British dyestuffs advisory licensing committee to recommend the granting of licenses for the importation of certain synthetic organic dyestuffs, provided sufficient quantities of the particular kinds which it was desired to import were not available from British sources.

No import duties are levied on coal-tar dyestuffs imported into Great Britain.

VENEZUELA

(Tariff law of 1924 (July 4), with modifications made by the Federal executive in exercise of the powers vested in him)

	Bolivares, per gross kilo
140 Indigo.....	10. 00
553 Anilines and chemical products not specified.....	1. 25
726 All dyes not elsewhere specified.....	1. 25

In addition to the customs duties proper, the following surtaxes are levied:

Contribution tax, 30 per cent of the customs duty.

Territorial tax, $12\frac{1}{2}$ per cent of the customs duty.

National tax, $12\frac{1}{2}$ per cent of the customs duty.

Sanitary tax, 1 per cent of the total duties.

The total of these surtaxes amounts to 56.55 per cent of the customs duty proper.

UNITED STATES

The following tabulation presents a summary of the rates of duties on coal-tar dyes when imported into the United States under the tariff acts of 1864 to 1922, inclusive:

Summary of rates of duty on coal-tar dyes under the tariff acts of 1864 to 1922

Act of—	Duty		Dyes	Free list
	Specific, per pound	Ad va- lorem		
		<i>Per cent</i>		
June 30, 1864.....	\$1. 00	35	Aniline dyes.....	
July 14, 1870.....	. 50	35	.....do.....	
Feb. 8, 1875.....	. 50	35	.....do.....	Alizarin.
Mar. 3, 1883.....		35	Coal-tar dyes.....	Alizarin, natural and artificial; indigo and artificial indigo.
Oct. 1, 1890.....		35	.....do.....	Alizarin, natural and artificial.
	.0075		Indigo, extracts or pastes.....	Alizarin, yellow, orange, green, blue, brown, and black.
	. 10		Indigo, carmined.....	Indigo.
Aug. 27, 1894.....		25	Coal-tar dyes.....	Alizarin and indigo; alizarin dyes.
July 24, 1897.....		30	.....do.....	Alizarin, alizarin dyes, and anthracene dyes; indigo.
Aug. 5, 1909.....	(¹)	(¹)		
Oct. 3, 1913.....		30	Coal-tar dyes.....	Alizarin and dyes derived from alizarin or from anthracene and carbazol; indigo and dyes derived therefrom.
Sept. 8, 1916.....	. 05	30	.....do.....	
		30	Indigo and indigoid dyes.....	
		30	Alizarin and alizarin dyes.....	
		30	Anthracene dyes.....	
Sept. 22, 1922 ².....	. 07	30	Carbazol dyes.....	
		45	.....do.....	

¹ Same as 1897.

² For two years after Sept. 22, 1922, 60 per cent.

TARIFF RATES ON COAL-TAR DYES, 1864-1922

Act of June 30, 1864:

On aniline dyes, one dollar per pound and thirty-five per centum ad valorem.

Act of July 14, 1870:

On aniline dyes and colors, by whatever name known, fifty cents per pound and thirty-five per centum ad valorem.

Act of February 8, 1875:

Same as act of July 14, 1870, with exception of alizarine which was transferred to the free list in act of February 8, 1875.

Act of March 3, 1883:

All coal-tar colors or dyes, by whatever name known and not specially enumerated or provided for in this act, thirty-five per centum ad valorem.

Alizarine, natural or artificial. (Free.)

Indigo and artificial indigo. (Free.)

Act of October 1, 1890:

PAR. 18. All coal-tar colors or dyes, by whatever name known and not specially provided for in this act, thirty-five per centum ad valorem.

PAR. 29. Indigo, extracts or pastes of, three-fourths of one cent per pound; carmined, ten cents per pound.

PAR. 478. Alizarine, natural or artificial, and dyes commercially known as Alizarine yellow, Alizarine orange, Alizarine green, Alizarine blue, Alizarine brown, Alizarine black. (Free.)

PAR. 614. Indigo. (Free.)

Act of August 27, 1894:

PAR. 14. All coal-tar colors or dyes, by whatever name known and not specially provided for in this act, twenty-five per centum ad valorem.

PAR. 368. Alizarin and alizarin colors or dyes, natural or artificial. (Free.)

PAR. 514. Indigo and extracts or pastes of and carmines. (Free.)

Act of July 24, 1897:

PAR. 15. Coal-tar dyes or colors, not specially provided for in this act, thirty per centum ad valorem. * * *

PAR. 25. Indigo, extracts or pastes of, three-fourths of one cent per pound; carmined, ten cents per pound.

PAR. 469. Alizarin, natural or artificial, and dyes derived from alizarine or from anthracin. (Free.)

PAR. 580. Indigo. (Free.)

Act of August 5, 1909: Same as 1897.*Act of October 3, 1913:*

PAR. 20. Coal-tar dyes or colors, not specially provided for in this section, 30 per centum ad valorem.

PAR. 394. Alizarin, natural or synthetic, and dyes obtained from alizarin, anthracene, and carbazol. (Free.)

PAR. 514. Indigo, natural or synthetic, dry or suspended in water, and dyes obtained from indigo. (Free.)

Act of September 8, 1916:

Title V, sec. 500, Gr. III—

All colors, dyes, or stains, whether soluble or not in water, * * * thirty per centum ad valorem.

(Sec. 501 imposed additional duty of 5 cents per pound.)

SEC. 501—

The following dyes were exempt from this specific duty:

* * * natural and synthetic alizarin, and dyes obtained from alizarin, anthracene, and carbazol; natural and synthetic indigo and all indigoids, whether or not obtained from indigo; and medicinals and flavors.

Under the trading with the enemy act (October, 1917) the President, on February 14, 1918, issued a proclamation declaring that certain articles of commerce should not be imported on and after February 16, 1918, from certain specified countries, except by license granted in accordance with prescribed regulations. Dyes and chemicals were included in this proclamation.

In the spring of 1919 (February) Swiss dyes (nonenemy origin) were imported under license, and in the fall of 1919 licenses were granted for the importation of German dyes.

Dye and chemical control act of 1921:

Under Title V, Dyes and Chemicals, of the emergency tariff the importation of dyes and other synthetic organic chemicals was placed under license control. This continued until the date of the passage of the tariff act of September 21, 1922.

Act of September 21, 1922:

PAR. 28. Coal-tar products: All colors, dyes, or stains, whether soluble or not in water, * * * 45 per centum ad valorem based upon the American selling price (as defined in subdivision (f) of section 402, Title IV) of any similar competitive article manufactured or produced in the United States, and 7 cents per pound: *Provided*, That for a period of two years beginning on the day following the passage of this act the ad valorem rate of duty shall be 60 per centum instead of 45 per centum: * * * *Provided*, That the specific duty of 7 cents per pound herein provided for on colors, dyes, or stains, whether soluble or not in water, * * * shall be based on standards of strength which shall be established by the Secretary of the Treasury, and that upon all importations of such articles which exceed such standards of strength the specific duty of 7 cents per pound shall be computed on the weight which the article would have if it were diluted to the standard strength, but in no case shall any such articles of whatever strength pay a specific duty of less than 7 cents per pound; * * *.

PART VI
—
APPENDIX
STATISTICS OF DOMESTIC IMPORTS
AND EXPORTS

STATISTICS OF IMPORTS AND EXPORTS

STATISTICAL TABLES

TABLE 73.—Imports of coal-tar products entered for consumption, calendar years 1920-1924

GROUP I. CRUDE (FREE)

	Year						
	1920		1921		1922		
	Quantity	Value	Quantity	Value	Quantity	Value	
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate.....	pounds	192,692	\$19,848	214,185	\$22,849	311,914	¹ \$33,781
Anthracene oil.....	gallons	15,054	3,945	12,776	5,019	13,368	3,242
Benzene.....	pounds	486,619	10,868	1,722,085	442,370	172,528	1,223
Creosol.....	do.	10,318,070	901,381	3,353,882	253,886	3,756,651	258,536
Dead or creosote oil.....	gallons	18,427,152	3,796,399	33,239,432	4,756,618	41,566,767	4,239,949
Naphthalene having a solidifying point less than 79° C.....	pounds	15,012,096	530,219	4,495,806	135,943	3,144,332	54,029
Pyridine and quinoline.....	do.	863,456	168,800	72,515	11,367	119,973	21,113
Coal tar, crude.....	barrels	11,901	24,140	21,551	46,784	23,431	54,324
Pitch, coal tar.....	do.	8,780	26,022	417	1,204	1,422	4,193
Paracresol, orthocresol, and paracresol—purity less than 90 per cent.....	pounds					3,962	352
Toluene.....	do.					144,237	6,061
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f.....	pounds	240,096	14,046	40,707	3,111	424,530	8,049
All other distillates, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate.....	pounds			7,310	959	459,727	50,652
Anthracene, purity less than 25 per cent.....	pounds	202,569	16,590	58,111	1,198	33,600	400
Acenaphthene, cumol fluorene, methylantracene, and methyl-naphthalene.....	pounds			100	64	66	17

	1923		1924		
	Quantity	Value	Quantity	Value	
Benzene.....	pounds	701,857	\$21,902	363,742	\$12,632
Dead or creosote oil.....	gallons	64,199,636	10,071,393	89,687,632	13,463,689
Naphthalene, solidifying at less than 79° C.....	pounds	20,992,439	575,702	5,266,708	96,491
Coal tar, crude.....	barrels	10,131	31,671	14,579	44,586
Pitch, coal tar.....	do.	4,644	15,154	2,630	7,765
Toluene.....	pounds	194,660	7,928		
Acenaphthene, fluorene, methylantracene, and methyl-naphthalene.....	do.	23,673	2,826		
Anthracene, purity less than 30 per cent.....	do.	869,780	23,925	298,022	8,759
Anthracene oil.....	gallons	31,198	7,078	18,259	3,863
Cumene, cymene.....	pounds	2	24		
Metacresol, orthocresol, and paracresol, purity less than 90°.....	pounds	3,805	2,846	1,008	454
Pyridine.....	do.	764,918	266,184	604,235	268,782
Xylene.....	do.	136,488	8,179		
All other distillates n. s. p. f., which on being subjected to distillation yield in the portion distilling below 190° C. a quantity of tar acids less than 5 per cent of the original distillate.....	pounds	5,761,011	489,824	2,440,358	151,850
All other products found naturally in coal tar, whether produced or obtained from coal tar or other sources, n. s. p. f.....	pounds	1,635,025	69,373	2,865,954	151,083
Cresylic acid.....	pounds			2,327,528	157,643

¹ First 9 months.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, n. s. p. f.:				
Acids—				
Amidosalicylic—				
1920.....	11,199	\$8,182	\$1,507	18.42
1921.....				
1922.....				
1923.....				
1924.....				
Arsanilic—				
1923.....	223	3,345	1,855	55.47
1924.....				
Benzoic—				
1920.....	250	1,087	169	15.58
1921.....	11,263	3,012	733	24.35
1922 ¹	100	365	57	15.68
1923.....	100	410	233	56.71
1924.....				
Carbolic (phenol) which on being subjected to distillation yields in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate—				
Crystal—				
1920.....				
1921.....	250	142	28	19.40
1922 ¹	280,224	30,414	11,568	38.03
1922 ²	69,310	16,102	13,708	85.13
1923.....	126,618	21,389	20,627	96.44
1924.....	176,081	46,786	38,058	81.34
Liquid—				
1920.....	1,040	244	63	25.67
1921.....				
1922 ¹	1,702	1,801	313	17.56
1922 ²	145,375	18,488	20,345	110.04
1923.....	2,815	257	338	131.67
1924 ¹	62,869	15,169	12,744	84.01
1924 ²	378,777	29,066	38,141	131.22
Cinnamic—				
1923.....	112	389	222	57.02
1924.....				
Dichlorophthalic—				
1923.....	10	8	5	63.75
1924.....				
Phenylglycine orthocarboxylic—				
1923.....	17,376	74,492	42,187	56.63
1924.....				
Salicylic—				
1920.....				
1921.....				
1922 ¹	2,276	1,881	339	18.02
Salicylic and salts of, not medicinal—				
1923.....	1,107	854	547	64.07
1924.....				
Sulphanilic—				
1923.....	16	19	12	60.89
1924.....				
Amidonapbthol—				
1920.....				
1921.....	11,025	9,990	1,774	17.76
1922.....				
1923.....				
1924.....				
Amidophenol—				
1920.....				
1921.....	14,623	11,699	2,120	18.12
1922.....				
1923.....				
1924.....				

¹ Act of 1916.² Act of 1922.³ Jan. 1 to Sept. 21, 1924.⁴ Sept. 22 to Dec. 31, 1924.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, n. s. p. f.—Contd.				
Aniline oil—				
1920	220	\$72	\$16	22.64
1921	11,243	1,799	551	30.62
1922 (included in aniline oil and salts)				
Aniline salt—				
1920	4	1		25.00
1921	13,316	12,109	2,274	18.78
1922 (included in aniline oil and salts)				
Aniline oil and salts—				
1922 ²	55	11	10	90.00
1923	30	220	123	55.95
1924				
Anthracene, purity of 25 per cent or more—				
1920	648,095	87,413	29,314	33.54
1921	261,645	12,639	8,437	66.75
1922 ¹	2	2	1	62.00
1923				
1924				
Anthraquinone—				
1920	13,053	5,612	1,168	20.82
1921	127,427	78,255	14,924	19.07
1922				
1923				
1924				
Benzaldehyde—				
1920	9,479	5,928	1,126	19.00
1921	1,056	465	96	20.68
Benzaldehyde (not medicinal) and nitrobenzaldehyde—				
1922 ²	20	11	7	67.73
1923	200	240	146	60.83
1924				
Benzidine, benzidine sulfate—				
1922 ²	72	56	36	64.00
1923	7	23	13	57.13
1924				
Benzylchloride—				
1920	150	22	7	32.05
1921				
1922				
Benzylchloride, benzalchloride, and benzoylchloride—				
1922 ²	29	10	8	75.30
1923	10	22	13	58.18
1924				
Binitrotoluol—				
1920	4,692	1,216	300	24.64
1921	1,164	155	52	33.77
1922				
1923				
1924				
Binitrobenzol—				
1921	5	3		19.33
1922				
1923				
1924				
Carbazole, purity of 25 per cent or more—				
1920	157	27	8	29.56
1921				
1922 ¹	8,820	3,865	800	20.70
1922 ²				
1923				
1924				
Dimethylaniline—				
1920	22,400	15,968	2,955	18.51
1921				
1922 ¹	23,565	3,828	1,163	30.39
Dimethylaniline and benzyloethylaniline—				
1922 ²				
1923	1	2	1	58.50
1924				

¹ Act of 1916.

² Act of 1922.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, n. s. p. f.—Contd				
Diphenylamine—				
1924 ³	11	\$16	\$10	59.81
1924 ⁴	23,576	8,134	4,904	60.29
Metacresol, orthocresol, and paracresol, purity of 90 per cent or more—				
1920.....	2,444	2,230	396	17.74
1921.....	556	341	65	19.08
1922 ¹	2,224	107	72	66.96
1922 ²	1,008	167	162	97.24
1923.....	8,754	5,410	3,588	66.33
1924 ³	15,326	1,995	2,170	108.78
1924 ⁴	1,000	663	335	50.56
Methylanthraquinone—				
1920.....	13,053	5,612	1,168	20.82
1921.....				
1922.....				
1923.....	977	1,221	740	69.70
1924.....				
Naphthalene solidifying at 79° C. or above—				
1920.....	3,697,562	416,172	154,865	37.21
1921.....	441,685	31,458	15,761	50.10
1922 ¹	75,680	7,684	3,045	39.61
1922 ²				
1923.....	9,605	194	779	401.57
1924.....	4,549	1,147	949	82.76
Naphthol—				
1920.....				
1921.....	333,356	112,922	25,272	22.38
1922 ¹	658	799	136	17.06
Naphthol, alpha and beta not medicinal—				
1922 ¹				
1923.....	13,376	29,569	17,199	58.17
1924.....	10,976	24,202	14,079	58.17
Naphthylamine—				
1920.....	69,695	7,208	2,824	39.18
1921.....				
1922.....				
1923.....				
1924.....				
Naphthylenediamine—				
1923.....	5	6	4	60.83
1924.....				
Nitrobenzol—				
1920.....	45,891	6,009	2,049	34.09
1921.....				
1922.....				
1923.....				
1924.....				
Nitronaphthalene—				
1920.....				
1921.....				
1922.....				
1923.....				
1924.....				
Nitrophenylenediamine—				
1921.....	1,132	6,590	1,017	15.43
1922.....				
1923.....				
1924.....				
Nitrotoluol—				
1920.....	684	359	71	19.76
1921.....				
1922.....				
1923.....				
1924.....				

¹ Act of 1916.² Act of 1922.³ From Jan. 1 to Sept. 21, 1924.⁴ From Sept. 22 to Dec. 31, 1924.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, n. s. p. f.—Contd.				
Phenylenediamine—				
1920.....	2,429	\$1,887	\$344	18.22
1921.....				
1922 ¹	6	16	9	57.62
1922 ²				
1923.....				
1924.....				
Phenylhydrazine—				
1923.....	18	39	23	58.23
1924.....				
Phthalic anhydride—				
1920.....				
1921.....				
1922 ¹	3,374	2,517	1,621	64.38
1922 ²				
1923.....				
1924.....				
Resorcinol, not medicinal—				
1920.....	51,529	39,932	7,278	18.23
1921.....	109,658	75,022	13,995	18.65
1922.....				
1923.....	12,520	16,976	10,213	60.16
1924.....	2,240	3,360	2,005	59.67
Thiocarbanilide—				
1924 ⁴	396	935	542	57.96
1924 ⁵	1,100	1,575	707	44.89
Tolidine—				
1923.....	5	6	4	60.83
1924.....				
Toluidine—				
1923.....	60	31	21	68.55
1924.....				
Tolylenediamine—				
1921.....	175	238	40	16.48
1922.....				
1923.....				
1924.....				
Xylidine—				
1920.....	56,047	41,237	7,587	18.40
1921.....				
1922.....				
1923.....	150	60	44	72.50
1924.....				
All distillates n. s. p. f., which on distillation yield in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate:				
1920.....	85,474	36,041	7,543	20.93
1921.....	16,240	11,811	2,178	18.43
1922 ¹	328,601	33,784	13,283	39.32
1922 ^{2,3}	22,163	9,128	6,572	72.00
1923 ³	245,119	30,328	33,839	111.58
1923 ^{3,4}	901	1,491	883	59.23
1924 ^{3,4}	662,037	47,889	65,498	136.77
All distillates of coal, blast-furnaces, oil-gas, and water-gas tar which on being subject to distillation below 215° C. a quantity of tar acids equal to or more than 75 per cent of the original distillate:				
1922 ²	18,257	4,102	3,534	86.16
1923.....	195,757	36,382	33,713	92.66
1924 ⁴	144,971	21,046	21,723	163.22
1924 ⁵	233,495	17,798	23,464	131.83

¹ Act of 1916.

² Act of 1922.

³ At 190° C. instead of 200° C.

⁴ From Jan. 1 to Sept. 21, 1924.

⁵ From Sept. 22 to Dec. 31, 1924.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP II (DUTIABLE AT 15 PER CENT AD VALOREM PLUS 2½ CENTS PER POUND; DUTIABLE AT 55 PER CENT PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
All similar products, obtained, derived, or manufactured in whole or in part from the products provided for in Group I (free):				
1920.....	87,911	\$74,514	\$13,375	17.95
1921.....	87,207	41,965	8,475	20.19
1922 ¹	389,708	153,625	32,786	21.34
1922 ²	187,377	61,967	47,198	76.17
1923.....	1,436,982	330,514	282,371	85.43
1924 ¹	2,104,299	475,136	408,626	86.00
1924 ²	158,766	73,973	40,703	55.02
All sulfoacids or sulfoacid salts of Group II:				
1920.....	100	87	16	17.88
1921.....	6,789	2,944	611	20.76
1922 ¹	11,374	12,058	2,093	17.36
1923.....				
1924.....				

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)

When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives:				
Alizarin, natural—				
1920.....	58,583	\$41,381	\$12,414	30.00
1921.....	59,306	81,816	24,545	30.00
1922 ¹	28,399	63,304	18,991	30.00
1922 ²	1,547	3,094	1,965	63.50
1923.....	9,283	18,600	11,810	63.49
1924.....	6,665	9,335	6,068	65.00
Alizarin, synthetic—				
1920.....	73,232	24,072	7,222	30.00
1921.....	136,283	49,707	14,912	30.00
1922 ¹	21,614	22,190	666	30.00
1923.....	1,836	3,699	2,348	63.47
1924.....	3,002	12,008	5,614	46.75
Dyes obtained, derived, or manufactured from alizarin—				
1920.....	29,436	25,498	7,647	30.00
1921.....	246,837	356,658	106,997	30.00
1922 ¹	293,005	468,134	140,440	30.00
Colors, dyes, stains, etc., obtained, derived, or manufactured from alizarin—				
1922 ²	56,294	82,981	53,729	64.75
1923.....	274,799	379,673	247,040	65.07
1924 ³	68,762	98,693	64,029	64.88
1924 ⁴	4,671	4,830	2,500	51.77
Dyes obtained, derived, or manufactured from anthracene and carbazole—				
1920.....	216,508	208,754	62,626	30.00
1921.....	226,956	422,941	126,882	30.00
1922 ¹	330,129	605,187	181,556	30.00
Colors, dyes, obtained, derived, or manufactured from anthracene or carbazole—				
1922 ²	17,697	26,002	16,840	64.76
1923.....	7,319	8,126	5,388	66.30
1924 ³	1,043	863	591	68.46
1924 ⁴	55	490	224	45.79
Indigoids, whether or not obtained from indigo—				
1920.....	86,439	196,783	59,035	30.00
1921.....	76,123	72,154	21,646	30.00
1922 ¹	184,886	267,059	80,118	30.00
1923.....				
1924.....				

¹ Act of 1916.² Act of 1922.³ From Jan. 1 to Sept. 21, 1924.⁴ From Sept. 22 to Dec. 31, 1924.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922—Contd.)

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
When obtained, derived, or manufactured in whole or in part from any of the products provided for in Group I (free) or II, including natural indigo and their derivatives—Continued.				
Indigo, natural—				
1920.....	36,537	\$69,528	\$20,858	30.00
1921.....	77,121	154,538	46,361	30.00
1922 ¹	14,461	19,074	5,722	30.00
1922 ²				
1923.....	9,102	4,149	3,427	73.70
1924.....	3,863	741	715	96.49
Indigo, synthetic—				
1920.....	171,101	207,299	62,190	30.00
1921.....	70,975	84,901	25,470	30.00
1922 ¹	86,585	123,702	37,111	30.00
1922 ²				
1923.....	356	117	95	81.30
1924.....	1,076	482	292	60.63
Colors, dyes, stains, etc., derived from indigo—				
1922 ¹	872	1,482	950	64.11
1923.....	13,864	18,636	12,152	65.21
1924.....	220	544	342	62.83
Colors, or color lakes obtained, derived, or manufactured from alizarin—				
1920.....	98,735	172,841	56,789	32.86
1921.....	59,290	66,171	22,816	34.48
1922 ¹	79,542	62,986	27,077	35.05
1922 ²				
1923 (see "Dyes, etc., from alizarin").				
Colors, or color lakes obtained, derived, or manufactured from anthracene and carbazols—				
1920.....	260,060	529,966	171,993	32.45
1921.....	62,748	65,635	22,828	34.78
1922 ¹	27,635	63,102	20,032	31.75
1922 ²				
1923 (see "Dyes, etc., from anthracene and carbazole").				
All other colors, dyes, or stains, whether soluble or not in water, color acids, color bases, or color lakes—				
1920.....	2,807,807	4,093,389	1,368,407	33.43
1921.....	2,751,535	3,968,319	1,328,072	33.47
1922 ¹	2,077,712	2,941,773	965,640	32.83
1922 ²	677,849	894,844	584,356	65.30
1923.....	3,059,361	4,154,091	2,706,610	65.16
1924 ³	1,905,219	2,320,712	1,525,793	65.75
1924 ⁴	1,357,133	1,865,036	934,266	50.09
Color lakes—				
1922 ²	239	262	174	66.38
1923.....	4,263	3,635	2,479	68.21
1924 ³	1,124	2,270	1,441	63.47
1924 ⁴	2,906	1,521	888	58.37
Phenolic resin, synthetic—				
1920.....	2,479	2,681	928	34.63
1921.....	1,420	2,366	781	33.00
1922 ¹	762	1,404	452	32.17
Resinlike products prepared from articles provided for in pars. 27 and 1549—				
1922 ²	1,756	2,094	1,379	65.87
1923.....	3,183	10,512	6,530	62.12
1924 ³	8,169	2,568	2,113	82.27
1924 ⁴	587	1,615	768	47.54
Photographic chemicals—				
1920.....	21,808	67,640	21,382	31.61
1921.....	29,281	65,906	21,236	32.22
1922 ¹	3,287	4,465	1,471	32.94
1922 ²	8,183	8,208	5,498	66.98
1923.....	10,182	28,504	17,815	62.50
1924 ³	2,868	9,612	5,968	62.09
1924 ⁴	781	2,272	1,077	47.41

¹ Act of 1916.

² Act of 1922.

³ From Jan. 1 to Sept. 21, 1924.

⁴ From Sept. 22 to Dec. 31, 1924.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Contd.

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Coal-tar medicinals:				
Acetanilid—				
1920				
1921				
1922				
1923	58	\$82	\$53	64.95
1924	13	26	17	63.50
Acetphenetid—				
1920				
1921				
1922				
1923	25	238	145	60.74
1924	200	720	338	40.94
Acetylsalicylic acid—				
1920				
1921				
1922				
1923	1	7	4	00
1924				
Antipyrène—				
1920	14,737	53,293	13,323	
1921				
1922 ¹	12,604	18,468	4,617	25.00
1922 ²	913	1,740	1,108	63.68
1923	14,250	20,602	13,359	64.89
1924 ³	3,080	3,650	2,406	65.91
1924 ⁴	3,920	4,715	2,396	50.82
Arsphenamine (salvarsan) and neo-arsphenamine—				
1923	5	211	127	60.17
1924	85	7,136	3,217	45.08
Benzaldehyde—				
1922	571	914	588	64.38
1923	2,780	4,059	2,630	64.80
1924				
Benzoic acid, medicinal—				
1924 ⁴	111	168	109	64.63
1924 ⁵	100	72	39	54.72
b. Naphthol, medicinal—				
1924	1,102	992	672	67.78
Novocain or procaine—				
1923	5	210	126	60.17
1924				
Phenolphthalein (25 per cent)—				
1920	200	726	181	25.00
1921	5,055	2,385	596	25.00
1922 ¹	64	36	9	25.00
1922 ²	1,487	8,877	5,430	61.17
1923	2,931	10,891	6,740	61.88
1924	220	2,646	1,206	45.58
Resorcinol, medicinal—				
1924	7,840	9,800	4,959	50.60
Salicylic acid and its salts, medicinal—				
1923	40	81	51	63.46
1924 ³	4	55	33	60.51
1924 ⁴	330	324	169	52.13
Medicinals—				
1920		165,055	49,517	30.00
1921		280,299	84,090	30.00
1922 ¹		154,620	46,386	30.00
1922 ^{2,3}	7,937	24,410	15,202	62.27
1923 ³	43,325	164,238	101,576	61.85
1924 ^{3,4}	23,257	115,937	71,190	61.40
1924 ^{3,5}	45,333	89,953	43,652	48.53
Flavors—				
1920	14	27	8	30.00
1921				
1922				
1923	31	90	56	62.41
1924	11	13	9	65.92

¹ Act of 1916.² Act of 1922.³ Other coal-tar medicinals.⁴ From Jan. 1 to Sept. 21, 1924.⁵ From Sept. 22 to Dec. 31, 1924.

TABLE 74.—Imports of coal-tar products entered for consumption, calendar years 1920 to 1924—Continued

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM; DUTIABLE AT 60 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPTEMBER 21, 1922)—Contd.

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Coal-tar medicinals—Continued.				
Saccharin—				
1920.....	40	\$39	\$26	66.67
1921.....	46	103	30	29.03
1922 ¹	1	15	1	4.33
1922 ²	1	14	8	60.70
1924.....	51	17	11	66.00
Explosives: Picric acid—				
1923.....	1,980	3,929	2,496	63.53
1924.....				
Ink powder ³ —				
1923.....	261	308	203	65.93
1924.....	18	6	5	81.00
Synthetic tanning material—				
1923.....	1,412	2,162	1,396	64.57
1924.....	1,643	3,926	2,471	62.93

¹ 1916.

² of 1922.

³ Imports for coal-tar ink powder first separately reported for 1923. In the Commission's Census of 1923, on page 194, were published the imports from 1918 to 1923, of "Ink and ink powders;" "Printers' ink," "Writing and copying inks," and "All other, including ink powders," and also exports of "Printers' ink," and "All other inks."

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924

DEAD OR CREOSOTE OIL (FREE)

Imported from—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Gallons</i>		<i>Gallons</i>		<i>Gallons</i>	
United Kingdom.....	12,661,527	\$2,589,331	19,466,800	\$3,115,056	22,383,535	\$2,235,656
Netherlands.....	4,145,712	979,438	10,403,414	1,295,749	14,471,820	1,528,941
Germany.....			2,993,469	280,948	2,406,364	193,804
Belgium.....					1,537,376	184,485
Canada.....	1,619,903	227,624	374,845	64,713	768,442	97,533
All other countries.....	10	6	904	152		
Total.....	18,427,152	3,796,399	33,239,432	4,756,618	41,567,537	4,240,449
			1923		1924	
Imported from—			Quantity	Value	Quantity	Value
			<i>Gallons</i>		<i>Gallons</i>	
United Kingdom.....			42,352,723	\$6,897,368	59,594,877	\$8,992,571
Netherlands.....			9,277,700	1,422,521	10,324,675	1,611,622
Germany.....			3,094,709	470,337	6,634,494	828,528
Belgium.....			8,478,364	1,153,750	11,064,665	1,744,817
Canada.....			996,140	127,417	2,069,073	286,151
All other countries.....						
Total.....			64,199,636	10,071,393	89,687,784	13,463,688

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

BENZOL OR BENZENE

Imported from—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
Canada.....	<i>Pounds</i> 486,619	\$10,868	<i>Pounds</i> 1,562,951	\$39,020	<i>Pounds</i> 172,108	\$1,167
Germany.....					420	56
All other countries.....			159,134	3,350		
Total.....	486,619	10,868	1,722,085	42,370	172,528	1,223

Imported from—	1923		1924 ¹	
	Quantity	Value	Quantity	Value
Canada.....	<i>Pounds</i> 700,157	\$21,732	<i>Pounds</i> 362,640	\$12,432
Germany.....	944	185	1,102	200
All other countries ²	800	20		
Total.....	701,901	21,937	363,742	12,632

¹ Includes toluene.² From New Zealand.CRESOL¹

Imported from—	1920		1921	
	Quantity	Value	Quantity	Value
England.....	<i>Pounds</i> 6,037,223	\$509,710	<i>Pounds</i> 1,708,992	\$139,737
Scotland.....	4,198,397	382,637	934,842	86,380
Canada.....	16,400	1,360	4,600	501
Germany.....	66,050	7,674	705,448	27,268
Total.....	10,318,070	901,381	3,353,882	253,886

¹ No imports in 1922, 1923, and 1924.

NAPHTHALENE

Imported from—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
United Kingdom.....	<i>Pounds</i> 10,155,579	\$357,954	<i>Pounds</i> 2,644,997	\$83,353	<i>Pounds</i> 2,488,716	\$38,619
Belgium.....	413,274	16,972	96,928	5,412		
Canada.....	2,959,976	78,704	1,708,868	44,541	532,935	12,823
Germany.....	381,740	34,135	42,683	2,383	11,316	446
Japan.....	98,695	7,653	2,320	252	1,000	94
Italy.....	494,644	17,077				
Australia.....	168,923	3,528				
Netherlands.....	61,879	5,400			110,365	2,047
All other.....	277,461	8,798				
Total.....	15,012,171	530,221	4,495,796	135,941	3,144,332	54,029

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

NA PHTHALENE—Continued

Imported from—	1923		1924	
	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>	
United Kingdom.....	16,991,359	\$408,584	2,707,419	\$56,963
Belgium.....	501,508	9,789	281,834	5,238
Canada.....	395,107	6,591	.....	.....
Germany.....	1,872,457	122,831	2,112,049	31,146
Netherlands.....	1,276,027	30,768	165,406	3,144
Total.....	21,036,458	578,563	5,266,708	96,491

PYRIDINE (FREE)

Imported from—	1924 ¹	
	Quantity	Value
	<i>Pounds</i>	
Belgium.....	24,075	\$9,410
France.....	14,215	7,018
Germany.....	87,269	33,382
Netherlands.....	22,576	10,279
England.....	452,611	203,743
Scotland.....	4,841	3,208
Canada.....	1,148	447
Panama.....	2,245	1,295
Total.....	608,980	268,782

¹ Included in "all other crudes" prior to 1924.

TAR AND PITCH OF COAL

Imported from—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Barrels</i>		<i>Barrels</i>		<i>Barrels</i>	
England.....	1,127	\$4,166	7	\$82	162	\$1,241
Scotland.....	580	3,706	.....	.....	100	956
Canada.....	18,824	41,940	21,948	47,913	24,563	56,229
All other countries.....	150	350	13	53	28	91
Total.....	20,681	50,162	21,968	48,048	24,853	58,517

Imported from—	1923		1924	
	Quantity	Value	Quantity	Value
	<i>Barrels</i>		<i>Barrels</i>	
England.....	72	\$365	21	197
Scotland.....	.....	.....	282	1,295
Canada.....	14,406	44,184	16,563	48,427
All other countries.....	297	2,276	343	2,432
Total.....	14,775	46,825	17,209	52,351

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

TOLUOL OR TOLUENE¹

Imported from—	1920		1921		1922		1923	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Canada.....	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	\$6,044	<i>Pounds</i>	\$7,928
Sweden.....					143,900	17	194,660	
Total.....					144,237	6,061	194,660	7,928

¹ Included with benzol in 1924.

ALL OTHER CRUDES

Imported from—	1920	1921	1922	1923	1924
France.....	\$10,903	\$1,507	\$308,895	\$929	
England.....	178,866	19,015	54,943	684,774	\$373,252
Scotland.....	1,581		1,570	65,102	73,720
Canada.....	876	840	8,199	14,010	7,326
Germany.....	9,179	352	6,373	18,873	2,840
Netherlands.....			142	6,370	
All other countries.....	2,886	4		17,583	
Total.....	204,381	21,718	380,122	807,641	

CARBOLIC ACID

Imported from—	1920				1921			
	Carbolic acid, free		Carbolic acid, dutiable (phenol)		Carbolic acid, free		Carbolic acid, dutiable (phenol)	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
England.....	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Scotland.....	178,652	\$18,258	1,040	\$244	205,113	\$21,841	250	\$142
Canada.....	14,040	1,590			9,072	1,008		
Total.....	192,692	19,848	1,040	244	214,185	22,849	250	142

Imported from—	1922 ¹		1923 ¹		1924 ²	
	Quantity	Value	Quantity	Value	Quantity	Value
England.....	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Netherlands.....	610,789	\$87,325	61,541	\$14,715		
Germany.....	62,715	12,258	20	37		
All other countries.....	11,098	898				
Total.....	1,702	1,801				
Total.....	686,304	102,282	61,561	14,762		

¹ Dutiable.² Not reported separately in 1924.

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

ALL OTHER ACIDS

Imported from—	1920		1921		1922		1923		1924 ³	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
England.....	<i>Pounds</i> 250	\$1,087	<i>Pounds</i> -----	-----	<i>Pounds</i> 60,471	\$5,228	100	\$410	<i>Pounds</i> 250,257	\$64,817
Japan.....	-----	-----	-----	-----	5	3	10	8	-----	-----
France.....	11,199	8,182	-----	-----	-----	-----	223	3,345	-----	-----
Germany.....	309	500	11,263	\$3,012	4,445	2,394	1,125	877	-----	-----
All other countries.....	-----	-----	-----	-----	8,938	9,936	17,486	174,877	45,024	12,606
Total.....	11,758	9,769	11,263	3,012	73,859	17,561	18,944	79,517	295,281	77,423

¹ All other composed of 17,376 pounds, valued at \$74,492, from Switzerland and 110 pounds, valued at \$385, from Canada.

² All from Scotland.

³ 1924 includes carbolic acid.

ANILINE OIL

Imported from—	1920		1921		1922		1923		1924	
France.....	<i>Lbs.</i> 220	\$72	-----	-----	-----	-----	-----	-----	-----	-----

ANILINE SALTS

Imported from—	1920		1921		1922		1923		1924	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
England.....	<i>Lbs.</i> 4	\$1	18,301	\$12,029	-----	-----	-----	-----	-----	-----
Germany.....	-----	-----	15	80	-----	-----	-----	-----	-----	-----
Total.....	4	1	18,316	12,109	-----	-----	-----	-----	-----	-----

ALL OTHER INTERMEDIATES

Imported from—	1920	1921	1922	
			Quantity	Value
			<i>Pounds</i>	
Belgium.....	\$41,291	\$18,774	-----	-----
France.....	140,095	62,028	45,666	\$31,180
Germany.....	191,732	80,306	514,437	83,397
Netherlands.....	13,427	2,761	83,998	18,898
England.....	302,235	98,502	669,475	124,632
Switzerland.....	2,435	36,090	62,261	43,856
Japan.....	68,323	15	400	39
Canada.....	-----	40,587	329	308
All other countries.....	72,130	2,539	-----	-----
Total.....	831,668	341,602	1,376,566	302,310

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

ALL OTHER INTERMEDIATES—Continued

Imported from—	1923		1924	
	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>	
Belgium.....				
France.....	30, 174	\$45, 070	7, 227	\$8, 937
Germany.....	128, 707	115, 513	1, 964, 349	507, 224
Netherlands.....	295, 939	59, 276	373, 004	93, 359
England.....	1, 700, 550	236, 069	1, 421, 393	102, 682
Switzerland.....	284	1, 758	5, 490	7, 437
Japan.....	60	31		
Canada.....	48, 022	8, 166	40, 356	9, 978
All other countries.....	394, 545	1 47, 809		
Total.....	2, 598, 281	513, 692	3, 811, 819	729, 617

¹ All other includes 394,487 lbs., valued at \$47,752, from Scotland.

ALIZARIN AND DERIVATIVES

Imported from—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Belgium.....	46, 283	\$32, 857	13, 280	\$9, 964	1, 232	\$2, 359
Denmark.....					1, 560	2, 240
France.....	444	689	6, 256	3, 406	7, 379	10, 137
Germany.....	141, 213	197, 562	285, 007	393, 374	323, 239	498, 548
Italy.....			13, 948	26, 464	46, 340	57, 686
Netherlands.....	5, 906	10, 314	12, 483	21, 582	47, 791	61, 043
Switzerland.....	222, 417	81, 333	110	374	28, 672	41, 670
United Kingdom.....	25, 196	18, 898	44, 026	54, 869	22, 758	28, 002
Canada.....	297	1, 806	2	5	887	249
All other countries.....						
Total.....	441, 756	343, 519	375, 112	510, 038	479, 858	701, 934

Imported from—	1923		1924	
	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>	
Belgium.....	275	\$457	5, 958	\$8, 802
Denmark.....				
France.....	13, 206	24, 630	1, 927	2, 750
Germany.....	139, 144	167, 728	90, 619	117, 816
Italy.....	24, 046	38, 190	4, 189	7, 405
Netherlands.....	11, 219	16, 024	3, 172	5, 994
Switzerland.....	73, 561	124, 831	30, 126	58, 343
United Kingdom.....	17, 792	18, 165	15, 593	13, 086
Canada.....	2, 813	4, 422	25	198
All other countries.....	8, 074	9, 165		
Total.....	290, 130	403, 612	151, 609	214, 394

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

ANTHRACENE AND CARBAZOLE COLORS AND DYES

Imported from—	1922 ¹		1923		1924	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Germany.....	11,900	\$23,128	4,434	\$4,692	-----	-----
England.....	5,797	2,874	-----	-----	-----	-----
Italy.....	-----	-----	3,885	4,284	-----	-----
Total.....	17,697	26,002	8,319	8,976	-----	-----

COLOR LAKES

France.....	16	\$23	88	\$162	-----	-----
Germany.....	223	239	2,175	2,710	-----	-----
England.....	-----	-----	2,000	763	-----	-----
Total.....	239	262	4,263	3,635	-----	-----

¹ Beginning Sept. 22, 1922.

INDIGO (DUTIABLE)

Imported from—	1920				1921			
	Natural		Synthetic		Natural		Synthetic	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Switzerland.....	57,411	\$150,957	285,153	\$252,708	27,366	\$55,142	59,873	\$101,073
England.....	27,269	51,556	1,229	361	9,245	9,857	6,895	5,045
Salvador.....	10,214	20,296	-----	-----	13,158	11,112	-----	-----
France.....	50,066	70,008	400,589	172,692	-----	-----	331,320	87,407
Germany.....	4,346	5,171	25,029	18,220	882	2,382	2,829	2,288
India.....	2,850	7,392	-----	-----	-----	-----	-----	-----
Italy.....	-----	-----	54,422	37,311	-----	-----	532	128
All other countries.....	48	48	-----	-----	1,838	7,202	6,813	4,962
Total.....	152,204	305,428	766,422	481,292	52,489	85,695	408,262	200,903

Imported from—	1922				1923				1924	
	Natural		Synthetic		Natural		Synthetic		Indigo and derivatives	
	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value	Pounds	Value
Switzerland.....	6,501	\$9,482	63,355	\$84,553	-----	-----	-----	-----	-----	-----
England.....	4,413	2,904	2,000	818	9,378	\$4,624	-----	-----	5,979	\$1,689
Salvador.....	-----	-----	-----	-----	900	450	-----	-----	-----	-----
France.....	-----	-----	5,324	13,920	-----	-----	-----	-----	220	167
Germany.....	1,536	1,462	610	1,756	-----	-----	-----	-----	220	544
India.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Italy.....	-----	-----	929	401	-----	-----	275	\$341	-----	-----
All other countries.....	-----	-----	-----	-----	195	142	1,356	1,117	-----	-----
Total.....	12,450	13,848	72,218	101,448	10,473	5,216	631	458	6,419	2,400

¹ From China.

TABLE 74.—General imports of coal-tar products, by countries, calendar years 1920-1924—Continued

INDIGO, DYES, COLORS, STAINS, ETC. (DUTIABLE) ¹

Imported from—	1922		1923		1924 ²	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
France.....			2,522	\$2,614		
Germany.....	100	\$752	1,860	2,676		
Italy.....	772	730	5,411	7,035		
Switzerland.....			2,206	2,548		
All other countries.....			1,810	3,301		
Total.....	872	1,482	13,809	18,174		

¹ Sept. 22 to Dec. 31.² No report.

COAL-TAR COLORS OR DYES (DUTIABLE)

Imported from—	1920		1921		1922 ¹	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Belgium.....	190,414	\$153,020	31,813	\$56,481	1,941	\$840
France.....	70,821	100,884	62,468	90,328	36,163	16,035
Germany.....	1,155,501	1,565,300	1,050,028	1,718,776	1,138,951	1,662,608
Switzerland.....	1,372,490	2,693,653	1,504,970	2,005,265	1,109,361	1,809,778
England.....	345,889	394,668	287,377	358,463	165,683	139,577
All other countries.....	351,758	351,277	169,689	216,035	101,537	133,991
Total.....	3,486,873	5,258,802	3,106,355	4,445,348	2,553,576	3,762,841

Imported from—	1922 ^{2 3}		1923		1924	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Belgium.....			17,269	\$33,667	45,063	\$55,488
France.....	15,111	\$17,523	209,865	347,596	124,958	183,526
Germany.....	266,255	344,569	1,580,403	1,945,814	1,652,784	2,079,059
Switzerland.....	295,470	390,457	857,466	1,331,075	1,118,215	1,523,829
England.....	31,374	27,812	106,704	104,965	104,113	98,427
All other countries.....	130,149	226,563	480,733	661,194	388,813	519,127
Total.....	738,359	1,006,924	3,252,440	4,424,311	3,433,946	4,459,456

¹ Jan. 1 to Sept. 21.² Title changed to: Colors, dyes, stains, color acids, and color bases, n. e. s.³ Sept. 22 to Dec. 31.⁴ Includes 346,526 lbs. valued at \$490,717 from Italy.

TABLE 74.—General imports of coal-tar products,¹ by countries, calendar years 1920-1924—Continued

COAL-TAR MEDICINALS

Imported from—	1920 ¹	1921 ¹	1922 ¹	1922 ²
France.....	\$21, 724	\$45, 378	\$43, 544	\$20, 089
Germany.....	59, 133	124, 862	92, 991	74, 983
Italy.....	8	60	17, 530	16, 953
Netherlands.....	21, 203	11, 680	20, 760	25, 462
Switzerland.....	18, 571	39, 151	19, 521	35, 473
England.....	40, 339	59, 681	49, 810	31, 701
All other countries.....	4, 595	795	128, 518	4, 009
Total.....	165, 573	281, 607	372, 674	208, 670

Imported from—	1923		1924	
	Pounds	Value	Pounds	Value
France.....	23, 117	\$59, 600	31, 868	\$63, 310
Germany.....	22, 087	52, 766	10, 092	33, 416
Italy.....	310	1, 593	271	1, 214
Netherlands.....	3, 611	46, 024	1, 652	78, 755
Switzerland.....	12, 802	36, 113	41, 351	60, 477
England.....	4, 707	13, 579	3, 112	11, 473
All other countries.....	1, 494	2, 580	3, 857	7, 330
Total.....	68, 128	212, 255	92, 203	255, 975

¹ "Medicinal preparations, n. e. s." to and including Sept. 21, 1922.

² Sept. 22 to Dec. 31, 1922.

EXPLOSIVES, 1922 ¹

	Quantity	Value
	Pounds	
Italy.....	5, 470	\$6, 843
Total.....	5, 470	6, 843

¹ None reported for 1923 and 1924.

ALL OTHER FINISHED COAL-TAR PRODUCTS

Imported from—	1920	1921	1922	1923		1924	
	Value	Value	Value	Pounds	Value	Pounds	Value ^{1, 2}
France.....	\$37, 192	\$39, 314	\$430	1, 110	\$11, 459	394	\$1, 506
Germany.....	21, 406	6, 518	16, 658	9, 821	27, 856	9, 871	7, 971
Switzerland.....	6, 715	15, 011	715	2, 372	8, 778	928	2, 411
England.....	10, 307	2, 657	2, 157	383	973	178	217
All other countries.....	29	302	1	3, 241	5, 731	709	1, 979
Total.....	75, 649	63, 802	19, 961	16, 927	54, 797	12, 080	14, 084

TABLE 75.—Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1920–1924

COAL TAR						
Exported to—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Barrels</i>		<i>Barrels</i>		<i>Barrels</i>	
Europe.....	243	\$1,441	212	\$1,394	46	\$392
North America.....	74,374	208,561	91,716	185,063	101,396	209,631
South America.....	3,725	23,656	457	3,125	580	3,142
Asia.....	10	65	17	1,857	63	545
Oceania.....	81	995	.....	.....	57	245
Africa.....	17	49	4	43	8	100
Total.....	88,350	234,767	92,406	191,482	102,150	214,055

Exported to—	1923 ¹		1924 ¹	
	Quantity	Value	Quantity	Value
	<i>Barrels</i>		<i>Barrels</i>	
Europe.....	348,105	\$1,299,531	348,825	\$666,106
North America.....	149,161	337,501	79,767	256,117
South America.....	844	5,677	986	8,374
Asia.....	28	278	88	1,016
Oceania.....	13	161	108	2,247
Africa.....	15,683	51,346	24,241	162,343
Total.....	513,834	1,694,491	269,015	1,076,203

¹ Crude tar and pitch.

COAL-TAR DISTILLATES—BENZOL

Exported to—	1920		1921		1922	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
France.....	2,528,494	\$138,850	24,344,624	\$1,095,063	20,158,912	\$738,078
Spain.....	129,378	19,056	19,100	5,278	44,697	8,045
England.....	57,500	4,970	16,073,896	1,797,780	39,649,410	1,390,924
Ireland.....	.....	.....	.....	.....	448,728	27,400
Canada.....	389,783	23,904	44,725	2,876	2,045,994	69,984
Mexico.....	2,729	219	1,443	94	13,405	1,048
Argentina.....	353,522	23,907	549,896	37,575	445,136	27,464
Chile.....	229,079	16,760	160,107	10,120	156,251	9,521
Java and Madeira.....	.....	.....	.....	.....	48,216	2,550
Australia.....	49,889	4,776	15,700	1,001	86,350	7,067
British South Africa.....	.....	.....	4,208	440	17,312	1,500
Algeria and Tunis.....	.....	.....	.....	.....	1,529,483	68,935
Italy.....	4,961,878	357,956	348,880	22,030	.....	.....
Belgium.....	3,150,240	238,617	.....	.....	.....	.....
All other countries.....	1,321,776	98,925	467,821	34,829	96,508	10,305
Total.....	13,174,268	927,940	72,030,400	3,007,086	64,740,402	2,362,821

Exported to—	1923		1924	
	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>	
France.....	25,932,540	\$975,152	25,160,724	\$690,683
England.....	80,899,171	2,415,199	31,206,248	936,044
Canada.....	80,725	3,586	33,221	1,730
Mexico.....	14,137	1,021	51,993	5,527
Argentina.....	740,496	52,230	759,301	51,254
Chile.....	92,006	4,928	171,956	9,903
Australia.....	23,240	2,066	.....	.....
British South Africa.....	749	80	2,418	260
Algeria and Tunis.....	44,777	1,629	.....	.....
Italy.....	7,010	810	.....	.....
All other countries.....	3,501,917	190,959	496,310	44,436
Total.....	111,336,768	3,647,660	57,882,171	1,739,837

TABLE 75.—Domestic imports of coal tar and of dyes and dyestuffs, calendar years 1920-1924—Continued

OTHER CRUDE DISTILLATES

Exported to—	1920	1921	1922 ¹	1923 ¹	1924
	<i>Value</i>	<i>Value</i>	<i>Value</i>	<i>Value</i>	<i>Value</i>
France.....	\$145,520	\$10,347	\$995	\$91	-----
Belgium.....	474,793	-----	12,849	-----	-----
Canada.....	314,641	156,917	51,718	109,770	\$163,559
Honduras.....	287	-----	15,454	20,797	16,794
Mexico.....	136,063	14,090	13,691	19,102	37,383
Brazil.....	193,089	32,550	29,738	16,569	3,820
Cuba.....	32,654	1,785	2,561	37,675	66,544
Japan.....	1,158,196	79,746	3,644	10,316	10,083
England.....	1,632,599	28,498	-----	8,027	8,498
Switzerland.....	1,313,431	44,833	-----	-----	-----
All other countries.....	1,260,976	140,742	24,333	79,355	147,705
Total.....	6,962,249	509,508	154,983	301,702	454,386

¹ Includes toluol and solvent naphtha.

CARBOLIC ACID

Exported to—	1922		1923		1924	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Canada.....	15,306	\$1,143	2,808	\$344	1,461	\$93
Mexico.....	50,096	4,040	9,545	1,099	17,706	1,716
Cuba.....	7,009	694	8,195	1,461	7,539	711
Japan.....	91,073	9,100	67,250	17,226	-----	-----
Kwangtung (leased territory).....	44,211	4,563	-----	-----	-----	-----
All other countries.....	15,451	3,683	145,032	¹ 14,259	² 24,658	5,496
Total.....	223,146	23,223	232,830	34,389	51,364	8,016

ANILINE OILS AND SALTS

Spain.....	10,000	\$1,450	-----	-----	-----	-----
Canada.....	211,010	40,919	288,043	\$57,307	160,756	\$41,838
Mexico.....	23,895	3,575	22,193	5,675	5,538	2,117
British India.....	29,302	7,009	27,885	4,693	-----	-----
Japan.....	30,603	6,120	110,777	17,384	165,242	40,280
Philippines.....	17,597	2,993	2,122	321	-----	-----
Australia.....	9,012	1,610	33,131	6,279	36,900	9,403
All other countries.....	6,804	1,915	13,300	3,364	7,023	7,799
Total.....	341,220	63,602	497,457	95,023	375,459	101,437

NAPHTHALENE

Switzerland.....	6,000	\$1,600	-----	-----	-----	-----
Canada.....	17,542	297	10,554	\$798	25,004	\$855
Mexico.....	11,558	1,044	7,247	1,322	7,686	596
Cuba.....	21,127	1,204	25,500	1,907	1,464	128
British India.....	11,853	770	10,294	672	274	21
Japan.....	14,610	4,329	12,529	3,045	10,058	3,520
Philippines.....	8,388	739	3,220	406	1,860	72
All other countries.....	18,423	2,674	25,820	2,236	65,850	³ 8,025
Total.....	109,514	12,657	95,164	10,386	112,196	13,217

NITROBENZOL ⁴

Norway.....	26,880	\$2,957	-----	-----	-----	-----
Canada.....	5,682	683	-----	-----	-----	-----
Cuba.....	3,203	399	-----	-----	-----	-----
Dominican Republic.....	3,040	608	-----	-----	-----	-----
Australia.....	2,147	312	-----	-----	-----	-----
All other countries.....	2,028	337	-----	-----	-----	-----
Total.....	42,980	5,296	-----	-----	-----	-----

¹ All other includes 130,049 pounds valued at \$11,106 to Panama.

² Includes 8,563 pounds (\$2,116) to Panama.

³ All other includes 44,850 pounds (\$6,279) to Spain.

⁴ Included in other intermediates for 1923 and 1924.

TABLE 75.—Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1920-1924—Continued

OTHER INTERMEDIATES

Exported to—	1922		1923		1924	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Greece.....	28,463	\$7,280	9,503	\$2,225	23,065	\$4,060
Spain.....	65,438	13,834	88,868	15,088	45,818	7,423
Switzerland.....	5,054	1,500	9,384	4,311	2,024	1,814
Canada.....	172,186	33,695	149,740	22,578	58,971	23,641
Mexico.....	77,642	3,481	130,564	13,258	177,290	14,395
Cuba.....	10,199	1,636	8,684	1,007	21,949	4,546
Brazil.....	42,618	8,275	181,361	34,457	200,526	35,847
Chile.....	12,192	1,823	100	9	200	32
China.....	314,774	65,047	89,336	18,802	15,200	4,634
Japan.....	54,888	12,910	256,373	51,407	505,914	74,071
Australia.....	20,050	11,844	17,600	8,103	26,170	5,821
All other countries.....	31,630	6,277	276,670	71,815	1,480,302	64,129
Total.....	835,134	167,602	1,218,183	243,060	1,557,429	240,413

COLOR LAKES, 1922²

Canada.....	16,900	\$14,477
Cuba.....	7,616	1,020
Peru.....	100	—
China.....	1,000	800
Hongkong.....	135	86
Japan.....	2,440	3,298
All other countries.....	—	—
Total.....	28,228	19,928

¹ Includes 409,860 pounds, \$28,550, to Russia in Europe.² Figures for 1923 and 1924 included in other colors, dyes, and stains.

DYES AND DYESTUFFS (VALUE)

Exported to—	1920			1921		
	Aniline dyes	Logwood extracts	All other	Aniline dyes	Logwood extracts	All other
Portugal.....	\$66,752	\$5,970	\$20,688	\$1,432	—	—
Belgium.....	507,371	118,339	41,523	100,821	\$6,843	\$45
France.....	807,241	607,017	391,060	67,535	66,762	8,334
Germany.....	454	1,456	7,745	653	13,885	6,352
Italy.....	582,236	404,367	275,149	45,068	8,723	70
Netherlands.....	39,682	73,472	56,057	1,938	2,535	6,590
Russia (European).....	100	—	—	—	—	—
Switzerland.....	132,359	60,157	92,017	20,374	—	19
United Kingdom.....	1,318,498	729,026	1,079,871	165,711	21,096	58,630
Canada.....	1,547,109	183,061	982,665	584,664	71,331	423,914
Mexico.....	1,091,603	11,092	210,145	149,009	3,560	132,075
Central America.....	13,159	1,852	13,730	7,982	975	5,680
West Indies.....	52,745	18,144	97,922	1,585	91	2,057
South America.....	2,282,210	45,586	497,029	432,881	16,466	89,156
Asia.....	12,783,303	195,493	3,208,107	3,131,071	347,610	833,709
Oceania.....	277,660	41,283	134,156	207,473	13,190	51,743
Africa.....	65,077	1,248	28,251	61,699	486	13,179
Denmark.....	26,463	2,903	2,794	1,305	—	3,849
Spain.....	682,998	77,183	149,365	36,844	535	12,040
Sweden.....	67,921	1,250	29,802	2,786	—	8,976
Norway.....	4,568	1,110	15,998	1,800	—	1,304
All other countries.....	100,971	25,051	38,997	44,369	15,868	45,433
Total.....	22,450,480	2,605,060	7,373,111	5,067,000	589,756	1,203,155

TABLE 75.—Domestic exports of coal tar and of dyes and dyestuffs, calendar years 1920-1924—Continued

OTHER COLORS, DYES, AND STAINS

Exported to—	1922		1923 ¹		1924 ¹	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Belgium.....	107,712	\$76,342	321,888	\$111,727	166,988	\$80,322
France.....	12,100	11,975	15,068	6,340	1,137	704
Greece.....	16,830	8,434	2,895	1,608	3,294	1,964
Italy.....	25,702	51,409	104	129	2,344	2,069
Netherlands.....	16,915	2,792	6,667	5,855	10,945	4,647
Portugal.....	24,973	10,787	1,155	497	4,209	1,650
Spain.....	87,566	42,426	11,598	12,500	10,329	7,643
United Kingdom.....	16,139	5,342	32,492	16,687	210,616	7,738
Canada.....	1,861,255	1,108,518	1,616,949	927,420	1,256,284	740,903
Mexico.....	159,857	87,920	155,302	78,536	193,394	87,376
Cuba.....	39,344	27,335	63,832	38,365	39,711	37,305
South America.....	425,551	323,922	490,619	352,265	508,623	345,838
British India.....	753,425	311,504	899,989	349,614	408,395	216,320
China.....	3,588,563	924,026	11,448,849	2,431,421	9,604,760	2,227,943
Japan.....	959,409	844,458	2,463,083	1,035,865	3,217,514	1,703,831
Philippine Islands.....	33,584	8,618	63,906	23,234	56,205	33,185
Australia.....	58,665	31,265	37,227	29,597	50,823	42,862
New Zealand.....	36,680	21,439	55,147	26,313	27,036	15,982
British South Africa.....	28,542	31,976	23,538	18,335	17,106	10,052
Other countries.....	71,397	50,669	214,228	99,063	123,378	66,730
Total.....	8,324,209	3,981,217	17,924,536	5,565,371	15,713,091	5,635,064

MEDICINALS

	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
Belgium.....	3,040	\$450			965	\$1,320
Greece.....	3,300	850				
Turkey in Europe.....	297,223	80,954				
England.....	80,540	31,709	74,169	\$49,301	31,641	25,275
Canada.....	55,874	13,001	10,926	8,617	48,119	31,553
Honduras.....	5,916	3,091	5,515	5,039	9,378	8,728
Mexico.....	37,829	30,476	33,999	30,840	92,097	133,541
Cuba.....	11,375	16,122	3,147	3,681	5,938	7,825
Venezuela.....	3,148	1,796	5,141	3,355	1,768	4,956
British India.....	3,330	3,107	2,667	1,458	24	121
Australia.....	27,575	21,135	11,346	5,653	16,787	13,861
British South Africa.....	4,848	3,863	931	988	2,064	1,426
All other countries.....	20,168	17,992	90,134	55,228	79,624	93,160
Total.....	554,166	224,546	237,975	164,160	288,405	321,766

¹ Includes color lakes.

² England.

SYNTHETIC PHENOLIC RESINS ¹

	1922	
	Quantity	Value
	<i>Pounds</i>	
England.....	500	\$69
Canada.....	121,183	7,786
Mexico.....	250	43
China.....	1,600	1,762
Japan.....	4,620	3,523
Total exports.....	128,153	13,183

¹ Included in total "Other coal-tar finished products, n. e. s." for 1923 and 1924.

TABLE 75.—Domestic exports of coal-tar and of dyes and dyestuffs, calendar years 1920-1924—Continued

PHOTOGRAPHIC CHEMICALS

Exported to—	1922		1923		1924	
	Quantity	Value	Quantity	Value	Quantity	Value
	<i>Pounds</i>		<i>Pounds</i>		<i>Pounds</i>	
England.....	11,274	\$4,896	2,205	\$1,054	1,992	\$1,872
Canada.....	65,411	15,971	23,427	5,775	20,679	6,583
Mexico.....	15,019	7,228	10,349	5,079	14,721	5,863
Cuba.....	16,738	6,306	16,223	5,406	18,788	7,261
Argentina.....	24,523	9,124	34,344	9,834	5,330	2,329
Japan.....	39,815	26,809	35,894	28,309	16,845	15,455
Philippines.....	11,709	5,509	8,862	5,051	10,545	4,063
Australia.....	10,806	9,018	12,716	12,030	13,688	12,731
New Zealand.....	13,094	4,302	22,101	5,363	14,883	3,230
All other countries.....	39,727	14,690	48,039	18,416	56,524	21,364
Total.....	248,119	103,853	214,160	96,317	173,995	80,751

OTHER FINISHED COAL-TAR PRODUCTS, N. E. S.

Denmark.....	37,226	\$1,540	4,174	\$3,193	1,000	\$680
France.....	80,800	2,560	30,893	6,576		
Norway.....	48,767	1,275				
England.....	264,009	33,285	167,822	37,292	74,137	23,539
Canada.....	2,797,967	63,908	1,128,524	57,663	209,457	41,520
Costa Rica.....	28,262	2,655	6,017	709	8,257	928
Panama.....	67,434	2,079	24,809	2,920	11,420	1,485
Mexico.....	470,344	26,902	334,479	20,560	150,729	13,724
British West Indies.....	95,545	5,401	21,854	3,460	12,769	2,006
Cuba.....	984,063	43,497	868,690	38,382	279,141	26,670
Argentina.....	107,043	8,831	207,900	9,200	201,125	9,051
Brazil.....	39,692	2,598	1,510	381	22,052	3,004
Chile.....	78,574	4,664	4,742	1,155	1,134	136
Colombia.....	80,661	13,442	103,833	18,951	134,398	22,625
Peru.....	80,470	13,415	202,251	27,707	214,821	30,975
Japan.....	67,948	17,550	154,606	38,981	387,275	58,253
Australia.....	21,533	4,533	26,785	5,166	18,038	2,948
All other countries.....	194,752	24,707	¹ 1,212,257	206,808	² 421,615	67,418
Total.....	5,545,090	272,842	4,501,146	479,104	2,147,368	304,962

¹ All other countries includes 768,236 pounds valued at \$140,077 to China.² Includes 217,369 pounds valued at \$34,212 to China.

DIRECTORY OF MANUFACTURERS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1924

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
1	Abbott Laboratories, The.....	4753 Ravenswood Avenue, Chicago, Ill.
2	Acids Manufacturing Corporation.....	50 East Forty-second Street, New York, N. Y. (Packer, Conn.)
3	Agawam Chemical Works (Inc.).....	10 Weybosset Street, Providence, R. I. (North Attleboro, Mass.)
4	Algon Color & Chemical Corporation.....	132 Front Street, New York, N. Y. (Elizabeth, N. J.)
5	Alston-Lucas Paint Co.....	1031 Currier Street, Chicago, Ill.
6	Althouse Chemical Co., The.....	540 Pear Street, Reading, Pa.
7	Alyco Manufacturing Co. (Inc.).....	86 Orange Street, Bloomfield, N. J.
8	Amalgamated Dyestuff and Chemical Works (Inc.).....	Plum Point Lane, Newark N. J.
9	American Aniline Products (Inc.).....	45 East Seventeenth Street, New York, N. Y. (Lock Haven, Pa.)
10	Amido Products Co.....	132 Front Street, New York, N. Y. (228 Emmett Street, Newark, N. J.)
11	Anderson Chemical Co.....	P. O. Box 307, Passaic, N. J. (Wallington, N. J.)
12	Ansbacher & Co. (Inc.), A. B.....	527 Fifth Avenue, New York, N. Y. (310 North Seventh Street, Brooklyn, N. Y.)
13	Auramine Corporation of America.....	22 Seventh Street, Long Island City, N. Y.
14	Baird & McGuire (Inc.).....	Holbrook, Mass.
15	Facelite Corporation of West Virginia.....	247 Park Avenue, New York, N. Y. (Bloomfield, N. J.; Chicago, Ill.; Painesville, Ohio; Perth Amboy, N. J.)
	rett Co., The.....	40 Rector Street, New York, N. Y. (Plants distributed throughout the United States.)
17	Bayer Co. (Inc.), The.....	117 Hudson Street, New York, N. Y. (Rensselaer, N. Y.)
18	Beaver Chemical Corporation.....	Damascus, Va.
19	Beaver Manufacturing Co.....	Ballardvale, Mass.
20	Belle Alkali Co.....	Belle, W. Va.
21	Benzol Products Co. (Inc.).....	13 Margaretta Street, Newark, N. J.
22	Berghausen Chemical Co., The E.....	915 Carr Street, Cincinnati, Ohio.
23	Berkheimer Manufacturing Co., J. E.....	2928 South M Street, Tacoma, Wash.
24	Brooklyn Color Works (Inc.).....	Stewart Avenue and Cherry Street, Brooklyn, N. Y.
25	Brown Co.....	404 Commercial Street, Portland, Me. (Berlin, N. H.)
26	Bush (Inc.), Burton T.....	45 John Street, New York, N. Y. (Delawanna, N. J.)
27	Bush & Co., W. J.....	370 Seventh Avenue, New York, N. Y. (Linden, N. J.)
28	Cable Chemical Works.....	1700 Elston Avenue, Chicago, Ill. (Cable, Wis.)
29	Ca'co Chemical Co., The.....	Bound Brook, N. J.
30	California Ink Co. (Inc.).....	West Berkeley, Calif.
31	Carbide & Carbon Chemical Corporation.....	30 East Forty-second Street, New York, N. Y.
32	Carey Manufacturing Co., The Philip.....	Lockland, Ohio.
33	Celluloid Co., The.....	36 Washington Place, New York, N. Y. (Newark, N. J.)
34	Central Dyestuff & Chemical Co.....	Foundry Street and Roanoke Avenue, Newark, N. J.
35	Central Specialty Co.....	524 Delaware Street, Kansas City, Mo.
36	Certain-teed Products Corporation.....	100 East Forty-second Street, New York, N. Y. (East St. Louis, Ill.)
37	Chemical Co. of America (Inc.), The.....	46 Murray Street, New York, N. Y. (Springfield, N. J.)
38	Childs & Co. (Inc.), Charles M.....	43 Summit Street, Brooklyn, N. Y.
39	Cincinnati Chemical Works (Inc.).....	Evanston Station, Box 20, Cincinnati, Ohio. (Norwood & St. Bernard, Ohio.)
40	Coal Tar Dyes (Inc.).....	132 Front Street, New York, N. Y. (Newark, N. J.)
41	Coleman & Bell Co.....	Norwood, Ohio.
42	Combustion Utilities Corporation.....	8-10 Bridge Street, New York, N. Y. (Toledo, Ohio.)
43	Commonwealth Chemical Corporation.....	25 West Forty-third Street, New York, N. Y. (Newark, N. Y.)
44	Commonwealth Color & Chemical Co.....	Nevins, Butler, and Baltic Streets, Brooklyn, N. Y.
45	Consolidated Color & Chemical Co.....	122 Hudson Street, New York, N. Y. (Newark, N. J.)
46	Cooks Falls Dye Works (Inc.).....	68 William Street, New York, N. Y. (Cooks Falls, N. Y.)
47	Coopers Creek Chemical Co.....	West Conshohocken, Pa.
48	Corona Chemical Division, Pittsburgh Plate Glass Co.....	205 Lake Street, Milwaukee, Wis.
49	Croton Color & Chemical Co. (Inc.).....	293 Broadway, New York, N. Y. (Croton-on-Hudson, N. Y.)
50	Crown Tar Works.....	418 Gas & Electric Building, Denver, Colo.
51	Crystal Color & Chemical Works.....	Saugus, Mass.
52	David Chemical Co., Albert.....	44 Watts Street, New York, N. Y. (Chicago Heights, Ill.)
53	Debrook Co. (Inc.).....	1105 Metropolitan Avenue, Brooklyn, N. Y.
54	Dehls & Stein.....	237 South Street, Newark, N. J.
55	Delta Chemical & Iron Co.....	Wells, Delta County, Mich.

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
56	Devoe & Reynolds Co. (Inc.)	101 Fulton Street, New York, N. Y. (Chicago, Ill., and Brooklyn, N. Y.)
57	Diarsenol Laboratories (Inc.)	454 Ellicott Square, Buffalo, N. Y.
58	Dovan Chemical Corporation	30 Church Street, New York, N. Y. (Newark, N. J.)
59	Dow Chemical Co., The	Midland, Mich.
60	Dupont De Nemours & Co., E. I.	Wilmington, Del. (Deep Water Point, N. J.)
61	Dye Products & Chemical Co. (Inc.)	200 Fifth Avenue, New York, N. Y. (Newark, N. J.)
62	Dyes & Chemicals of New Jersey (Inc.)	702 Court Street, Brooklyn, N. Y.
63	Dyestuffs & Chemicals (Inc.)	11th and Monroe Streets, St. Louis, Mo.
64	Eakins, (Inc.), J. S. & W. R.	24 Wallabout Street, Brooklyn, N. Y.
65	Eastern Color Co.	16 East Forty-third Street, New York, N. Y.
66	Eastman Kodak Co.	343 State Street, Brooklyn, N. Y. (Rochester, N. Y.)
67	Essex Aniline Works (Inc.)	88 Broad Street, Boston, Mass. (South Middleton, Mass.)
68	Federal Color Laboratories (Inc.)	Forest Street, Norwood, Ohio.
69	Fine Colors Co.	21 McBride Avenue, Paterson, N. J.
70	Florasynth Laboratories (Inc.)	Olmstead and Starling Avenues, Unionport, N. Y.
71	Ford Motor Co.	Iron Mountain, Mich.
72	Foster-Heaton Co.	833-839 Magnolia Avenue, Elizabeth, N. J.
73	Fries Bros.	92 Reade Street, New York, N. Y. (Bloomfield, N. J.)
74	Fries & Fries Co., The	1501 West Sixth Street, Cincinnati, Ohio.
75	Garfield Aniline Works (Inc.)	Midland Avenue, Garfield, N. J.
76	Gary Chemical Co.	749 Broadway, Gary, Ind. (Chesterton, Ind.)
77	Gaskill Chemical Corporation, The	157 Spencer Street, Brooklyn, N. Y.
78	Gebauer Chemical Co., The	669 Erie Building, Cleveland, Ohio. (9408 St. Catherine Avenue, Cleveland, Ohio.) Akron, Ohio.
79	Goodrich Co., The B. F.	350 Madison Avenue, New York, N. Y. (New Brunswick, N. J.)
80	Granton Chemical Co. (Inc.)	117 Hudson Street, New York, N. Y. (Grasselli, N. J.; Rensselaer, N. Y.)
81	Grasselli Dyestuff Corporation	2 South Twenty-first Street, Philadelphia, Pa.
82	Harmer Laboratories Co.	361-371 Harmon Street, Brooklyn, N. Y.
83	Harmon Color Works (Inc.)	338 Wilson Avenue, Newark, N. J.
84	Heller & Merz Co., The	222 North Dunn Street, Bloomington, Ind.
85	Henke Chemical Co.	200 Fifth Avenue, New York, N. Y. (878 Mount Prospect Avenue, Newark, N. J.)
86	Herrmann & Co. (Inc.), Morris	45 East Seventeenth Street, New York, N. Y. (Garfield, N. J.)
87	Heyden Chemical Co. of America (Inc.)	25 Pine Street, New York, N. Y. (Niagara Falls, N. Y.)
88	Hooker Electrochemical Co.	951 East Orange Street, Lancaster, Pa.
89	Hydrocarbon Chemical Co.	Charles and Chase Streets, Baltimore, Md.
90	Hynson, Westcott & Dunning	Glens Falls, N. Y.
91	Imperial Color Works (Inc.)	667 Garfield Avenue, Jersey City, N. J.
92	Interstate Chemical Co.	Flushing, N. Y.
93	Ising Corporation, The C. E.	509 South Tenth Street, Philadelphia, Pa.
94	Johnson & Co., Charles Eneu	2 South Ninth Street, Brooklyn, N. Y.
95	Kent Color Corporation	Thirty-fourth and Bank Streets, Louisville, Ky.
96	Kentucky Color and Chemical Co.	Central National Bank Building, Marietta, Ohio
97	Kerin Manufacturing Co., The	575 Nassau Street, Orange, N. J.
98	Kessler Chemical Co., The	644 Greenwich Street, New York, N. Y. (Carteret, N. J.; South Charleston, W. Va.)
99	Klipstein & Sons Co., E. C.	87 Park Place, New York, N. Y. (Brooklyn, N. Y.)
100	Kohnstamm & Co. (Inc.), H.	2 Jersey Street, Buffalo, N. Y. (Roulette, Pa.)
101	Lakeview Laboratories	McCormick Building, 400 Light Street, Baltimore, Md.
102	LaMotte Chemical Products Co., The	Lawrence, Mass. (Methuen, Mass.)
103	Lee Co., A.	2513 South Robey Street, Chicago, Ill.
104	Lewis Mfg. Co., F. J.	Indianapolis, Ind.
105	Lilly and Co., E. H.	322 Race Street, Philadelphia, Pa. (Gibbsboro, Camden City, N. J.)
106	Lucas & Co. (Inc.), John	45 John Street, New York, N. Y. (Newark, N. J.)
107	Maas & Waldstein Co.	3700 North Second Street, St. Louis, Mo.
108	Mallinckrodt Chemical Works	122 Maple Avenue, Rosebank, Staten Island, N. Y.
109	Maple Chemical Co. (Inc.)	192 Coit Street, Irvington, N. J.
110	Marx Color & Chemical Co., Max	2 Pine Street, San Francisco, Calif. (Waldo, Marin County, Calif.)
111	Mason By-Products Co.	Room 540, State House, Boston, Mass. (83 Washington Street, Brookline, Mass.)
112	Massachusetts Department of Public Health	204 Niagara Street, Newark, N. J.
113	May Chemical Works	100 West Hunter Avenue, Maywood, N. J.
114	Maywood Chemical Works	Twentyeth Street and Lynch Avenue, East St. Louis, Ill.
115	Mephram & Co., Geo. S.	45 Park Place, New York, N. Y. (Rahway, N. J.)
116	Merck & Co.	148 State Street, Boston, Mass. (Woburn, Mass.)
117	Merrimac Chemical Co.	122 Hudson Street, New York, N. Y. (Brooklyn, N. Y.)
118	Metz Laboratories (Inc.), H. A.	96 East Tenth Street, New York, N. Y.
119	Meyer, Alexander	110 William Street, New York, N. Y. (Newark, N. J.; St. Marys, Pa.)
120	Miner-Edgar Co., The	1724 South Second Street, St. Louis, Mo.
121	Monsanto Chemical Works	118 East Twenty-seventh Street, New York, N. Y. (Elizabeth, N. J.)
122	Morana (Inc.)	

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
123	National Ammonia Co. of Pa., The.....	Delaware Avenue and Van Kirk Street, Philadelphia, Pa.
124	National Aniline & Chemical Co. (Inc.).....	40 Rector Street, New York, N. Y. (Buffalo, N. Y.; Marcus Hook, Pa.)
125	Naugatuck Chemical Co., The.....	Naugatuck, Conn.
126	New England Aniline Works (Inc.).....	Ashland, Mass.
127	New Haven Gas Light Co.....	80 Crown Street, New Haven, Conn.
128	New York Quinine & Chemical Works (Inc.) The.....	99 North Eleventh Street, Brooklyn, N. Y.
129	Newport Co., The.....	P. O. Box 1582, Milwaukee, Wis. (Carrollville, Wis.; Passaic, N. J.)
130	Niagara Alkali Co.....	4205 Buffalo Avenue, Niagara Falls, N. Y.
130a	Niagara Smelting Corporation.....	Bridge Station, Niagara Falls, N. Y.
131	Northwestern Chemical Co.....	137 Sixth Avenue, Wauwatosa, Wis.
132	Norvell Chemical Corporation, The.....	99 John Street, New York, N. Y. (Perth Amboy, N. J.)
133	Novocol Chemical Manufacturing Co. (Inc.).....	2923 Atlantic Avenue, Brooklyn, N. Y.
134	Oldbury Electro Chemical Co.....	Niagara Falls, N. Y.
135	Palatine Aniline & Chemical Corporation.....	81 North Water Street, Poughkeepsie, N. Y.
136	Passaic Color Corporation.....	50 Eighth Street, Passaic, N. J.
137	Peek Chemical Works (Inc.).....	380 Williamson Street, Elizabeth, N. J.
138	Peerless Color Co.....	521 North Avenue, Plainfield, N. J.
139	Pennsylvania Coal Products Co.....	Reiber Building, Butler, Pa. (Petroia, Pa.)
140	Pfizer & Co. (Inc.), Chas.....	81 Maiden Lane, New York, N. Y.
141	Pharma-Chemical Corporation.....	233 Broadway, New York, N. Y. (Bayonne, N. J.)
142	Portland Gas & Coke Co.....	Gasco Building, Portland, Oreg.
143	Powers-Weightman-Rosengarten Co.....	916 Parrish Street, Philadelphia, Pa.
144	Providence Chemical Laboratories.....	51 Empire Street, Providence, R. I.
145	Puritan Dye & Chemical Co.....	Northborough, Mass.
146	Quaker Oats Co., The.....	1600 Railway Exchange, Chicago, Ill. (Cedar Rapids, Iowa.)
147	Radiant Dye & Color Works.....	2837 West Twenty-first Street, Brooklyn, N. Y.
148	Republic Creosoting Co.....	1614 Merchants Bank Building, Indianapolis, Ind. (Mobile, Ala.; Ironton, Utah; St. Louis Park, Minn.; Norfolk, Va.; Indianapolis, Ind.)
149	Rhodia Chemical Co.....	89 Fulton Street, New York, N. Y. (New Brunswick, N. J.)
150	Roessler & Hasslacher Chemical Co., The....	709 Sixth Avenue, New York, N. Y. (Perth Amboy, N. J.; Niagara Falls, N. Y.)
151	Rossville Co., The.....	Lawrenceburg, Ind.
152	Rubber Service Laboratories Co., The.....	611 Peoples Savings & Trust Building, Akron, Ohio. (Nitro, W. Va.)
153	Ruxton (Inc.), Philip.....	220 West Forty-second Street, New York, N. Y. (247-255 Water Street, Brooklyn, N. Y.)
154	Selden Co., The.....	339 Second Avenue, Pittsburgh, Pa.
155	Semet-Solvay Co.....	Syracuse, N. Y.
156	Seydel Chemical Co.....	86 Forrest Street, Jersey City, N. J. (Nitro, West Va.)
157	Sherwin-Williams Co., The.....	601 Canal Road, Cleveland, Ohio.
158	Siemon & Elting (Inc.).....	Linden, N. J. (Irvington, N. J.)
159	Sinclair & Valentine Co.....	11 St. Clair Place, New York, N. Y.
160	Southern Dyestuffs Co.....	Nitro, W. Va.
161	Special Chemicals Co.....	Highland Park, Ill.
162	Springdale Finishing Co. (Inc.), The.....	57 Pine Street, Canton, Mass.
163	Squibb & Sons, E. R.....	80 Beekman Street, New York, N. Y. (Brooklyn, N. Y.; New Brunswick, N. J.)
164	Stearns & Co., Frederick.....	Bellevue Street and Jefferson Avenue, Detroit, Mich.
165	Sun Chemical & Color Co.....	309 Sussex Street, Harrison, N. J.
166	Synfleu Scientific Laboratories (Inc.).....	Monticello, N. Y.
167	Synthetical Laboratories of Chicago.....	1326 West Congress Street, Chicago, Ill.
168	Tar Products Corporation.....	99 Empire Street, Providence, R. I. (East Providence, R. I.)
169	Texdel Chemical Co.....	136 Water Street, New York, N. Y. (Nutley, N. J.)
170	Textile Chemical Co. (Inc.).....	90 Smithfield Avenue, Providence, R. I.
171	Thatcher Process Co. (Inc.).....	203 Richmond Avenue, Syracuse, N. Y. (523 Tracy Street, Syracuse, N. Y.)
172	Todd Co., A. M.....	Kalamazoo, Mich.
173	Trico Chemical Co. (Inc.).....	502 Iroquois Building, Buffalo, N. Y.
174	Uhlich & Co. (Inc.), Paul.....	11 Cliff Street, New York, N. Y. (Brooklyn, N. Y.)
175	Ullman Co., Sigmund.....	Park Avenue and One Hundred and Forty-sixth Street, New York, N. Y.
176	Ulto Chemical Corporation.....	1 Hudson Street, New York, N. Y. (Brooklyn, N. Y.)
177	United States Industrial Chemical Co. (Inc.)..	110 East Forty-second Street, New York, N. Y. (Curtis Bay, Md.)
178	Van Dyk & Co. (Inc.).....	4-6 Platt Street, New York, N. Y. (Jersey City N. J.)
179	Van Schaack Bros. Chemical Works (Inc.).....	3358 Avondale Avenue, Chicago, Ill.
180	Vernon Synthetic Chemical Corporation (Inc.).....	166 Vernon Avenue, Long Island City, N. Y.
181	Verona Chemical Co.....	26 Verona Avenue, Newark, N. J.

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
182	Victor Chemical Works	343 South Dearborn Street, Chicago, Ill. (Chicago Heights, Ill.)
183	Wamesit Chemical Co.	Lowell, Mass. (Wamesit, Mass.)
184	Warner-Jenkinson Manufacturing Co.	2526 Baldwin Street, St. Louis, Mo.
185	Western Dry Color Co.	Fifty-second and Wallace Streets, Chicago, Ill.
186	Westvaco Chlorine Products (Inc.)	415 Lexington Avenue, New York, N. Y. (South Charleston, W. Va.)
187	White Tar Co. of New Jersey (Inc.), The.....	56 Vesey Street, New York, N. Y. (Kearney, N. J.; Cincinnati, Ohio.)
188	White Chemical Co., Wilbur	66 Temple Street, Owego, N. Y.
189	Wilhelm Co., The A.	Third and Bern Streets, Reading, Pa.
190	Williamsburg Chemical Co. (Inc.)	230 Morgan Avenue, Brooklyn, N. Y.
191	Witbeck Chemical Corporation	1-24 Broadway, Albany, N. Y.
192	Wolf-Alport Chemical Corporation	593 Irving Avenue, Brooklyn, N. Y.
193	Yocum Laboratories, The	168 Coit Street, Irvington, N. J.
194	Zinsser & Co.	Hastings-on-Hudson, N. Y.
195	Organo Chemico Co.	1636 Columbus Avenue, Sandusky, Ohio.



