UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 39

CENSUS OF DYES

AND OF

OTHER SYNTHETIC ORGANIC CHEMICALS

▼

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CONTENTS

Part V

Part VI

Statistical Tables

INTRODUCTION

This report is a survey of the domestic dye and of the synthetic organic chemical industry in 1929. It presents the results of a special investigation made by the United States Tariff Commission with respect to the production in the United States of coal-tar dyes and of synthetic organic chemicals of coal-tar and of noncoal-tar origin. It includes a detailed tabulation of coal-tar dyes imported into the United States and official statistics of imports and exports of coal-tar dyes by the large consuming and producing nations of the world.

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

In the preparation of this report the Tariff Commission had the services of Dexter North, Wilbur F. Sterling, G. Raymond Webb, Florence Burlingame, and Bertha M. Robertson, of the chemical division of the commission's staff, and of others. The commission is indebted to Warren N. Watson, former chief of the chemical division, for his valuable suggestions in the preparation of this report.

PART I

SUMMARY OF THE CENSUS OF DYES AND OF OTHER SYNTHETIC ORGANIC CHEMICALS, 1929

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SUMMARY OF THE CENSUS OF DYES AND OF OTHER SYNTHETIC ORGANIC CHEMICALS, 1929

Introduction

The United States Tariff Commission has prepared, beginning with 1917, an annual report of the American dye and coal-tar chemical industry.[1] In 1921 the scope of this survey was extended to include synthetic organic chemicals not of coal-tar origin. This rapidly expanding branch of the American chemical industry has been covered in each succeeding census, including this issue.

In addition to statistics of production and sales of the domestic industry, this report contains a detailed tabulation of coal-tar dyes imported into the United States in 1929; a discussion of the international dye trade, including significant developments that have occurred in the principal foreign dye-producing countries since the last census; and official statistics of exports and imports of coal-tar dyes of the more important dye-producing and consuming countries of the world in 1929. The development of the organic-metallic fungicide industry in the United States is discussed under "Intermediates."

The general grouping of coal-tar chemicals in this report follows that of the tariff act of 1930, and conforms in general, although not in every detail, to common practice. Crudes, free under paragraph 1651, are prepared from crude coal tar; intermediates, dutiable at 40 per cent and 7 cents per pound and at 20 per cent and 3½ cents per pound under paragraph 27, are chemically manufactured from crudes; and dyes and other finished coal-tar products, dutiable at 45 per cent and 7 cents per pound[2] under paragraph 28, are prepared by chemical treatment from intermediates. "Other finished coal-tar products" include color lakes, photographic chemicals, medicinals, flavors, perfume materials, synthetic resins, and synthetic tanning materials. Explosives of coal-tar origin, although dutiable under paragraph 28, are not included in this census.

A summary of domestic production and sales of coal-tar products in 1918 and in 1927–1929, inclusive, appears in Table 1, page 6. The data for the years omitted are contained in the 1928 census. The figures for 1929 were compiled from returns of 199 companies[3] and are thought to form a complete record of the manufacture of such products. Data for separate items are given in as great detail

[1] 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, Dec. 12, 1918.

[2] Except indigo and sulfur black, which are dutiable at 20 per cent and 3 cents per pound.

[3] This census includes production returns of 199 firms, of which 31 made synthetic organic chemicals of noncoal-tar origin only, and 168 made synthetic organic chemicals of coal-tar origin or of both coal-tar and noncoal-tar origin. Of the 199 firms, 161 granted permission for the publication of their names. The names of the 161 firms are listed in the directory of manufacturers of dyes and other synthetic organic chemicals, page 188.

as is possible without disclosing the operations of individual manufacturers. The policy of the commission is to omit production and sales figures for a given product unless at least three firms report a substantial production. If the total is not well distributed among the three or more manufacturers, or if one producer reports the bulk of the total, production or sales figures are not published.

Summary of Domestic Production, 1929

CRUDES

The total domestic production of coke in 1929 was 59,884,923 net tons, a decided increase over the previous year and the highest output on record. Of this total, by-product ovens reported 89.2 per cent and beehive ovens 10.8 per cent. In 1913 only 27.5 per cent was from by-product ovens. Since then the trend of the industry has been toward the increased use of the by-product oven, which permits the recovery of ammonia, gas, tar, creosote oil, and valuable phenolic products, heretofore lost in the beehive process of coking. By-product ovens are supplying increasing quantities of gas for urban consumption and of coke for domestic fuel.

The total production of coke-oven and coal-gas tar in 1929 was 736,864,366 gallons, an increase of 7 per cent over the output in 1928. The production of American tar is greatly in excess of the requirements of tar-distilling and coal-tar chemical industries, and a large portion of the annual output is used as fuel. In 1929 tar distillers utilized 367,340,281 gallons of tar, or about 50 per cent of the quantity produced. The 367,340,281 gallons distilled were converted into partly refined products, such as motor fuel, solvents, and pitches, and into refined products, such as benzene, toluene, and naphthalene.

Dead or creosote oil is one of the crudes of great commercial value and economic importance. It is extensively used as a wood preservative. The production of 170,476,958 gallons of creosote oil in 1929 was an increase of about 35 per cent over the output of the previous year. Imports declined from 88,385,074 gallons in 1928 to 77,100,896 gallons in 1929. During 1929 a large number of new units for the recovery of creosote oil were installed. The United States now has an installed capacity sufficient to produce well in excess of the present domestic consumption. Of the coal-tar products imported in 1929, creosote oil is the largest single item both in quantity and value.

INTERMEDIATES

Intermediates, prepared from coal-tar crudes by chemical methods, are used in the manufacture of dyes and other finished products, and, to a lesser extent, directly as accelerators and antioxidants in the processing of rubber, as camphor substitutes, as insecticides and germicides, and in the flotation process of concentrating ores.

The total production of intermediates by 77 firms in 1929 was 354,487,718 pounds, an increase of 27 per cent over the 279,274,807 pounds reported by the same number of firms in 1928.

Intermediates used in the preparation of fast and specialty dyes showed increased production, and several new intermediates of this type were reported in 1929. The output of phthalic anhydride, used in the manufacture of anthraquinone, was above the record production of 1928.

Phenol, an intermediate used in the preparation of synthetic resins, dyes, medicinals, and explosives, more than doubled in production in 1929. The increase was largely due to the peak output of phenolic synthetic resins. A new synthetic process for manufacturing phenol from monochlorobenzene and caustic soda, now in large-scale operation in this country, is largely responsible for the unusual increase in the output of monochlorobenzene.

The manufacture of synthetic organic chemicals for use in compounding rubber showed progress in 1929. It is estimated that accelerators reduce the time of vulcanization by about three-fourths, and that antioxidants increase the average life of tires about one year. Many of the existing compounds were used in increased quantity by the rubber trade, and several new products of this class were reported in 1929 for the first time.

COAL-TAR DYES

Production.—The output of dyes in 1929 by 54 firms was 111,421,505 pounds, an increase of 14,796,054 pounds or 15.31 per cent over the production of 96,625,451 pounds in 1928. Substantially larger outputs of direct, sulfur, and vat dyes (including indigo) accounted for 81.12 per cent of this increase in production. Sales totaled 106,070,887 pounds, valued at $45,842,130, as compared with 93,302,708 pounds, valued at $39,792,039, in 1928.

Since the war the manufacture of dyes and finished coal-tar chemicals has steadily developed, until now over $100,000,000 are invested in buildings and equipment and employees number 11,270, as contrasted with 528 in 1914. During this interval hundreds of new dyes have been produced, and most of them for the first time in the United States. Of the 78,377,709 pounds of dyes apparently consumed in the United States in 1929, 91.79 per cent by quantity and 77.80 per cent by value were made in American plants.

Expenditures for research on dyes and coal-tar chemicals bore the same relation to total sales in 1929 as in 1928. Nearly $3,000,000 is reported as having been the net cost of research in 1929. That nearly four cents out of every dollar paid for dyes and coal-tar chemicals is spent on research work to improve quality and to meet competitive conditions in the industry attests to the importance which our dye manufacturers attach to research work.

Prices.—The weighted average price per pound of all domestic dyes sold declined on an average of 8.7 cents per year during the period 1917 to 1927. Though there were general price recessions in 1928 and in 1929, the weighted average price per pound increased from 39 cents to 42.6 cents in 1928 and to 43.2 cents in 1929, largely because of an increase in the price of indigo and sulfur black in 1928, a further increase in the price of indigo in 1929, and increased production of higher priced dyes in both years.

Imports.—Imports of dyes in 1929, amounting to 6,437,147 pounds, with an invoice value of $5,374,085, represent an increase of 1,085,196 pounds, or 20.28 per cent in quantity and of $1,052,218 or 24.35 per cent in value, over the 1928 imports of 5,351,951 pounds, with an invoice value of $4,312,867. Germany and Switzerland supply nearly all of our dye imports. Classified by method of application, 41.87 per cent of our imports in 1929 were vat dyes; 23.17 per cent, acid dyes; 15.19 per cent, direct dyes; 8.47 per cent, mordant and chrome dyes; and the remainder, basic, spirit-soluble, and sulfur dyes.

Exports.—Exports of dyes in 1929, amounting to 34,130,325 pounds, and valued at $7,279,086, represent an increase of 6,306,061 pounds or 22.66 per cent in quantity and of $747,467 or 11.44 per cent in value over the 1928 exports of 27,824,264 pounds, valued at $6,531,619. Sales to China, Hongkong, Belgium, Germany, British India, and South America increased appreciably in 1929, while those to Canada, Cuba, the United Kingdom, the Philippine Islands, and France decreased. Low-priced bulk dyes, such as indigo and sulfur black, direct blue and black, and acid black are the principal colors exported by the United States.

STATISTICS OF PRODUCTION OF INTERMEDIATES AND FINISHED PRODUCTS

TABLE 1.—*Dyes and coal-tar chemicals: Summary of production, 1918 and 1927–1929*

	1918		
	Number of manufacturers	Production	
		Quantity	Value
		Pounds	
Intermediates (total)	128	357,662,251	$124,382,892
Finished products (total)		76,802,959	83,815,746
Dyes	78	58,464,446	62,026,390
Color lakes	29	9,590,537	5,020,023
Photographic chemicals	6	316,749	823,915
Medicinals	31	3,623,352	7,792,984
Flavors	7	458,256	4,925,627
Perfumes	6	116,263	584,695
Synthetic tanning materials	1	4,233,356	2,642,120
Synthetic phenolic resins	5		

	1927			
	Number of manufacturers	Production, quantity	Sales	
			Quantity	Value
		Pounds	*Pounds*	
Intermediates (total)	72	240,073,184	92,917,439	$20,127,459
Finished products (total)	130	133,357,423	136,206,835	61,272,645
Dyes	55	95,167,905	98,339,204	38,532,795
Color lakes	40	11,601,507	11,629,740	6,446,508
Medicinals	24	3,598,839	3,548,556	6,819,487
Flavors	16	2,205,472	2,235,791	1,435,445
Perfumes	18	1,998,987	2,025,614	991,922
Photographic chemicals	6	5,332,483	5,352,617	951,832
Synthetic tanning materials	2			
Synthetic phenolic resins	7	13,452,230	13,084,313	6,094,656

TABLE 1.—*Dyes and coal-tar chemicals: Summary of production, 1918 and 1927–1929*—Continued

	1928			
	Number of manufacturers	Production, quantity	Sales	
			Quantity	Value
		Pounds	*Pounds*	
Intermediates (total)	77	279, 274, 807	115, 837, 340	$24, 126, 473
Finished products (total)	125	143, 563, 099	140, 796, 814	65, 762, 945
Dyes	53	96, 625, 451	93, 302, 708	39, 792, 039
Color lakes	38	12, 127, 242	12, 045, 435	6, 589, 166
Medicinals	23	4, 088, 393	4, 004, 557	8, 650. 838
Flavors	14	1, 746, 350	1, 966, 467	1, 296, 034
Perfumes	18	1, 577, 718	1, 619, 476	1, 000, 001
Photographic chemicals	5	478, 979	493, 825	696, 101
Synthetic phenolic resins	9	20, 411, 465	20, 778, 856	7, 211, 958
Synthetic tanning materials and miscellaneous	4	6, 587, 501	6, 585, 490	526, 808

	1929			
	Number of manufacturers	Production, quantity	Sales	
			Quantity	Value
		Pounds	*Pounds*	
Intermediates (total)	77	354, 487, 718	148, 711, 591	$28, 871, 572
Finished products (total)[1]	120	167, 175, 703	158, 698, 300	77, 247, 361
Dyes	54	111, 421, 505	106, 070, 887	45, 842, 130
Color lakes	37	13, 244, 676	12, 907, 914	7, 262, 543
Medicinals	24	5, 000, 205	4, 745, 054	8, 358, 526
Flavors	10	2, 292, 450	2, 253, 414	3, 517, 182
Perfumes	16	1, 599, 430	1, 480, 368	1, 082, 602
Photographic chemicals	5	580, 947	580, 150	790, 981
Synthetic resins	11	33, 036, 490	30, 660, 513	10, 393, 397
Synthetic tanning materials	2			
Research chemicals	3			
Miscellaneous products	1			

[1] Totals for synthetic tanning materials, research chemicals, and miscellaneous products not included.

INTERNATIONAL DYE TRADE

Previous issues of the Census of Dyes have discussed trends in international trade during pre-war years and through the post-war period up to 1929. This issue of the census considers major developments in 1929 of international importance and contains the latest available statistical data of exports and imports of the principal dye-producing and dye-consuming nations of the world.

The dye-producing nations have an installed capacity sufficient to produce about 40 per cent more than the world's annual consumption of dyes. This condition has resulted in severe international competition, which has been somewhat checked, however, among European producers by cartel arrangements allocating the world's markets, limiting production, and stabilizing prices. Germany, France, and Switzerland have consummated an agreement regulating their collective dye trade. Negotiations between the German and British dye producers have failed. The United States is not a party to any international cartel or combination.

The United States, Great Britain, Switzerland, and Italy extended their export dye trade in 1929, while Germany, France, and Japan

exported a lesser quantity of dyes than in the previous year. The universal trend toward increased production and consumption of fast dyes and the higher-priced specialties continued during 1929.

Official statistics of exports and estimates of production indicate that the German dye industry declined somewhat in 1929. These, however, do not present a complete picture of this nation's dye activities, because it either owns or controls dye plants in other countries, of which no exact appraisal can be made. The Interessen Gemei schaft Acktien Gesellschaft (hereinafter referred to as the I. G.) is the sole producer of dyes in Germany. The net earnings of this organization showed a decrease in 1929 as compared to the previous year. In addition to manufacturing coal-tar chemicals, the I. G. has expanded its production of fixed nitrogen, fertilizers, solvents, synthetic motor fuels, and other chemicals.

In Great Britain the production of dyes in 1929 was 9.6 per cent greater than in 1928. The Imperial Chemical Industries (Ltd.) showed an increase in net earnings in 1929. This corporation, formed by the merging of a number of units, is the outstanding British producer of chemicals. The long-continued patent litigation between the Imperial Chemical Industries and the I. G. concerning certain azo and monoazo dyes was terminated in favor of the English.

Switzerland increased her exports of dyes both in quantity and value in 1929. The increase in value was greater than the gain in quantity. This indicates further specialization in the high-priced specialty dyes by the Swiss manufacturers.

Italy's export trade in dyes increased decidedly in 1929. The unit value of exports declined because more of the lower-priced dyes were exported than in previous years.

Japan increased her production of dyes more than 8 per cent in 1928 as compared with 1927. The nation is endeavoring to become self sufficient in the production of indigo. It is reported that the Government will subsidize the Miike factory to the amount of 195,000 yen during the first calendar year. This establishment plans to make its own acetic acid and other chemicals used in the production of indigo.

In Spain the Royal Order of March 9, 1926, restricting the importation of dyes and certain other coal-tar chemicals, was revoked on March 5, 1930. A commission has been appointed to make a uniform interpretation of this revocation.

Synthetic Organic Chemicals Not Derived From Coal Tar

The production of synthetic organic chemicals other than those of coal-tar origin has developed into an industry of major economic importance owing to their use in several rapidly expanding industries, such as the lacquer and rayon industries, and to the increasing consumption of aliphatic chemicals in general. Since 1921 the production of these chemicals has increased from 21,545,186 pounds to 633,192,215 pounds, and sales have increased from 16,761,096 pounds, valued at $7,226,068, to 405,185,980 pounds, valued at $65,117,651. As compared with 1928, the quantities produced and sold have increased 64.65 and 57.61 per cent, respectively.

Solvents, such as butyl and amyl alcohols and acetates which are used in the manufacture of lacquers, are naturally the most important items of the noncoal-tar group, although products derived from ethylene and acetylene are rapidly increasing in both importance and number. The high-pressure synthesis of certain aliphatic chemicals from gases is assuming an important rôle. By this means we are now obtaining methanol from carbon monoxide, ethyl alcohol from ethylene, isopropyl alcohol from propylene, higher alcohols from hydrogen and carbon monoxide, and acetone from propylene.

Important chemicals showing marked increases in production in 1929 include acetaldehyde, acetic acid, citric acid, ethyl and methy chlorides, ethyl propionate, formic acid, isopropyl alcohol, methanol, tetraethyl lead, and triethanolamine.

New products of commercial value reported in 1929 for the first time include synthetic acetone from propylene, synthetic ethyl alcohol from ethylene, ethyl mercury chloride, isopropyl ether, and synthetic resins.

Table 2 shows the remarkable expansion of the synthetic organic chemicals not derived from coal tar.

TABLE 2.—*Synthetic organic chemicals of noncoal-tar origin: Production and sales, 1921–1929*

Year	Production (pounds)	Sales		Year	Production (pounds)	Sales	
		Pounds	Value			Pounds	Value
1921	21, 545, 186	16, 761, 096	$7, 226, 068	1926	214, 842, 513	168, 712, 158	$29, 719, 270
1922	79, 202, 155	50, 494, 494	11, 964, 074	1927	280, 992, 825	201, 548, 089	36, 600, 628
1923	90, 597, 712	67, 727, 067	13, 875, 521	1928	384, 564, 836	257, 077, 856	45, 928, 945
1924	115, 817, 865	85, 933, 461	20, 604, 717	1929	633, 192, 215	405, 185, 980	65, 117, 651
1925	156, 878, 013	114, 626, 209	23, 632, 779				

PART II

PRODUCTION OF DYES AND OF COAL-TAR CHEMICALS, 1929

Part II

PRODUCTION OF DYES AND OF COAL-TAR CHEMICALS 1929

Coal-Tar Crudes

Peak production of coke.—The total domestic production of coke in 1929 was 59,884,923[1] net tons, an increase of 13.5 per cent over the output in the previous year. This aggregate consisted of 53,411,923 tons of by-product coke, or 89.2 per cent of the total, and 6,473,000 tons of beehive coke, or 10.8 per cent of the total. For the first time since 1921 the rate of increase in beehive coke production exceeded that of by-product, 45 per cent as against 10.5 per cent.

Approximately 200 new by-product coke ovens were in operation in 1929. It was in the districts where these new ovens were added that production showed the highest rates of increase. The United States Bureau of Mines estimates[2] that 80 per cent of the total production of coke is used in blast furnaces; 12 per cent in domestic heating; 5 per cent in foundries; and 3 per cent in other industries. As coke is one of the best available substitutes for anthracite coal, it is in growing demand for household fuel.

In addition to their output of coke in 1929, by-product coke plants produced 680,864,366 gallons of tar; 200,594,027 gallons of crude light oil; 884,306 short tons of ammonium sulfate, an important nitrogenous fertilizer material, used extensively in this country and exported in large quantities to the Orient; 858,815,000,000 cubic feet of gas, widely used in towns and cities throughout the country for heating and lighting.

Prior to 1918 blast furnaces were fueled chiefly with beehive coke, but they have increased their consumption of by-product coke until now the beehive-coke industry is merely an auxiliary source of coke in the steel industry.

Table 3 shows the production of by-product and of beehive coke from 1913 to 1929, inclusive. The figures for 1929 are not final. Those for by-product coke are taken from preliminary reports of the Bureau of Mines; those for beehive coke are estimates based on the number of cars loaded for shipment.

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[1] Preliminary figures.

[2] Coke and by-products in 1928, Bureau of Mines.

TABLE 3.—*By-product and beehive coke: Production in the United States, 1913–1929*

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
1914	11,219,943	23,335,971	34,555,914	32.5	67.5
1915	14,072,895	27,508,255	41,581,150	33.8	66.2
1916	19,069,361	35,464,224	54,533,585	35.0	65.0
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	33,983,568	10,286,037	44,269,605	76.8	23.2
1925	39,912,159	11,354,784	51,266,943	77.9	22.1
1926	44,376,586	12,488,951	56,865,537	78.0	22.0
1927	43,884,726	7,207,417	51,092,143	85.9	14.1
1928 [1]	48,313,025	4,492,803	52,805,828	91.5	8.5
1929 [2]	53,411,923	6,473,000	59,884,923	89.2	10.8

[1] Revised since last report. [2] Preliminary figures.

Total production of tar.—The total production of coke-oven and coal-gas tar in 1929 was 736,864,366 gallons, an increase of 7 per cent over the output in 1928. Sales of tar from both sources in 1929 were 384,057,501 gallons, or about 52 per cent of the amount produced.

Table 4 shows the production of coal tar from all sources and the quantity and value of sales from 1918 to 1929, inclusive.

TABLE 4.—*Coke-oven, coal-gas, water-gas, and oil-gas tar: Production and sales in the United States, 1918–1929*

[Compiled by the Bureau of Mines 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 [1]	Coal-gas tar [2]	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	53,146,421	342,048,160	[3] 105,318,339
1920	360,664,124	51,264,956	411,929,080	116,073,907
1921	253,051,649	[4]	309,051,649	[5]
1922	327,779,734	48,082,228	375,861,962	104,555,028
1923	440,907,109	[4]	493,407,109	[5]
1924	422,074,326	[4]	475,074,326	[5]
1925	480,848,814	[4]	534,848,814	[5]
1926	529,486,374	[4]	583,486,374	[5]
1927	546,859,205	[4]	600,859,205	[5]
1928	631,844,767	[4]	688,344,767	[5]
1929 [6]	680,864,366	[4]	736,864,366	[5]
Sales (gallons):				
1918	200,233,002	47,727,839	247,960,841	55,283,484
1919	217,707,157	49,307,852	267,015,009	[3] 58,557,947
1920	174,363,696	46,604,133	220,967,829	59,238,730
1921	135,293,047	51,976,307	187,269,354	[3] 53,432,945
1922	162,204,417	41,266,074	203,470,491	47,338,489
1923	211,739,469	47,840,512	259,579,981	[3] 49,990,820
1924	209,979,999	[4]	258,479,999	[5]
1925	240,160,986	49,175,979	289,336,965	[3] 61,471,124
1926	277,248,522	[4]	326,248,522	[5]
1927	305,898,176	51,266,279	357,164,455	[3] 83,479,339
1928	332,150,270	[4]	383,150,270	[5]
1929 [6]	333,557,501	[4]	384,057,501	[5]

[1] Includes tar produced in by-product coke ovens operated by city gas companies.
[2] The figures here given for coal-gas tar include only the operations of coal-gas retorts. For 1918, 1920, and 1922 they are taken from special studies by the U. S. Geological Survey. For 1919, 1921, 1923, 1925, and 1927 revised census figures are used, obtained by subtracting from the totals for the manufactured gas industry, as published by the Bureau of the Census, the tar produced at by-product coke ovens operated by city gas companies.
[3] As reported by the Bureau of the Census.
[4] Estimate included in total, based upon reported sales.
[5] No data.
[6] Preliminary figures.

TABLE 4.—*Coke-oven, coal-gas, water-gas, and oil-gas tar: Production and sales in the United States, 1918–1929*—Continued

	Coke-oven tar	Coal-gas tar	Total coal tar	Water and oil gas tar
Value of sales:				
1918	$6,364,972	$1,863,580	$8,228,552	$1,805,865
1919	6,918,549	2,156,471	9,075,020	[3] 2,012,723
1920	6,378,040	2,010,186	8,388,226	2,109,388
1921	5,645,309	2,811,728	8,457,037	[3] 2,192,015
1922	6,419,743	1,955,950	8,375,693	1,879,490
1923	9,250,552	2,461,691	11,712,243	[2] 2,001,363
1924	9,623,520	[4]	12,293,520	[5]
1925	11,903,196	2,750,719	14,653,915	[3] 2,594,025
1926	14,103,760	[4]	16,803,760	[5]
1927	16,095,478	2,923,819	19,019,297	[3] 3,768,464
1928	17,544,797	[4]	20,454,797	[5]
1929 [6]	16,982,406	[4]	19,862,406	[5]

[3] As reported by the Bureau of the Census.
[4] Estimate included in total, based upon reported sales.
[5] No data.
[6] Preliminary figures.

Table 5 shows the ratio of sales to production of coke-oven tar from 1918 to 1929, inclusive.

TABLE 5.—*Coke-oven tar: Production in the United States and percentage sold and used, 1918–1929*

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

Year	Coke-oven tar			Year	Coke-oven tar		
	Gallons produced	Per cent sold	Per cent used [1]		Gallons produced	Per cent sold	Per cent used [1]
1918	263,299,470	76.0	24.0	1924	422,074,326	49.6	50.4
1919	288,901,739	75.4	24.6	1925	480,848,814	49.9	50.1
1920	360,664,124	48.3	51.7	1926	529,486,374	52.4	47.6
1921	253,051,649	53.5	46.5	1927	546,859,205	55.9	44.1
1922	327,779,734	49.5	50.5	1928	631,844,767	52.6	47.4
1923	440,907,109	48.0	52.0	1929 [2]	680,864,366	50.6	49.4

[1] The percentage "used" consists largely of tar consumed in steel furnaces; this percentage would be still larger if deliveries by the coke-oven company to a separate but affiliated corporation were included. Such deliveries are usually reported as "sales" but can not be accurately separated. From general information it appears that in 1929 they amounted to about 6 per cent of the total production. Were they counted as "used" the percentage would be 55.4 and the percentage sold would be 44.6. Since 1927, however, a number of coke-oven plants have begun to treat their own tar for the recovery of creosote oil, and in 1929 a total of 43,000,000 gallons was refined on the premises. In computing these percentages no account is taken of changes in stocks.
[2] Preliminary figures.

Uses of tar.—Tar is used in its raw state, or as raw material for many products having wide commercial uses.

Raw or dehydrated tar is used chiefly for fuel, about 50 per cent of the total output in 1929 serving this purpose. Open-hearth steel manufacture consumes more fuel tar than any other industry. The quantity of tar burned is governed largely by the price of fuel oil and the demand from manufacturers of coal-tar chemicals.

Minor uses of raw tar are: (1) In mixture with creosote oil as a wood preservative, (2) in stone work and road construction material, (3) as a waterproofing material for brick and other masonry, (4) as a dust settler, and (5) as a protective coating. Specially prepared pitch paints are more weather resistant than raw tar and, consequently, are better for surface coatings.

Modified and refined tars are used in roofing felts and in tar paper.

Distillates of tar.—On distillation tar yields two general groups of products: (1) Complex fractional distillates commercially designated as light oil, dead or creosote oil, solvent naphtha, and anthracene oil; (2) coal-tar crudes, such as benzene, toluene, naphthalene, anthracene, and the less important cumene, carbazol, the cresols, and pyridine. After purification these crudes are used in the manufacture of coal-tar intermediates, which in turn are used in the preparation of dyes or other coal-tar chemicals, and directly as rubber accelerators.

The domestic production of crudes at by-product coke-oven operations is reported to the Bureau of Mines; production by firms engaged primarily in the distillation of tar is reported to the Tariff Commission. Where tar-distilling operations were limited to recovery of the simpler materials and were conducted in conjunction with coke-oven plants, under the same corporate name, the Bureau of Mines collected and compiled the statistics for 1929. Where distillation was carried on by a separate corporation, reports were made to the Tariff Commission. For certain plants equipped to produce a complete run of refined tar products in coke-oven operations, the Bureau of Mines gathered the data on the production of creosote oil and pitch, together with standard light oil products—benzene, motor benzol, toluene, solvent naphtha, xylene, and naphthalene, and the Tariff Commission, on the production of phenol and cresylic acid.

Table 6 shows the domestic production of certain coal-tar crudes from all sources, 1918–1929, inclusive.

TABLE 6.—*Total commercial production of benzene, toluene, solvent naphtha, naphthalene, and creosote oil from all sources in the United States, 1918–1929*

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

	By-product coke plants (sales) [1]	Gas works not elsewhere included (sales) [1] [2]	Tar refineries and all other establishments [3] (production)	Total commercial production [4]
Benzene (all grades except motor benzol): Gallons—				
1918	43,441,980	2,177,168	3,015,848	48,634,996
1919	[5] 63,077,463	(6)	1,826,373	65,403,836
1920	17,230,776	(6)	875,561	18,141,337
1921	6,839,021	(6)	2,171,631	9,045,642
1922	12,256,348	(6)	774,940	13,071,288
1923	16,724,182	(6)	394,906	17,154,088
1924	17,740,608	(6)	629,934	18,417,542
1925	21,816,386	(6)	741,576	22,607,962
1926	21,987,790	(6)	377,048	22,374,838
1927	21,193,807	(6)	370,782	21,579,589
1928 [7]	21,452,973	(6)	474,457	21,942,430
1929 [8]	24,558,745	(6)	546,268	25,119,013

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

[2] In order to eliminate duplication, the figures for gas works are exclusive of by-product coke ovens operated by city gas companies, which are included in the preceding column, and exclusive of recoveries from such tar-refining operations conducted by the city gas companies as are included in the column headed "tar refineries." From time to time plants formerly included in the column headed "gas works" have been transferred to the column "tar refineries," hence the figures in the "gas works" column are not strictly comparable from year to year. The total commercial production shown in the last column contains no duplication and is comparable from year to year.

[3] See note 2.

[4] Totals include estimates for firms not reporting, and actual figures for items that can not be shown separately without disclosing individual returns.

[5] Includes motor benzol and 13,000 gallons of gasoline used in blending.

[6] Reports incomplete. Estimate included in total.

[7] Final figures.

[8] Subject to revision.

TABLE 6.—*Total commercial production of benzene, etc.*—Continued

	By-product coke plants (sales)	Gas works not elsewhere included (sales)	Tar refineries and all other establishments (production)	Total commercial production
Benzene (all grades except motor benzol)—Con.				
Value—				
1918	$11,966,367	$572,950	$994,161	$13,533,478
1919	[5] 11,643,645	[6]	560,547	12,296,192
1920	4,497,823	[6]	287,586	4,794,409
1921	1,611,721	[6]	463,205	2,082,926
1922	3,435,381	[6]	215,136	3,664,517
1923	3,839,237	[6]	118,505	3,968,742
1924	3,736,656	[6]	155,973	3,901,629
1925	4,888,240	[6]	171,005	5,070,245
1926	5,067,693	[6]	105,513	5,175,206
1927	4,371,519	[6]	100,453	4,474,972
1928 [7]	4,215,752	[6]	111,805	4,330,557
1929 [8]	5,169,743	[6]	137,364	5,310,107
Motor benzol:				
Gallons—				
1918				
1919 (included under benzene above)			[9]	[9]
1920	[10] 55,764,265	467,126	[9]	[9]
1921	50,022,573	[11] 350,000	[9]	[9]
1922	54,930,203	[12]	[12]	55,622,482
1923	80,480,326	[6]	[12]	83,664,846
1924	72,921,244	[6]	[12]	76,072,771
1925	80,957,983	[6]	[12]	84,789,206
1926	89,501,212	[6]	[12]	92,891,995
1927	86,802,745	[6]	[12]	90,160,367
1928 [7]	102,935,995	[6]	[12]	106,574,289
1929 [8]	100,807,852	[6]	[12]	102,810,061
Value—				
1918				
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	13,145,833	[6]	[12]	13,851,704
1924	11,066,652	[6]	[12]	11,678,665
1925	13,441,422	[6]	[12]	14,270,746
1926	16,863,109	[6]	[12]	17,578,255
1927	14,629,999	[6]	[12]	15,201,144
1928 [7]	16,832,646	[6]	[12]	17,388,166
1929 [8]	16,063,285	[6]	[12]	16,407,442
Toluene, all grades:				
Gallons—				
1918	8,541,366	3,965,518	1,596,353	14,103,237
1919	1,353,827	[6]	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	2,634,783	[11] 2,000	[13]	[13]
1924	3,231,502	[11] 2,000	[13]	[13]
1925	5,038,147	[11] 2,000	[13]	[13]
1926	8,650,605	[11] 200	[13]	[13]
1927	11,784,984	[11] 1,000	[13]	[13]
1928 [7]	16,181,650	[11] 1,000	[13]	[13]
1929 [8]	17,064,206	[11] 1,000	[13]	[13]
Value—				
1918	$12,249,702	$5,597,353	$8,044,890	$20,891,945
1919	355,990	[6]	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	766,030	[11] 570	[13]	[13]
1924	769,682	[11] 500	[13]	[13]
1925	1,310,786	[11] 500	[13]	[13]
1926	2,914,752	[11] 170	[13]	[13]
1927	3,999,820	[11] 300	[13]	[13]
1928 [7]	5,513,624	[11] 300	[13]	[13]
1929 [8]	6,580,176	[11] 300	[13]	[13]

[5] Includes motor benzol and 13,000 gallons of gasoline used in blending.
[6] Reports incomplete. Estimate included in total.
[7] Final figures.
[8] Subject to revision.
[9] Data not collected from tar refiners prior to 1922.
[10] Includes 1,333,000 gallons of gasoline used in blending.
[11] Estimate.
[12] Included in total, but can not be shown separately without disclosing individual returns.
[13] A certain quantity of toluene was produced, but the figures can not be given without disclosing individual returns.

TABLE 6.—*Total commercial production of benzene, etc.*—Continued

	By-product coke plants (sales)	Gas works not elsewhere included (sales)	Tar refineries and all other establishments (production)	Total commercial production
Solvent naphtha, crude and refined, including xylene:				
Gallons—				
1918	3,284,037	1,442,267	965,458	5,691,762
1919	3,649,066	[6]	[12]	4,128,747
1920	4,695,464	[6]	[12]	5,384,560
1921	2,881,656	[6]	[12]	3,627,488
1922	2,861,482	[12]	[12]	3,680,811
1923	3,399,904	[6]	[12]	4,041,497
1924	3,884,585	[6]	812,378	4,781,963
1925	3,993,735	[6]	530,833	4,609,568
1926	3,546,117	[6]	[12]	4,588,844
1927	3,661,970	[6]	[12]	4,536,967
1928 [7]	4,471,141	[6]	[12]	5,615,192
1929 [8]	6,581,047	[6]	[12]	7,896,802
Value—				
1918	$458,689	$191,475	$232,003	$882,167
1919	557,416	[6]	[12]	672,685
1920	851,048	[6]	[12]	994,205
1921	510,509	[6]	[12]	644,548
1922	538,512	[12]	[12]	773,336
1923	608,084	[6]	[12]	800,698
1924	724,874	[6]	153,941	896,815
1925	805,251	[6]	148,801	972,052
1926	1,035,870	[6]	[12]	1,174,297
1927	926,787	[6]	[12]	1,072,198
1928 [7]	1,047,095	[6]	[12]	1,201,882
1929 [8]	1,591,333	[6]	[12]	1,773,119
Naphthalene:				
Pounds—				
1918	15,890,447	896,080	40,138,092	56,924,619
1919	6,702,040	[6]	12,612,203	20,114,243
1920	14,448,762	1,760,293	26,393,411	42,602,466
1921	1,983,523	[6]	16,949,464	19,432,987
1922	4,887,935	[6]	19,323,393	25,411,328
1923	11,245,633	1,115,563	41,453,002	53,814,195
1924	8,219,073	[6]	34,683,803	44,102,878
1925	9,900,517	1,266,037	34,135,175	45,301,726
1926	7,723,223	[6]	45,165,957	53,059,189
1927	7,848,224	[6]	45,298,441	53,176,660
1928 [7]	10,937,429	[6]	35,179,996	46,157,425
1929 [8]	19,442,381	[6]	19,501,679	38,984,060
Value—				
1918	$650,229	$14,282	$1,281,440	$1,945,951
1919	191,364	[6]	327,201	542,565
1920	487,974	63,449	791,403	1,342,826
1921	59,335	[6]	380,167	462,502
1922	131,252	[9]	352,957	536,209
1923	239,709	42,247	652,148	934,104
1924	128,208	[6]	441,333	602,541
1925	97,493	34,751	519,773	652,017
1926	97,310	[6]	494,986	594,296
1927	86,078	[6]	470,806	557,884
1928 [7]	135,693	[6]	395,059	531,752
1929 [8]	319,037	[9]	366,491	686,528
Creosote oil:[14]				
Gallons—1928 [7]	[15] 12,386,000		122,074,126	134,460,126
1929 [8]	26,730,126		143,746,832	170,476,958
Value—1928 [7]	[6]		$15,894,588	$17,507,588
1929 [8]	$2,566,092		17,020,595	19,586,687

[6] Reports incomplete. Estimate included in total.
[7] Final figures.
[8] Subject to revision.
[12] Included in total, but can not be shown separately without disclosing individual returns.
[14] Prior to 1928, all the creosote oil reported produced came from the "Tar refineries, etc." Beginning with 1928 considerable quantities were recovered at by-product coke plants.
[15] Figures represent production.

Production of crudes in by-product coke ovens.—The output of leading coal-tar crudes in by-product coke-oven operations in 1929 was as follows: Crude light oil, 200,594,027 gallons, an increase of 11,996,071 gallons over the output in 1928; motor benzol, 105,923,762 gallons, or 2,871,862 gallons more than were produced in 1928; crude and refined toluene, 18,343,295 gallons as against 16,097,856 gallons in the previous year.

Motor benzol is a partly refined light oil, usually blended with gasoline or gasoline and alcohol for motor fuels. More than 95 per cent of the total quantity produced in 1929 was sold at an average value of 15.9 cents per gallon.

In recent years several coke-oven plants have been recovering crude phenol from crude ammonia liquors by extraction with benzene and subsequent treatment with caustic soda. Four producers reported about 85,000 gallons so recovered in 1929.

Through the installation of additional stills during 1929, this country is now able to produce creosote oil in excess of domestic demands. Many of the stills installed are of a new type, internally heated by coke-oven gases. Their output in 1929 is largely responsible for the increased production of creosote oil by coke-oven plants, amounting to 26,730,126 gallons, or more than twice the output in the preceding year. For every ton of coal coked by the new process the average yield of tar is reported to be 8 gallons, which will produce from 5½ to 6 gallons of creosote oil.

In the purification of coke-oven gas a finely divided, almost colloidal sulfur, valuable as a contact insecticide, is obtained as a by-product.

Table 7 shows the production of crudes obtained as by-products in coke-oven operations, 1927-1929, inclusive.

TABLE 7.—*Coal-tar crudes obtained as by-products in coke-oven operations, 1927–1929*

[Bureau of Mines]

Product	Production	Sales		
		Quantity	Value	
			Total	Average
1927				
Tar.....gallons..	546, 859, 205	305, 898, 176	$16, 095, 478	$0. 053
Light oil and derivatives:				
Crude light oil.....do....	[1] 164, 488, 233	9, 265, 948	1, 077, 957	.116
Benzol, crude and refined.....do....	22, 007, 760	21, 193, 807	4, 371, 519	.206
Motor benzol.....do....	86, 995, 343	86, 802, 745	14, 629, 999	.169
Toluol, crude and refined.....do....	12, 093, 590	11, 784, 984	3, 999, 820	.339
Solvent naphtha (including xylol)...do....	4, 979, 736	3, 661, 970	926, 787	.253
Other light oil products.....do....	3, 155, 031	1, 393, 876	147, 017	.105
	[2] 129, 231, 460	134, 103, 330	25, 153, 099	.188
Naphthalene, crude.....pounds..	8, 302, 845	7, 818, 224	86, 078	.011

[1] Refined on the premises to make the derived products shown: 1927, 161,072,729 gallons of crude light oil; 1928, 182,998,384 gallons; 1929, 192,759,303 gallons.
[2] Total gallons of derived products.

TABLE 7.—*Coal-tar crudes obtained as by-products in coke-oven operations, 1927–1929*—Continued

Product	Production	Sales		
		Quantity	Value	
			Total	Average
1928 [3]				
Tar—gallons	631,844,767	332,150,270	$17,544,797	$0.053
Light oil and derivatives:				
Crude light oil—do	[1] 188,597,956	10,334,813	1,158,846	.112
Benzol, crude and refined—do	21,451,748	21,452,973	4,215,752	.197
Motor benzol—do	103,051,900	102,935,995	16,832,646	.164
Toluol, crude and refined—do	16,097,856	16,181,650	5,513,624	.341
Solvent naphtha (including xylol)—do	5,587,370	4,471,141	1,047,095	.234
Other light oil products—do	3,114,531	1,388,106	111,844	.081
	[2] 149,303,405	156,764,678	28,879,807	.184
Naphthalene, crude and refined—pounds	12,182,143	10,937,429	135,693	.012
Creosote oil—gallons	12,386,000	7,377,816	910,318	
Phenol—do	57,794	66,607		
Pitch of tar—net tons	54,131	1,725		
Other products [4]				
1929 [3] [5]				
Tar—gallons	680,864,366	333,557,501	16,982,406	.051
Light oil and derivatives:				
Crude light oil—do	[1] 200,594,027	11,090,709	1,374,527	.124
Benzol, crude and refined—do	28,832,002	24,558,745	5,169,743	.211
Motor benzol—do	105,923,762	100,807,852	16,063,285	.159
Toluol, crude and refined—do	18,343,295	17,064,206	6,580,176	.386
Solvent naphtha (including xylol)—do	7,131,111	6,581,047	1,591,333	.242
Other light oil products—do	6,684,568	1,886,362	126,183	.067
	[2] 166,914,738	161,988,921	30,905,247	.191
Naphthalene, crude and refined—pounds	19,595,548	19,442,381	319,037	.016
Creosote—gallons	26,730,126	23,938,431	2,296,862	.096
Phenol (crude)—do	84,683	78,869	28,347	.359
Pitch or tar—net tons	88,158	5,599	27,273	4.871
Other products [4]			129,848	

[1] Refined on the premises to make the derived products shown: 1927, 161,027,729 gallons of crude light oil; 1928, 182,998,384 gallons; 1929, 192,759,303 gallons.
[2] Total gallons of derived products.
[3] Includes products of tar distillation conducted by coke-oven operators under same corporate name, excepting, however, phenol and other tar acids produced at Clairton, Pa., which are covered elsewhere by report of the U. S. Tariff Commission.
[4] Sodium prussiate, carbolate, sulfur, smoke compound, textile covering, and tar paint.
[5] Preliminary figures.

Production of crudes by firms not primarily engaged in the operation of coke-oven plants.—Returns to the Tariff Commission by firms engaged primarily in distilling tar show that 367,340,281 gallons of tar were distilled in 1929. This was approximately 50 per cent of the total production of tar in that year and about 31,000,000 gallons in excess of the quantity distilled in 1928. As in 1928, dead or creosote oil was the chief distillate produced in 1929.

Coal-tar creosote.—The total commercial production of coal-tar creosote in 1929 from all sources was 170,476,958 gallons, valued at $19,586,687, or 11.5 cents per gallon, as against 134,460,126 gallons, valued at $17,507,588, or 13 cents per gallon in 1928. Of the 170,476,958 gallons produced in 1929, tar refineries produced 143,746,832 gallons, or 21,673,000 gallons more than they produced in 1928. The production of creosote oil reported to the Tariff Commission was

101,409,233 gallons of distillate as such and 42,337,599 gallons in coal-tar solution.

Increased domestic production and reduced prices are largely responsible for the decline in imports from 88,385,074 gallons in 1928 to 77,100,896 gallons in 1929. The average invoice price per gallon fell from 15.7 cents in 1928 to 13 cents in 1929.

As a wood preservative, coal-tar creosote is finding increasing applications in the treatment of railway ties, telegraph poles, mine and construction timbers, and other wood products. Its major advantages are (1) high toxicity to wood-destroying fungi, (2) relative insolubility in water and low volatility which cause almost indefinite retention in the treated wood, (3) ease of application, (4) ease of measuring the depth of penetration, (5) general availability and nominal cost.

Although there were six more wood-treating plants in 1928 than in 1927 (193 as compared with 187) the volume of business was larger in 1927. The quantity of wood treated was 335,920,379 cubic feet or 9,765,425 cubic feet less than was treated in 1927. The decrease is attributed largely to a substantial reduction in the number of cross-ties treated in 1928. A total of 220,478,409 gallons [3] of creosote was used in wood treatment in 1928. It consisted of 48,805,428 gallons of distillate coal-tar creosote, 87,212,477 gallons of creosote coal-tar solution, 820,421 gallons of refined water-gas tar, 1,485,352 gallons of water-gas tar solution, and 82,154,731 gallons of imported creosote.

Other materials used in wood preservatives in 1928 were: Petroleum, 25,075,903 gallons; paving oil, 2,347,517 gallons; solid zinc chloride, 23,524,340 pounds; miscellaneous salts, 443,308 pounds; miscellaneous liquid preservatives, 417,953 gallons.

Decline in production of naphthalene.—The output of naphthalene decreased from 35,179,996 pounds in 1928 to 19,501,679 pounds in 1929. Profits were low during 1929, as the limited demand forced producers to sell at a price near the actual cost of production.

Pitch and other products.—Pitch is the residue from the distillation of tar. The total production in 1929 was 646,536 tons, of which 558,378 tons, valued at $8,198,124, was produced by plants primarily engaged in the distillation of tar. Because of its resistance to atmospheric conditions, particularly to moisture, pitch is extensively used as a waterproofing material in roof construction, building foundations, and railways, and as a protective coating for underground pipe lines. Extensive installation of new pipe lines has increased the consumption of pitch and other coal-tar materials for surface coatings. Soft pitch is used in large quantities for road construction. Metal paints consist of pitch dissolved in certain light coal-tar oils.

Refined tar is the residue from the distillation of a varying proportion of the lower boiling products made from crude tar. Production in 1929 was 2,440,748 barrels, as compared with 1,640,282 barrels in 1928.

Other distillates showing increased production in 1929 were crude anthracene, anthracene oil, extracted crude tar acids, light oil, and solvent naphtha. Those showing decreased output were napthalene, motor fuel, pseudocumene, and xylene.

[3] Quantities of wood treated and preservatives used in United States in 1928. Forest Service, U. S. Department of Agriculture.

Table 8 shows the production of coal-tar crudes in 1929 by firms not primarily engaged in the operation of coke-oven plants and gas houses.

TABLE 8.—*Coal-tar crudes: Production, 1929, 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 p. 188. 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 figures can not be published without revealing the output of individual firms]

Name	Manufacturers' identification numbers (according to list on p. 188)	1929		
		Quantity	Value	Unit value
Total crudes			$40, 310, 326	
Anthracene, crude (less than 30 per cent)—pounds.	134			
Anthracene oil—gallons	127, 134			
Benzene (benzol)—do	17, 24, 123, 127, X	546, 268	137, 364	$0. 25
Carbolic oil or middle oil—do	45, 88, X, X	214, 574	27, 060	. 13
Cresol or cresylic acid, crude—do	17			
Dead or creosote oil:				
Distillate as such—do	12, 15, 17, 24, 43, 45, 85, 88, 127, 134, 144, 154, 159, X, X, X, X, X, X, X.	101, 409, 233	12, 789, 189	. 13
Distillate in coal-tar solution—gallons.	17, 85, X, X	42, 337, 599	4, 231, 406	. 10
Light oil—gallons	43, 45, 88, 127, 154, X, X, X, X			
Motor fuel—do	17, 123			
Naphthalene, crude—pounds	12, 16, 17, 88, 123, 134, X, X	19, 501, 679	366, 491	. 02
Other distillates—gallons	17, 24, 43, 88, 127, 154, X, X, X, X.	10, 007, 225	1, 322, 889	. 13
Pitch of tar—tons	12, 15, 17, 24, 43, 45, 85, 127, 134, 144, 154, X, X, X, X, X, X, X.	558, 378	8, 198, 124	14. 68
Pseudocumene—gallons	17			
Pyridine—do	17			
Refined tars—barrels	12, 17, 24, 45, 88, 123, 134, 144, X X, X, X, X, X, X, X, X.	2, 440, 748	11, 537, 899	4. 73
Solvent naphtha—gallons	17, 134, X, X, X	1, 259, 904	157, 912	. 13
Toluene (toluol)—do	17, 123			
Xylene (xylol)—do	17			

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 oil, 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.

Imports of crudes.—Imports are given in Table 78, page 179.

Exports of crudes.—Benzol was the crude exported in greatest quantity in 1929. Foreign shipments were 33,346,381 gallons, valued at $8,536,878, an increase of 12,007,952 gallons over 1928. Of this total, Germany took 17,828,355 gallons, or 7,004,029 gallons more than in 1928; the United Kingdom, 9,251,276 gallons, or 2,692,090 gallons in excess of the quantity bought in 1928; the Netherlands and Italy, neither a customer in 1928, took 1,921,733 gallons, and, 1,030,-387 gallons, respectively.

Exports of crude coal tar declined from 138,153 barrels, valued at $580,629 in 1928 to 108,537 barrels, valued at $389,216 in 1929. Foreign shipments of coal-tar pitch were 9,805 tons, valued at $204,047.

Low temperature carbonization of coal.—A venture that has some promise but which has thus far not proved an economic success in

this country is the low temperature carbonization of coal on a commerical scale. Unforeseen technical difficulties in coking American coal, inability to produce a solid fuel for sale at a favorable price without briquetting, and failure to obtain a market for the tar at a price much above its value as fuel, are obstacles to be overcome before successful commercial production is possible.

COAL-TAR INTERMEDIATES

DESCRIPTION

Intermediates are ordinarily transitional compounds used in the manufacture of dyes and other finished coal-tar chemicals from coal-tar crudes. They are, however, frequently used directly as such in rubber accelerators, in camphor substitutes, in germicides, in insecticides and fungicides, and in flotation compounds for the concentration of ores. Others are used in the direct production of dyes on the fiber, and as developers for increasing the fastness of dyes. After purification many intermediates are used directly as drugs, perfumes, and flavors.

Various chemical treatments are necessary to produce intermediates from the crudes (benzene, toluene, naphthalene, and anthracene). These conversion steps are: (1) Nitration, (2) reduction, (3) sulfonation, (4) caustic fusion, (5) chlorination, (6) alkylation, (7) liming, (8) condensation, (9) carboxylation, (10) oxydation, and (11) diazotization.

The intermediate and coal-tar dye industry is an important consumer of heavy chemicals and other noncoal-tar chemical products. The conversion of coal tar into finished products requires large quantities of acids, alkalies, sodium nitrite and sulfide, salt, chlorine, bromine, and sulfur. Noncoal-tar organic chemicals used in large quantities are methanol, formaldehyde, and acetic anhydride. It is estimated that from 12 to 15 pounds of heavy chemicals are used in the manufacture of each pound of finished coal-tar products. Some of the anthraquinone vat dyes require 80 pounds or more of inorganic chemicals per pound of dye.

PRODUCTION

Statistics of production and sales of intermediates are given in Table 10, page 29, in as great detail as possible without disclosing the operations of individual manufacturers. The total production in 1929 was 354,487,718 pounds, as compared with 279,274,807 pounds in 1928, or an increase of 27 per cent. Sales advanced in about the same proportion as did production. Total sales in 1929 were 148,711,591 pounds, valued at $28,871,572, or 19.4 cents per pound, as against 115,837,340 pounds, valued at $24,126,473, or 20.8 cents per pound in the previous year.

In general the intermediates normally consumed in large quantities in the manufacture of dyes showed a decided increase in 1929 over 1928, and the intermediates used in the preparation of fast and specialty dyes were well above the 1928 level.

Diphenyl and derivatives.—Production of diphenyl, first reported in 1928, increased substantially in 1929. In addition to its use as a heat transfer agent, important applications for its chlorinated, nitrated,

and sulfonated derivatives, and for diphenyl benzene or phenyldiphenyl, are being developed. These uses include the manufacture of new intermediates for new types of dyes and provide new raw materials for the established intermediates. The chlorinated diphenyls are being used for a new type of synthetic resin valuable for the manufacture of varnishes and lacquers. Production of these derivatives on a semicommercial scale in 1929 is expected to be on a commercial basis in 1930.

Synthetic phenol.—The combined production of natural and synthetic phenol in 1929 was 24,177,618 pounds,[4] as compared with 10,227,489 pounds [4] in 1928. More than 80 per cent of total production was by synthetic methods. Sales in 1929 were 19,938,503 pounds, valued at $2,248,288, or 11 cents per pound as against 7,745,650 pounds, valued at $912,304, or 12 cents per pound in the previous year.

This marked increase in the production and sales of phenol is largely due to the unusual increase in the output of synthetic phenolic resins, which require large quantities of phenol as a raw material. These resins are discussed under "Finished coal-tar products," p. 59. Other important uses of phenol are as an antiseptic and as a disinfectant; as a raw material in the manufacture of picric acid; as an intermediate in the manufacture of coal-tar dyes, and as a constituent of certain pharmaceuticals.

There are two methods of manufacturing phenol: (1) Either (*a*) from one of the fractions obtained in the distillation of coal tar, or (*b*) from the manufacture of coal gas; (2) synthetically from benzene, distilled from coal tar. The synthetic process has shown continuous expansion since 1923, when it was developed on a large scale.

A new method of synthesizing phenol from monochlorobenzene, now developed on a large scale in this country, shows promise of further reducing production costs. This development was largely responsible for the unusual increase in the production of monochlorobenzene in 1929.

Imports of phenol increased from 1,653 pounds, valued at $298, in 1928 to 433,385 pounds, valued at $44,226, in 1929. Practically all of the imports in 1929 were entered during the first six months of that year.

Cresylic acid.—Cresylic acid is obtained by refining the crude tar-acid fractions from the distillation of coal tar. It occurs with phenol and the two products are separated from the crude-tar fraction by extraction with caustic soda solution and fractional distillation. A major use of cresylic acid is as a raw material in the manufacture of synthetic resins. Other uses are in the preparation of tricresyl phosphate, a substitute for camphor in the manufacture of pyroxylin plastics; and in germicides, antiseptics, and similar products. Production of cresylic acid increased materially in 1929 over 1928.

Tricresyl phosphate.—Tricresyl phosphate, used in the manufacture of pyroxylin plastics, increased in production, but declined in unit value.

Rubber accelerators.—Intermediates for use as rubber accelerators were made in larger quantity in 1929 than in 1928, but their total

[4] Does not include crude phenol reported to Bureau of Mines by certain coke-oven operators.

consumption in the rubber trade can not be accurately measured because some of the reported output was also used in dyes and other coal-tar products.

Accelerators and antioxidants have played a conspicuous part in the advancement of rubber compounding. They reduce the time of vulcanization and increase the resistance of rubber and rubber products to ageing. This branch of manufacture is an important division of the coal-tar industry in the United States. New compounds are being constantly prepared and the older ones are either discontinued or improved to meet changing conditions in the rubber industry.

The following compounds used as rubber accelerators are among those showing increased production in 1929 over 1928: Dimethylaniline, acetaldehyde, aniline and derivatives, diphenylguanidine, nitrosodimethylaniline, mercapto-benzo-thiazole, p-toluidine, dimethylamine, formanilide, thiocarbanilide, p-dimethylamino-butylidine aniline, and phenyl-b-naphthylamine. Some of the compounds showing decreased production are crotilidine aniline, o-ditolylguanidine, triphenylguanidine, anhydroformaldehyde-p-toluidine, crotilidine-a-naphthylamine, and dimethyl-p-phenylenediamine.

Aniline and derivatives.—The production of aniline increased from 29,770,194 pounds in 1928 to 33,743,270 pounds in 1929. The value of sales per pound dropped from 13½ cents in 1928 to 13 cents in 1929. The output of aniline hydrochloride was slightly more in 1929 than in 1928.

Dimethylaniline increased in production in 1929 and the value of sales per pound was 21 cents as compared with 23 cents in 1928.

Other aniline derivatives showing increased output in 1929 were aniline disulfonic acid, dichloroaniline, ethylaniline (mono), sulfanilic acid, acetanilide (technical), aniline sulfonic acid, methylene dianilide, and m-nitroaniline. Some of the aniline compounds showing decreased production during the same period were diethylaniline, diethylaniline-m-sulfonic acid, aniline sulfate, and dinitroaniline.

Naphthalene.—The production of refined naphthalene was 31,143,716 pounds in 1929 as against 24,992,092 pounds in the previous year. In general, the derivatives of naphthalene were manufactured in greater quantity in 1929 than in 1928. Among those showing increased production were phthalic acid and anhydride, a-naphthylamine, and most of the anthraquinone derivatives.

Phthalic anhydride.—Phthalic anhydride, one of the most important of the intermediates, is made by the catalytic oxidation of naphthalene. Its principal uses are as a raw material for anthraquinone, which is used in the manufacture of many vat dyes, alizarin, and alizarin derivatives; directly in making fluoroscein, eosine, and rhodamine dyes; in the manufacture of such esters as diethylphthalate and dibutylphthalate, and as condensation product with glycerin to form the glyptal type of synthetic resin.

Anthraquinone.—Anthraquinone is the basic raw material for certain vat dyes. The bulk of the supply in recent years has been prepared synthetically from phthalic anhydride and benzene. This synthetic product is of high purity and consequently gives dyes of purer shade than those made by the oxidation of anthracene. Improvements in the method of deriving anthraquinone from anthra-

cene promise to give a better product at lower cost. One of these improvements is the removal of heterocyclic and aliphatic impurities by catalytic oxidation; the other involves the use of furfural as a solvent.

Benzoyl peroxide.—More benzoyl peroxide, used in bleaching flour, was produced in 1929 than in the previous year. Benzyl chloride, used in the preparation of benzoyl peroxide, showed decreased production. Stocks on hand of benzyl chloride at the beginning of 1929 were, in all probability, used to supply the raw material for the increased output of benzoyl peroxide.

Halogenated intermediates.—The halogenated products as a whole showed a decided increase in production in 1929 over 1928. Among the compounds of this class that showed greater output were chloronaphthalene (halowax), monochlorobenzene, p-dichlorobenzene, o-dichlorobenzene, o-chlorotoluene, and chloroanthraquinone.

Organic metallic fungicides.—The annual loss caused by fungus plant diseases amounts to hundreds of millions of dollars. It is estimated that stinking smut or bunt alone reduces the yield of wheat 15,000,000 to 20,000,000 bushels annually. The losses attributed to this cause are largely due to (1) reduced seed germination, (2) weak and unhealthy plants, (3) reduced yields, (4) impaired quality of the crop, (5) discounts and dockage when the crop is marketed. Many fungus diseases are seed born; others are spread by air-carried spores and by mechanical contamination.

Plant pathologists have been combating these fungus diseases for many years and have recommended treatment with various chemicals, notably formaldehyde, mercuric chloride, and copper sulfate. These treatments are sometimes effective, but unless applied under carefully controlled conditions are liable to damage the seed and so reduce germination as to cause a loss equal to that caused by the disease. Since the war, the chemist has furnished the pathologist with a class of organic metallic compounds that give promise of being a decided aid in controlling these fungus parasites. These compounds are a combination of metal, usually mercury or copper, with an organic radical. The metallic radical continues to be effective against smut spores; the organic radical alters the toxicity so as to reduce or eliminate seed damage.

Organic mercury compounds as an antidote to plant fungus diseases were first used in Germany during the war. Their use for this purpose was an application of the principles developed in the study of organic arsenicals and mercurials for the treatment of infections of the human blood. The first of these fungicidal compounds to be used in this country was "Upsulun" or hydroxymercurichlorophenol, manufactured by the I. G. Farbenindustrie and distributed by the Bayer Co. Domestic manufacturers were quick to realize the potentialities of this development and soon began to experiment, but many of the compounds they made failed to meet the requirements of practical tests. Only a half a dozen or more survived the experimental stage. They are being manufactured and distributed and are quoted to the consumer at $0.50 to $1.50 per pound. They are sold in the dust form and contain 5 to 10 per cent of the active ingredient diluted with 95 to 90 per cent inert matter. Applied as a dust, a pound will treat about 5 bushels of grain; or applied as a liquid solution, about 10 bushels of seed. Although the dust method

is more expensive it is generally applied to seed, because it is easier to use and has none of the deleterious effects of the wet treatment, such as fermentation and heating of moist seed, premature germination of damp seed, freezing of moist seed, and drill clogging by seed that have not been thoroughly dried. Vegetables, flowers, and lawns are frequently treated by the liquid method.

Organic copper compounds are a specific for stinking smut in wheat. They do not, however, have sufficient advantage over basic copper carbonate, the standard treatment, to justify their higher cost. Basic copper carbonate retails at about 16 to 30 cents a pound, whereas organic copper preparation sells at about 25 to 40 cents per pound.

A partial list of organic metallic compounds that have been produced experimentally, semicommercially, and commercially follows.

Trade name	Composition
Mercury compounds:	
Ceresan	Ethyl mercury chloride.
Semesan	Hydroxymercurichlorophenol.
Semesan, jr	Hydroxymercuricresol.
Mercury C	
Sterocide	A mercury furfural derivative. Containing not less than 3.5 per cent mercury.
Merko	Ethanol mercury chloride.
Upsulun [5]	Hydroxymercurichlorophenol.
Bayer compound [5]	Hydroxymercurinitrophenol sulfate.
Germisan [5]	A mercury cresol-sodium cyanide compound.
Corona No. 620 [5]	Mercuriated ortho-nitro-phenol.
Corona No. 640 [5]	Mercuriated acetaldehyde.
Tillantin [5]	
Agfa [5]	
Copper compounds:	
———	Copper oxalate compound.
———	Copper beta naphthol.
Cupro-jabonite [5]	
Dupont No. 68	
Cuprobol	
Wa Wa	Copper mercury compound.
Höchst [5]	Copper arsenic naphthol dust.

The United States Department of Agriculture has materially aided in the development of organic metallic fungicides. In its laboratory for the study of cereal diseases innumerable preparations have been treated under greenhouse conditions. Inefficient preparations have been weeded out and the usefulness of those surviving the experimental stage has been established. Investigation work has so far been largely confined to grain seed. The compounds recommended for the various grain crops are as follows:

Grain	Disease	Specific
Corn	Seed-born, root, stalk, and ear rots	Semesan, jr., Sterocide, Merko.
Barley	Stripe and covered smut	Ceresan.
Wheat	Stinking smut	Ceresan.
Oats	Various smuts	Ceresan.

These are not the only compounds that are effective against the parasitic smuts, but they have been tested and found efficient and are commercially manufactured.

[5] German preparations.

Manufacturing companies are actively engaged in research, endeavoring to produce a compound that will be effective against all fungus parasites and that can be manufactured at a cost low enough to insure general application. Progress has been made to the extent that many new fungicides have been discovered and others whose value has been conclusively proved have had their usefulness greatly extended.

Experimental work with vegetable crops has shown that compounds of mercury in organic combination are effective in controlling such seed-born diseases as potato scab and various root and plant molds and rots. Semesan is recommended by the manufacturer as being effective against such diseases.

Organic-metallic fungicides are also being used to eradicate certain fungus growths on flowers and grass. Semesan is said to be effective in ridding lawns and golf greens of the familiar "brown patch."

Directly comparable statistics of production of these organic metallic fungicidal compounds are not available, but it is known that there has been a decided increase in production and consumption during the last two years.

New intermediates.—There were 362 intermediates made in 1929, or 15 more than were made in 1928. Many of those reported in 1929 but not in 1928 were manufactured for the first time during the latter year. These new products find use in the preparation of new coal-tar dyes, rubber accelerators, medicinals, and other finished coal-tar products.

Among the intermediates reported in 1929 but not in 1928 were: Acetyl-o-toluidine, p-aminodimethylamine; m-azo-a-naphthylamine; chloro-m-phenylenediamine; ethyl carbazole; 1-naphthylamine-4:6- and 4:7- disulfonic acid; and p-sulfophenyl hydrazine.

Other intermediates.—Some of the many intermediates, used in the manufacture of specialty dyes, that showed increased production are: 1-amino-2-naphthol-4-sulfonic acid; methyl anthraquinone; quinizarin; 1-naphthylamine-5-sulfonic acid; aminoazotoluene; tetramethyldiaminodiphenylmethane; dichlorosulfophenylpyrazolone; 2-amino-8-naphthol-6-sulfonic acid (gamma acid); ethylbenzylaniline; anthraquinone-1:5-dihydroxy; anthraquinone-1:5-disulfonic acid; diaminostilbene disulfonic acid; dibenzanthrone; and dinitroanthraquinone.

Among the intermediates showing decreased production were: Chromotropic acid; 1-amino-8-naphthol-4-sulfonic acid; xylidine, and salt; aminonaphthylamine trisulfonic acid (T acid); chlorobenzanthrone; ethylbenzylaniline sulfonic acid; and 1-napthylamine-4-sulfonic acid.

STATISTICS OF PRODUCTION AND SALES

Table 9 gives the weighted average sales price of a list of domestic coal-tar intermediates for the period 1923-1929, together with the invoice price of imports of the same compounds in 1914. The invoice price is below the cost to the consumer, as it does not include the profit to the importer and certain other charges.

Table 10 is a detailed record of the production and sales of coal-tar intermediates in 1929.

Table 11 is an arrangement of intermediates in 10 groups of unit values, showing the quantity and percentage of total production falling within each group, for the years 1925–1929, inclusive.

TABLE 9.—*Coal-tar intermediates: Domestic sales price per pound, 1923–1929,*[1] *and invoice price of same intermediates imported, 1914*

Intermediates	Invoice price, 1914	Domestic sales price						
		1923	1924	1925	1926	1927	1928	1929
Acetanilide, technical	[2] $0.15	$0.26	$0.23	$0.22	------	$0.21	$0.23	------
1-Amino-8-naphthol-3:6-disulfonic acid (H acid)	[3].23	.68	.65	------	------	.41	.42	$0.43
2-Amino-8-naphthol-6-sulfonic acid (gamma acid)	------	1.51	1.18	1.30	$1.02	.75	.77	.78
p-Aminophenol and hydrochloride	[2].16	1.13	1.11	1.12	1.05	1.02	.97	.95
Aniline oil	[2].08	.16	.16	.16	.15	.14	.14	.13
Anthraquinone	[2].19	.95	.95	------	------	------	------	------
Benzidine	[2].31–[3].55	.80	.74	.72	.73	.65	.63	.64
Chlorobenzene (mono)	[2].09	.07	.06	.06	.06	.06	.05	.05
Dianisidine	[2].40	3.69	3.34	------	2.19	2.17	1.88	1.59
p-Dichlorobenzene	[3].09	.15	.16	.16	.16	.15	.15	.14
Diethylaniline	------	.48	.40	------	.49	------	------	------
Dimethylaniline	[3].15	.38	.34	.30	.28	.26	.23	.21
Naphthalene, solidifying 79° or above (refined, flake)	[3].02	.06	.05	.05	.05	.05	.05	.05
b-Naphthol, technical	[2].07–[3].09	.22	.22	.20	------	.19	.19	.19
1-Naphthol-4-sulfonic acid (Nevile & Winther's)	------	------	1.00	------	------	.83	.70	.64
1-Naphthylamine-4-sulfonic acid (naphthionic acid)	------	.40	.43	------	.40	.36	.34	.35
p-Nitroaniline	[2].13–[3].14	.69	.64	------	.45	.47	.47	------
Phenol	.06	.27	.30	.21	.18	.15	.12	.11
p-Phenylenediamine	[2].31–[3].44	1.32	1.27	1.16	1.06	------	1.12	1.08
Phthalic acid and anhydride	[2].25	.29	.24	.20	.18	.17	.16	.15
Sulfanilic acid	[2].06–[3].16	.17	.17	.16	.15	.14	.14	.14
Thiocarbanilide	------	.25	.23	.23	.22	.21	.22	.22
o-Toluidine	[2].09–[3].10	.13	.13	.17	.23	.22	.25	.23
m-Tolylenediamine	[2].19	.93	.86	.81	.73	.69	.69	.67
Xylidine and salt	[3].12	.43	.39	------	.36	.35	.36	.34

[1] Weighted average. For 1917 to 1921, *see* Census of Dyes and Other Synthetic Organic Chemicals, 1924.
[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 10.—*Coal-tar intermediates, production and sales, 1929*

[The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on page 188. An X signifies that the manufacturer did not consent to the publication of his identification number with the designated product. A blank in the third and fourth 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 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]

Intermediates	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
Total	------	*Pounds* 148,711,591	$28,871,572	$0.19	*Pounds* 354,487,718
Acetaldehyde aniline condensation products.	130, X	------	------	------	------
Acetanilide, tech	29, 38, 44, 52, 134	------	------	------	------
Acetoacetanilide	78, X	------	------	------	------
Acetyl-p-phenylenediamine (p-amino-acetanilide).	7, 52, 69, 106, 134	------	------	------	112,491
Acetyl-o-toluidine	106	------	------	------	------
Acetyl-p-toluidine	38, 52, 134	------	------	------	------
Acridine yellow	106	------	------	------	------
Aldehyde amine condensation products.	52	------	------	------	------
Aldol aniline derivatives	130	------	------	------	------
Alkylbenzene	32	------	------	------	------
1-Amino-4-acetylamino-6 and 7-naphthylamine sulfonic acid (acetylamino-Cleve's acid).	106	------	------	------	------
b-Amino anthraquinone	21, 52, 69, 106, 110	------	------	------	557,386

TABLE 10.—*Coal-tar intermediates, production and sales, 1929*—Continued

Intermediates	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Aminoazobenzene	8, 38, 53, 69, 79, 106				172, 295
Aminoazobenzene sulfonic acid	8, 36, 52, 53, 106, 110				59, 223
Aminoazobenzene disulfonic acid	106				
Aminoazotoluene	8, 29, 36, 38, 52, 63, 69, 79, 106.	21, 222	$15, 638	$0. 74	191, 436
Aminoazoxylene and hydrochloride	79, 106				
p-Aminobenzoic acid	52, 133				
Aminobenzoyl J acid	52				
m-Aminocresol methyl ether	38				
p-Aminodimethylamine	7				
1-Amino-2-naphthol-4-sulfonic acid	7, 21, 36, 38, 52, 69, 106, 117.				1, 013, 523
1-Amino-8-naphthol-4-sulfonic acid	36, 38, 106, 110				68, 413
1-Amino-8-naphthol-2:4-disulfonic acid (Chicago acid).	38, 52, 106, 110				129, 682
1-Amino-8-naphthol-3:6-disulfonic acid (H acid).	52, 69, 106, 110, X				2, 965, 637
2-Amino-5-naphthol-7-sulfonic acid (J acid).	7, 38, 52, 106, 110				286, 550
2-Amino-8-naphthol-6-sulfonic acid (gamma acid).	7, 38, 52, 69, 106, 110				481, 125
2-Amino-8-naphthol-3:6-disulfonic acid	7, 110				
Aminonaphthylamine trisulfonic acid (T acid).	69				
o-Aminophenol	29, 67, 152, 158				
o-Aminophenol-p-sulfonic acid	106, 158				
p-Aminophenol and hydrochloride	29, 44, 52, 56, 67, 152, X	206, 662	196, 102	.95	300, 482
Aminophenyl tolylamine sulfonic acid (nerol acid).	38, 110				
Aminosalicylic acid	8, 38, 52, 106, 110				94, 522
Anhydroformaldehyde-p-toluidine	52				
Aniline hydrochloride	29, 52, 106				
Aniline oil	29, 50, 52, 100, 105, 106, 107, 110.	15, 215, 814	1, 965, 893	.13	33, 743, 270
Aniline sulfate	79				
Aniline sulfonic acid	106				
Aniline disulfonic acid	38, 52, 106, 110				23, 030
1-Aniline-2-methylanthraquinone	52				
o-Anisidine	38, 52, 105, 110				
o-Anisidine sulfonic acid	106				
Anthranilic acid (o-aminobenzoic acid)	50				
Anthraquinone (100 per cent)	20, 90, 106, 110				
Anthraquinone-1:5-dihydroxy (anthrarufin).	69				
Anthraquinone-1:5-disulfonic acid	20, 69, 110				
Anthraquinone-2:7-disulfonic acid	106				
Anthraquinone-2-sodium sulfonate (silver salt).	8, 20, 52, 106, 110				804, 714
Aroclor (*See* diphenyl, chlorinated)					
m-Azo-a-naphthylamine	36				
Benzaldehyde	65, 80, 99, 128, 138	381, 695	216, 213	.57	345, 212
Benzanthrone	69, 106, 110, 119				
Benzidine base	38, 52, 69, 106				1, 303, 728
Benzidine disulfonic acid	8, 36, 66, 69				
Benzidine sulfate and hydrochloride	52, 106				
Benzoate of ammonia	X				
Benzoate of potash	133				
Benzoate of soda	33, 52, 80, 82, 99, 133	1, 170, 018	480, 768	.41	1, 121, 569
Benzoic acid, tech	33, 80, 133				
Benzoic acid, U. S. P	33, 51, 80, 82, 99, 133	128, 093	64, 921	.51	
Benzotrichloride	80				
Benzoyl chloride	19, 80, 82, 99				
Benzoyl J acid	36, 110				
Benzoyl peroxide	94				
Benzyl chloride	80, 82				
Benzyl mercaptan	106				
Broenner's acid (*See* 2-naphthylamine-6-sulfonic acid).					
Butylaldehyde aniline condensation products.	74, 130, X				68, 154
Calcium malate	106				
Chloramine, tech	105				
p-Chloro-o-aminophenol	158				
p-Chloroaniline	8				

TABLE 10.—*Coal-tar intermediates, production and sales, 1929*—Continued

Intermediates	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
p-Chloroaniline sulfonic acid	8, 38				
Chloroanthraquinone	106				
b-Chloroanthraquinone	69				
o-Chlorobenzaldehyde	106				
Chlorobenzanthrone	52, 106, 119				
Chlorobenzene (mono)	50, 52, 82, 105, 138	5,257,306	$274,627	$0.05	
o-Chlorobenzoic acid	106				
Chlorometanilic acid	36, 52, 69, 106, 110				38,205
6-Chloro-4-methoxy-3-hydroxy thionaphthalene.	52				
Chloromethylanthraquinone	106				
Chloronaphthalene (halowax)	X				
Chloronitroaminophenol	38				
o-Chloro-p-nitroaniline	13, 29, 52, X				36,478
p-Chloro-o-nitrophenol	158				
Chlorophenol (mono, di, tri)	52, 130				
Chloro-m-phenylenediamine	36				
o-Chlorotoluene	52, 106				
o-Chlorotoluene-p-sulfonic acid	52				
o-Chloro-m-toluidine-p-sulfonic acid	8				
2-Chloro-5-toluidine-4-sulfonic acid	29, 52, 134, 158, X				211,091
Chlorotolylthioglycollic acid	52				
Chromotropic acid (*See* 1: 8-dihydroxy naphthalene-3: 6-disulfonic acid).					
Chrysazine	69				
Cresidine	52				
Cresylic acid, refined (distillates yielding below 215° C. tar acids equal to more than 75 per cent of the original distillate).	17, X, X				14,601,534
Crotilidine aniline	X				
Crotilidine a-naphthylamine	74				
Cumidine	106, X				
Dehydrothio-p-toluidine	110				
Dehydrothio-p-toluidine sulfonic acid	38, 66, 110				
Dehydrothio-m-xylidine	110				
Diaminochlorobenzene-p-sulfonic acid	36				
Diaminodimethyldihydroacridine	121				
Diaminodiphenylthiourea	158				
Diaminophenol sulfonic acid	69				
Diaminostilbene disulfonic acid	52, 106, 110				199,960
Dianisidine	38, 52, 106, 110				127,753
1-Diazo-2-naphthol-4-sulfonic acid	36, 38, 52, 106, 117				
Diazosalicylic acid	69, 106				
Dibenzanthrone	110				
1: 5-Dibenzoyldiaminoanthraquinone	52				
Dibenzoyldiaminoanthraquinonyl anthrimide.	52				
Dibenzoyldiaminodianthraquinonyl imide.	52				
Dibenzylamine	X				
Dibenzylaniline	52				
Dibutyl phthalate	89, 148, 151, X	4,251,171	1,074,049	.25	4,749,776
Dichloroaniline	38, 52, 110, 152, 158				83,848
Dichloroaniline sulfonic acid	8, 121				
o-Dichlorobenzene	50, 105				
p-Dichlorobenzene	50, 82, 105, 138	5,275,248	761,098	.14	5,616,475
p-Dichloronitrobenzene	38, 110				
Dichlorophenylhydrazine sulfonic acid	121				
Dichlorosulfophenylpyrazolone	38				
Dichlorosulfophenylmethylpyrazolone	121				
Diethylamine	161				
Diethyl-m-aminophenol	52, 97				
Diethylaniline	50, 106				
Diethylaniline-m-sulfonic acid	52				
1: 4-Dihydroxyanthraquinone (quinizarin).	8, 106				
5: 5-Dihydroxy-7: 7-disulfonic-2: 2-dinaphthylamine (Rhoduline acid).	52				
5: 5-Dihydroxy-7: 7-disulfonic-2: 2-dinaphthylurea (J acid urea).	36, 38, 52, 106, 110				129,108
1: 5-Dihydroxynaphthalene	52, 69, 106				
1: 8-Dihydroxynaphthalene-3: 6-disulfonic acid (chromotropic acid).	52, 106, X				
Dimethylamine	52, 161				
p Dimethylamino butylidine aniline	74				

TABLE 10.—*Coal-tar intermediates, production and sales, 1929*—Continued

Intermediates	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Dimethylaniline	8, 29, 52, 106				3,831,006
2:2-Dimethyl-1:1-dianthraquinonyl	52				
Dimethylphenylbenzylammonium disulfonic acid, calcium salt (leukotrope W).	X				
Dimethyl-p-phenylenediamine	74				
Dimethyltetraaminodiphenylmethane	121				
b-b-Dinaphthylamine	X				
Dinitroaniline	8, 29, X				37,590
Dinitroanthraquinone	36				
Dinitrobenzene	29, 52, 106				1,831,167
Dinitrobenzene sulfonic acid	38, 69				
Dinitrochloroanisole	38				
Dinitrochlorobenzene	52, 69, 106				7,317,164
Dinitrohydroxydiphenylamine	38, 69				
Dinitrophenol and sodium salt	8, 52, 69, 90				
Dinitrophenyl ester of dimethyldithiocarbamic acid.	X				
s-Di-(b-naphthyl)-p-phenylenediamine.	74				
Dinitrostilbene disulfonic acid	52, 106, 110				40,481
Dinitrotoluene	29, 52, 79, 106, 110				
Diphenyl	58				
Diphenyl, chlorinated (aroclor)	58				
Diphenylamine	52				
Diphenylethylenediamine	X				
Diphenylguanidine	50, 52, 129, 130, X	2,191,538	$649,485	$0.30	2,444,226
Diphenylmethane sulfonic acid	106				
Distilbenediphenol	106				
o-Ditolylethylenediamine	X				
o-Ditolylguanidine	52, X				
Ditolylmethane	106				
o-Ditolylthiourea	52, 74, 130				
6-Ethoxy-3-hydroxy thionaphthalene	52				
Ethyl-p-aminobenzoate	104				
Ethyl-o-amino-p-cresol	52				
Ethylaniline (mono)	52, 106				
Ethylbenzene	32				
Ethylbenzylaniline	52, 106				
Ethylbenzylaniline sulfonic acid	38, 52, 106, 140				
Ethylbenzylaniline disulfonic acid	52				
Ethyl carbazole	52				
Ethyl-o-toluidine	52				
Ethyl-o-toluidine-p-sulfonic acid	52				
Ethylidine aniline and derivatives	129				
Fluorescein	47, 79				
Formanilide (anhydroformaldehyde aniline).	52, 129, 130				
Gamma acid (*see* 2-amino-8-naphthol-6-sulfonic acid).					
H acid (*see* 1-amino-8-naphthol-3: 6-disulfonic acid).					
Halowax (*see* chloronaphthalene)					
Heptaldehyde aniline condensation products.	X				
p-Hydroxy benzaldehyde-o-sulfonic acid.	140				
p-Hydroxy benzoic acid	104				
Hydroxychlorocresol	52				
Hydroxymercurichlorophenol	52				
b-Hydroxy naphthoic acid	52				
b-Hydroxy naphthoic anilide (naphthol AS).	52				
Indamine	7				
Indophenol	7				
Isopropyl naphthalene sulfonic acid	106				
Iso violanthrone	52				
J acid (*see* 2-amino-5-naphthol-7-sulfonic acid).					
Laurent's acid (*see* 1-naphthylamine-5-sulfonic acid).					
Lead dithiobenzoate	X				
Maleic acid	106				
dl-Malic acid	8, 106				

TABLE 10.—*Coal-tar intermediates, production and sales, 1929*—Continued

Intermediates	Manufacturers' identification number (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Mercapto-benzo-thiazole	130, X				
Metanilic acid	7, 36, 38, 52, 69, 79, 106, 110.				781,411
Methyl aniline sulfonic acid	66				
Methyl anthraquinone	90, 110				
Methyl pyridine	X				
2-Methyl quinoline (quinaldine)	106				
Methylene dianilide	52				
Methylene di-b-naphthol	X				
Methylhydroxybenzoate	104				
Methylhydroxynitrobenzoate	104				
Michler's hydrol (see tetramethyldiaminobenzhydrol).					
Michler's ketone (*see* tetramethyldiaminobenzophenone).					
Naphthalene, solidifying 79° C. or above (refined, flake).	17, 29, 110, 159, X	21,120,049	$1,027,094	$0.05	31,143,716
a-Naphthalene sulfonic acid	69				
b-Naphthalene sulfonic acid	134				
1:5-Naphthalene disulfonic acid	52, 69, 106				189,094
2:7-Naphthalene disulfonic acid	52, 106, 134				
Naphtho-1:8-sultam-2:4-disulfonic acid (sultam acid).	52				
a-Naphthol	8, 29, 38, 52, 79, 106, 110, X.	122,425	68,023	.56	
b-Naphthol, tech	29, 38, 79, 134				
1-Naphthol-8-chloro-3:6-disulfonic acid (chloro H acid).	106				
1-Naphthol-4-sulfonic acid (Nevile & Winther's).	38, 52, 106, 110				174,164
1-Naphthol-5-sulfonic acid	7, 36, 38, 52, 69, 106, 110				223,746
1-Naphthol-8-sulfonic-3-sultone	38				
1-Naphthol-3:8-disulfonic acid	110				
1-Naphthol-3:6:8-trisulfonic acid	106, 110				
2-Naphthol-1-sulfonic acid	52				
2-Naphthol-6-sulfonic acid (Schaeffer's acid).	7, 8, 38, 52, 53, 69, 106.	8,991	4,182	.47	158,567
2-Naphthol-7-sulfonic acid	38, 134				
2-Naphthol-8-sulfonic aid	38				
2-Naphthol-3:6-disulfonic acid	29, 38, 52, 69, 106, 134.	218,301	85,361	.39	755,116
2-Naphthol-6:8-disulfonic acid	38, 52, 69, 106, 134	67,343	27,878	.41	748,524
a-Naphthylamine	69, 106, 110	2,625,768	639,485	.24	3,801,144
b-Naphthylamine	8, 38, 52, 106, 110, 134.				
1-Naphthylamine-4-amino-6 and 7 sulfonic acid.	110				
1-Naphthylamine-4-sulfonic acid (naphthionic acid).	7, 38, 79, 106, 110, X.				1,205,283
1-Naphthylamine-5-sulfonic acid (Laurent's acid).	7, 38, 52, 69, 106, 110.				209,104
1-Naphthylamine-6-sulfonic acid	38, 52, 106				43,368
1-Naphthylamine-6 and 7-sulfoinic acid.	7, 38, 52, 106, 110				235,080
1-Naphthylamine-7-sulfonic acid	38				
1-Naphthylamine-8-sulfonic acid	7, 38, 52, 69, 106				391,414
1-Naphthylamine-3:8-disulfonic acid	38, 52, 110				
1-Naphthylamine-4:8-disulfonic acid	38, 52, 69, 106, 110				340,284
1-Naphthylamine-4:6 and 4:7-disulfonic acid.	110				
1-Naphthylamine-3:6:8-trisulfonic acid	52, 106, 110, X				
1-Naphthylamine-8:2:4-trisulfonic acid	69				
2-Naphthylamine-1-sulfonic acid	7, 38, 52, 134	320,941	235,578	.73	637,367
2-Naphthylamine-6-sulfonic acid (Broenner's acid).	38, 52, 106				32,023
2-Naphthylamine-3:6-disulfonic acid	38				
2-Naphthylamine-4:8-disulfonic acid	38, 52, 106, 110				71,653
2-Naphthylamine-5:7-disulfonic acid	38, 52, 106, 110				444,288
2-Naphthylamine-6:8-disulfonic acid	7, 38, 52, 106, 110				
2-Naphthylamine-3:6:8-trisulfonic acid	110				
p-Nitroacetanilide	134				
Nitroaminophenol	8, 36, 69, 106				50,199
p-Nitroaminophenol	38, 52				

TABLE 10.—*Coal-tar intermediates, production and sales, 1929*—Continued

Intermediates	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
m-Nitroaniline	29, 52, 152				
o-Nitroaniline	105				
p-Nitroaniline	29, 44, 105				
p-Nitroaniline sulfonic acid	38, 52, 66, 158				26,429
p-Nitro-o-anisidine	52				
o-Nitroanisole	38, 52, 105, 110				
m-Nitrobenzaldehyde	106				
Nitrobenzene	29, 52, 105, 106, 107, 110, X.	2,688,957	$237,025	$0.09	47,931,925
Nitrobenzene sulfonic acid	33, 66, 69				
Nitrobenzene-m-sulfonic acid	8, 52				
Nitrobenzene-2:5-disulfonic acid	38				
Nitrobenzidine	110				
p-Nitrobenzoic acid	1, 52, 133				47,222
m-Nitrobenzoyl chloride	121				
Nitrochlorobenzene (ortho and para)	52, 105				
p-Nitrochlorobenzene-o-sulfonic acid	38, 52, 66, 106, 110, 158.				162,634
Nitrocresol	52				
m-Nitro-p-cresol	38				
Nitrocresol methyl ether	52				
Nitrocumene	106				
6-Nitro-1-diazo-2-naphthol-4-sulfonic acid.	38				
8-Nitro-1-diazo-2-naphthol-4-sulfonic acid.	69, 106				
3-Nitro-4-hydroxyphenyl arsonic acid	104				
Nitronaphthalene	69, 110				
2-Nitronaphthalene-4:8-disulfonic acid	38				
o-Nitrophenol	152, 158				
p-Nitrophenol	52, 105, 152				
Nitrosobetanaphthol	69				
Nitrosodimethylaniline	29, 69, 90, 106, X				110,900
Nitrosophenol	21, 38, 52, 56, 69, 106.				205,754
Nitrotoluene	29, 38, 52, 79, 106, 110.				8,036,397
m-Nitrotoluene	110				
o-Nitrotoluene	52, 106, 110				3,648,335
o-Nitrotoluene sulfonic acid	8, 36, 66				
p-Nitrotoluene	52, 106, 110				1,888,720
p-Nitrotoluene-o-sulfonic acid	7, 38, 52, 106, 110				767,089
m-Nitro-p-toluidine	29, 38, 44, 52, 69, 120, 134.	421,351	601,459	1.43	511,192
p-Nitro-o-toluidine	38, 52				
Nitroxylene	38, 52, 106, 110				376,932
Oxalyl-p-nitroaniline	52				
Oxalyl-m-phenylenediamine	52, 106				
Oxalyl-p-phenylenediamine	52				
Phenazine	7				
Phenol	17, 50, 105, 130, X	19,938,503	2,248,288	.11	24,177,618
Phenyl-2-amino-5-naphthol-7-sulfonic acid (phenyl J acid).	38, 52, 106, 110				32,215
Phenyl-2-amino-8-naphthol-6-sulfonic acid (phenyl gamma acid).	7, 8, 52, 110, 121				9,795
Phenyl malonate	1				
Phenyl-a-naphthylamine	52				
Phenyl-b-naphthylamine	52, 74				
Phenyl-1-naphthylamine-8-sulfonic acid.	7, 36, 52, 69, 106, 110.				404,674
Phenyldimethylaminopyrazolone	104				
m-Phenylenediamine	7, 8, 29, 36, 38, 52, 69, 79, 106, 110, 117, 152.				878,150
m-Phenylenediamine sulfonic acid	38, 69, 106				45,299
p-Phenylenediamine	8, 29, 44, 67				
p-Phenylenediamine sulfonic acid	36, 38				
Phenylglycine, sodium salt	50, 52, 106				
Phenylhydrazine and hydrochloride	52, 66, 69, 121				27,992
Phenylhydrazine-p-sulfonic acid	52, 69, 121				
Phenylmethylpyrazolone	66, 121				
Phenylmethylpyrazolone sulfonic acid	121				
Phenylpyrazolone	X				
Phthalic acid and anhydride	52, 105, 106, 132	7,450,037	1,147,953	.15	9,168,946
Picramic acid	29, 52, 106				76,175

TABLE 10.—*Coal-tar intermediates, production and sales, 1929*—Continued

Intermediates	Manufacturers' identification number (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Poly ethyleneamine b-naphthol condensation products.	X				
Primuline, base	21, 38, 106, 110				
Quinaldine (*see* 2-methylquinoline).					
Quinizarin (*see* 1:4 dihydroxy anthraquinone).					
Quinoline yellow base	106				
Resorcinol, tech	120				
Resorcinol, USP	120, X				
Rosaniline	79				
Salicylic acid, tech	50, 80, 105				
Salicylic acid, USP	50, 80, 105	1,577,758	$510,711	$0.32	4,219,186
Sulfanilic acid	8, 29, 38, 79, 96, 106				1,677,077
o-Sulfobenzoic acid	83				
p-Sulfophenyl hydrazine	36				
Tetraaminoditolylmethane	52, 121				
Tetrachlorofluorescein	79				
Tetramethyldiaminobenzhydrol (Michler's hydrol).	52				
Tetramethyldiaminobenzophenone (Michler's ketone).	52				
Tetramethyldiaminodinitroacridine	121				
Tetramethyldiaminodihydroacridine	121				
Tetramethyldiaminodiphenylmethane	29, 52, 69, 97, 106				
Tetramethyldiaminophenolhydrol	69				
Tetramethyldiaminophenylacridine	121				
Tetramethyldiaminophenyldihydroacridine	121				
Tetramethyltetraaminotriphenyl methane	121				
Thioaniline	7				
Thiocarbanilide	52, 74, 106, 130	442,027	97,582	.22	923,091
Tolidine and salt	38, 52, 106, 110				129,311
Toluene sulfamide (ortho and para)	105				
p-Toluene sulfochloride	105				
p-Toluene-o-sulfonic acid	36				
p-Toluene sulfonic acid ethyl ester	152				
m-Toluenediamine sulfonic acid	38				
Toluidine	29, 38, 106	161,798	35,636	.22	
m-Toluidine	52, 110				
o-Toluidine	29, 52, 106, 110	840,982	192,368	.23	2,339,436
o-Toluidine sulfonic acid	52, 79, 106				
p-Toluidine	52, 106, 110	483,308	172,174	.36	1,151,483
p-Toluidine sulfonic acid	8, 52				
Toluidine disulfonic acid	8, 36				
Tolyl-1-naphthylamine-8-sulfonic acid (tolyl-peri acid)	7, 69, 106, 110				
m-Tolylenediamine	38, 52, 53, 69, 79, 106, 110.	306,591	205,501	.67	911,351
m-Tolylenediamine sulfonic acid	7, 106				
p-Tolylenediamine sulfonic acid	53				
Tribenzoate of soda	133				
Tricresylphosphate	X				
Trinitrophenol	106				
Triphenylguanidine	52, 106				
Triphenylphosphate	50, 130				
Xyleneazotoluidine	79				
Xylidine and salt	38, 52, 106, 110				269,210
m-Xylidine	52, 110				
m-Xylidine acetate	106				
m-Xylidine sulfonic acid	52				
m-Xylidine-6-sulfonic acid	106				
p-Xylidine	106, 110				
All other	8				

TABLE 11.—*Intermediates: Production, by groups, according to unit values, 1925–1929*

Group	1925		1926		1927		1928		1929	
	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total
0-15 cts.	89,686,885	42.566	135,324,911	58.93	150,641,892	62.75	172,187,886	61.66	229,029,120	64.61
16-25 cts.	62,801,070	29.806	47,228,385	20.57	34,353,105	14.31	39,099,559	14.00	44,865,731	12.66
26-50 cts.	32,081,452	15.226	24,130,013	10.51	29,973,693	12.49	40,702,440	14.56	50,835,573	14.34
51-75 cts.	13,442,218	6.380	10,571,635	4.60	14,498,391	6.04	18,419,660	6.60	19,910,895	5.62
$0.76-$1.	5,787,165	2.747	7,097,246	3.09	4,797,843	2.00	3,049,726	1.09	3,279,172	.93
$1.01-$1.50	3,632,570	1.724	2,621,011	1.14	2,604,940	1.08	2,591,619	.93	4,057,157	1.14
$1.51-$2.	1,614,041	.766	1,434,404	.62	2,022,746	.84	1,252,592	.45	1,286,595	.36
$2.01-$3.	994,224	.472	916,665	.40	763,154	.31	1,079,646	.39	850,330	.24
$3.01-$4.	111,432	.053	144,587	.06	281,366	.12	699,843	.25	145,953	.04
Over $4.	548,722	.260	184,945	.08	136,055	.06	191,836	.07	227,192	.06
Total	210,699,779	100.000	229,653,802	100.00	240,073,184	100.00	279,274,807	100.00	354,487,718	100.00

DYES AND OTHER FINISHED COAL-TAR PRODUCTS

INTRODUCTION

Finished coal-tar products may be divided into eight classes: (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 dyes and that of explosives and poisonous gases. The dye industry is now considered a key industry by the industrial nations of the world. Closely connected also with dyes are such coal-tar products as flavors, perfume materials, synthetic resins, photographic chemicals, medicinals, and others which, although produced in smaller quantities, use as raw materials many of the by-products obtained in the manufacture of coal-tar dyes.

In 1929 a total of 167,175,703 pounds of dyes and other finished coal-tar products, exclusive of synthetic tanning materials, miscellaneous products, and research chemicals, was produced by 120 firms. Including these three items excepted in 1929, the production in 1928 by 125 firms was 143,563,099 pounds. Sales in 1929 amounted to 158,698,300 pounds, valued at $77,247,361. In both production and sales 1929 was a record year for the domestic industry.

Table 31, page 64, shows the production of dyes and other finished coal-tar products in 1929 in as great detail as is possible without disclosing the output of individual manufacturers.

SUMMARY OF PRODUCTION OF DYES

INCREASE IN PRODUCTION

The output of dyes in 1929 by 54 firms was 111,421,505 pounds, an increase of 14,796,054 pounds, or 15.31 per cent, over 1928, when production was 96,625,451 pounds. Sales in 1929 totaled 106,070,887 pounds, valued at $45,842,130, as compared with 93,302,708 pounds, valued at $39,792,039 in 1928.

The outstanding features of dye production in 1929 were: (1) A record production of vat dyes; (2) an increase in imports, especially of acid and vat dyes; (3) a notable increase in exports; (4) a marked increase in the production of dyes manufactured in foreign-controlled dye plants in the United States.

Table 12 shows the production and sales of dyes in the United States in recent years as compared with the pre-war year 1914.

TABLE 12.—*Coal-tar dyes: Domestic production and sales, 1914 and 1917–1929*

Year	Production	Sales		Year	Production	Sales	
		Quantity	Value			Quantity	Value
	Pounds	*Pounds*			*Pounds*	*Pounds*	
1914	6,619,729		[1] $2,470,096	1923	93,667,524	86,567,446	$47,223,161
1917	45,977,246		[1] 57,796,228	1924	68,679,000	64,961,433	35,012,400
1918	58,464,446		[1] 62,026,390	1925	86,345,438	79,303,451	37,468,332
1919	63,402,194		[1] 67,598,855	1926	87,978,624	86,255,836	36,312,648
1920	88,263,776		[1] 95,613,749	1927	95,167,905	98,339,204	38,532,795
1921	39,008,690	47,513,762	39,283,956	1928	96,625,451	93,302,708	39,792,039
1922	64,632,187	69,107,105	41,463,790	1929	111,421,505	106,070,887	45,842,130

[1] Value of production.

STOCKS ON HAND

Commencing with 1924, the commission has annually published data as to the quantity of certain dyes on hand at the beginning of the year. Table 13 shows stocks on hand January 1, 1929, and January 1, 1930, for a selected list of dyes.

TABLE 13.—*Domestic dyes: Stocks on hand January 1, 1929, and January 1, 1930*

Colour Index No.		Jan. 1—	
		1929	1930
		Pounds	*Pounds*
20	Chrysoidine Y	168,300	228,317
31	Amidonaphthol red G	50,150	86,726
79	Ponceau 2R	178,057	190,954
138	Metanil yellow	158,907	185,891
151	Orange II	250,587	400,091
179	Azo rubine	92,030	90,730
189	Lake red R	129,146	129,794
202	Chrome blue black U	305,859	353,966
208	Fast acid blue R	52,775	71,665
234	Resorcin brown B	97,045	128,648
246	Acid black 10B	561,955	430,655
289	Fast cyanine 5R	237,441	320,063
326	Direct fast scarlet	112,898	189,734
332	Bismarck brown 2R	147,195	205,976
365	Chrysophenine G	312,834	332,446
370	Congo red	602,066	495,101
401	Developed black BHN	345,014	342,308
406	Direct blue 2B	570,427	774,422
448	Benzopurpurine 4B	153,594	205,439
518	Direct pure blue 6B	189,724	208,682
520	Direct pure blue	124,759	173,351
581	Direct black EW	2,384,776	2,357,510
582	Direct black RX	285,492	456,244
593	Direct green B	146,757	183,179
596	Direct brown 3GO	252,612	309,718
620	Direct yellow R	189,228	185,306
640	Tartrazine	65,520	156,140
655	Auramine	185,909	323,998
680	Methyl violet	205,624	261,126
812	Primuline	151,680	209,593
814	Direct fast yellow	91,689	89,598
864	Nigrosine (spirit-soluble)	89,479	134,285

TABLE 13.—*Domestic dyes: Stocks on hand January 1, 1929, and January 1, 1930*—Continued

Colour Index No.		Jan. 1— 1929	1930
		Pounds	*Pounds*
865	Nigrosine (water-soluble)	356, 937	444, 975
	Sulfur blacks	5, 289, 388	6, 313, 446
	Sulfur blue	541, 600	509, 289
	Sulfur brown	578, 182	737, 363
	Sulfur yellow	265, 585	272, 545
1177	Indigo, 20 per cent paste	10, 509, 873	10, 448, 023
	Anthraquinone vat dyes (single strength)	1, 738, 503	2, 414, 735
	Zambesi black	104, 650	92, 632
	Total	28, 273, 247	31, 444, 664

PRICES

The weighted average price per pound of all domestic dyes sold during the period 1917 to 1927 declined, on an average, 8.7 cents per year. In 1928 the weighted average sales price per pound was 42.6 cents, an increase of 3.6 cents over 1927. Although the price trend was downward in 1929, especially for sulfur, basic, and mordant and chrome dyes, the net result of the increased production of high-priced dyes and the advance of 1 cent per pound in the price of indigo, of which over 29,000,000 pounds were sold, was an advance to 43.2 cents in the weighted average price per pound.

Table 14 shows the unit value of production in 1917, and the weighted average sales price per pound from 1921 to 1929, inclusive.

TABLE 14.—*Domestic dyes: Weighted average sales price per pound,*[1] *1917 and 1921–1929*

Year	Weighted average sales price of domestic dyes	Year	Weighted average sales price of domestic dyes
1917	[2] $1.26	1925	$0.47
1921	.83	1926	.42
1922	.60	1927	.39
1923	.55	1928	.43
1924	.54	1929	.43

[1] The total value of all dyes sold divided by the total quantity sold.
[2] Unit value of production.

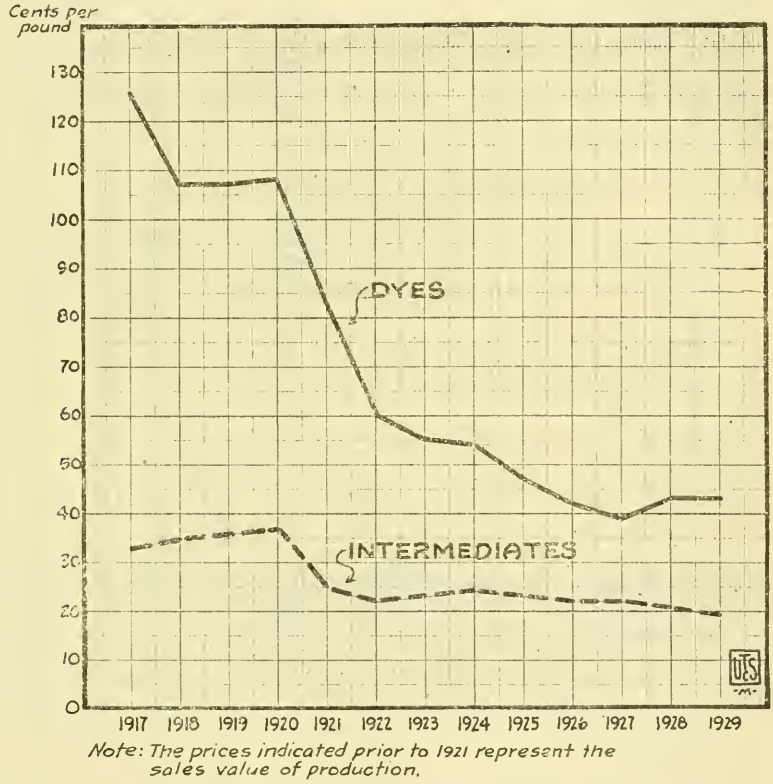
These price data on dyes, together with similar data on intermediates, are shown in the graph on page 39.

Table 15 shows the sales price of nearly 100 domestic dyes from 1925 to 1929, inclusive, with the invoice price of the same types of dyes imported in 1914. The dyes for which statistics are here given constitute about 90 per cent of domestic production. Strictly speaking, domestic sales prices can not, of course, be compared with invoice prices, for the reason that the latter do not represent the cost to the consumer, since they do not include the importer's profit and the usual charges for containers, packing, freight, insurance to seaport,

consular certification, and minor shipping charges at point of departure and at seaport.

In Table 15 the Colour Index number appears in the first column, and the type name of the dye adopted by the Tariff Commission for designating all dyes reported under a given Colour Index number, in the second column. The invoice price (1914) shown in column 3

WEIGHTED AVERAGE PRICES, DYES AND INTERMEDIATES, 1917-1929.



Note: The prices indicated prior to 1921 represent the sales value of production.

represents the weighted average of all dyes classified under a given number in "Artificial Dyestuffs Used in the United States," published by the Department of Commerce, as Special Agents Series No. 121. The figures in column 4, the domestic sales price as reported to the Tariff Commission, represent the weighted average selling price of all dyes reported under a given Colour Index number.

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TABLE 15.—*Domestic sales price of certain dyes, 1925–1929, compared with invoice value of dyes of the same kind imported in 1914*

Colour Index No.	Common name	1914 invoice value imported dyes (weighted average of all types)	Average price per pound				
			1925	1926	1927	1928	1929
20	Chrysoidine Y	$0.136	$0.43	$0.34	$0.33	$0.31	$0.31
21	Chrysoidine R	.165	.45	.36	.35	------	------
27	Orange G	.148	.52	.44	.49	.54	------
31	Amidonaphthol red G	.150	.53	.46	.43	.40	.34
36	Chrome yellow 2G	.077	.42	.50	.49	.49	.47
40	Chrome yellow R	.154	.45	.58	.61	.54	.57
57	Amidonaphthol red 6B	.604	.55	.54	.54	.49	.48
79	Ponceau 2R	.095	.51	.48	.41	.42	.43
88	Bordeaux B	.159	.56	.56	.53	.51	.49
138	Metanil yellow	.164	.69	.64	.58	.56	.54
146	Azo yellow	.249	.88	.78	.75	.73	.70
151	Orange II	.081	.29	.27	.26	.26	.26
167	Acid chrome brown B	.256	.99	.92	------	------	------
176	Fast red A	.118	.69	.62	.60	.59	.57
179	Azo rubine	.198	.76	.71	.65	.63	.61
180	Fast red VR	.188	.87	.66	.48	.54	.59
184	Amaranth	.138	.63	.58	.64	.54	.64
189	Lake red R	.083	.86	.85	.80	.79	.80
195	Mordant yellow	.149	.57	.55	.58	------	------
202	Chrome blue black U	.156	.44	.37	.36	.36	.30
208	Fast acid blue R	.252	.65	.63	.55	.56	.52
246	Acid black 10B	.134	.55	.46	.39	.37	.40
252	Brilliant croceine	.165	.95	.84	.82	.81	.76
262	Cloth red 2B	.143	.96	.98	.82	.80	.69
289	Fast cyanine 5R	.166	.83	.74	.69	.67	.53
299	Chrome black F	.172	.81	.73	.68	.64	.61
307	Fast cyanine black B	.110	.84	.80	.80	.72	.66
308	Naphthylamine black D	.144	.72	.61	.70	.70	.76
331	Bismarck brown	.186	.47	.44	.41	.39	.39
332	Bismarck brown 2R	.183	.45	.42	.40	.40	.38
365	Chrysophenine G	.270	.78	.55	.53	.50	.49
394	Direct violet N	.255	1.22	1.21	1.05	.99	.96
401	Developed black BHN	.133	.58	.50	.42	.39	.35
406	Direct blue 2B	.041	.34	.31	.26	.25	.26
410	Chrysamine G	.189	.83	.55	.85	.72	.61
415	Direct orange R	.231	.69	.62	.57	.56	.67
419	Direct fast red F	.362	.95	.82	.76	.72	.66
420	Direct brown M	.194	.77	.70	.64	.61	.58
448	Benzopurpurine 4B	.133	.66	.58	.49	.48	.46
477	Direct blue 3B	.209	.46	.39	.40	.39	.39
495	Benzopurpurine 10B	.234	1.32	1.27	1.06	.94	1.07
512	Direct blue RW	.222	.97	.87	.82	.77	.73
518	Direct pure blue 6B	.275	.97	.77	.68	.62	.59
520	Direct pure blue	.440	.67	.59	.45	.54	.52
581	Direct black EW	.144	.34	.31	.28	.28	.28
582	Direct black RX	.139	.45	.35	------	.32	.30
593	Direct green B	.174	.61	.51	.43	.38	.37
594	Direct green G	.230	.70	.66	.53	.56	------
596	Direct brown 3GO	------	.44	.39	.37	.35	.35
598	Congo brown G	.194	.80	.68	.64	.61	.68
606	Direct brown G	.170	.72	.74	------	------	------
620	Direct yellow R	.178	.61	.49	.40	.35	.35
621	Chloramine orange G	.239	.94	.81	.78	.77	.74
640	Tartrazine	.200	.67	.58	.54	.58	------
655	Auramine	.240	2.00	.90	.81	.81	.78
657	Malachite green	.241	1.54	1.31	1.11	1.20	1.24
666	Acid green B	.255	1.30	1.13	1.04	.99	.88
677	Magenta	.294	1.81	1.81	1.89	1.82	1.87
680	Methyl violet	.248	.99	.93	.88	.84	.76
698	Acid violet	.281	1.49	1.36	1.20	1.08	.98
704	Alkali blue	.109	2.24	2.59	2.89	2.26	------
737	Wool green S	.353	.57	.59	.69	.75	.73
768	Eosine	.418	------	1.80	------	------	1.77
793	Phosphine	.352	1.56	1.52	1.32	1.12	1.07
812	Primuline	.144	.64	.54	.48	.43	.39
814	Direct fast yellow	.136	1.06	1.05	.93	.93	.91
860	Induline (spirit-soluble)	.198	------	.56	.75	------	------
861	Induline (water-soluble)	.258	.69	.68	.72	.69	------
864	Nigrosine (spirit-soluble)	.126	.45	.47	.45	.43	.37
865	Nigrosine (water-soluble)	.149	.42	.39	.40	.35	.34
883	Gallocyanine	.347	1.79	1.85	1.87	1.81	1.56

TABLE 15.—*Domestic sales price of certain dyes, 1925–1929, compared with invoice value of dyes of the same kind imported in 1914*—Continued

Colour Index No.	Common name	1914 invoice value imported dyes (weighted average of all types)	Average price per pound				
			1925	1926	1927	1928	1929
922	Methylene blue	$0.390	$1.11	$0.94	-------	$0.93	$0.84
	Sulfur black	.100	.17	.15	$0.13	.14	.14
	Sulfur blue	----------	.55	.54	.55	.51	.51
	Sulfur brown	.107	.35	.35	.32	.32	.31
	Sulfur tan	----------	.35	.39	.39	.31	.28
	Sulfur maroon	.186	.56	.53	.53	.52	.45
	Sulfur yellow	----------	.46	.40	.41	.41	.39
1035	Alizarin brown	.290	2.16	2.18	-------	1.74	------
1099	Anthraquinone vat dark blue B O	.227	-------	1.68	1.64	------	1.41
1113	Anthraquinone vat blue GCD	.350	1.20	1.08	.92	.78	.69
1177	Indigo, synthetic	.128	.16	.13	.12	.14	.15

UNIT VALUE OF DYES PRODUCED, 1925–1929

Table 16 shows the domestic production of dyes from 1925 to 1929, inclusive, arranged according to eight value groups. The actual quantity is given for each group and the relation of each group to the total production.

TABLE 16.—*Dyes: Production, by groups, according to unit value, 1925–1929*

Group	1925		1926		1927		1928		1929	
	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total
1–25 cents	45,815,114	53.06	43,747,262	49.72	49,314,987	51.82	43,321,274	44.81	49,919,561	44.80
26–50 cents	16,134,929	18.69	20,666,640	23.49	23,450,835	24.64	26,624,686	27.55	30,251,786	27.15
51–75 cents	9,598,483	11.11	8,794,368	10.00	7,470,547	7.85	9,432,458	9.76	10,121,960	9.09
$0.76–$1	4,851,750	5.62	8,045,922	9.15	7,570,480	7.96	9,550,635	9.88	10,072,975	9.04
$1.01–$1.50	5,027,117	5.82	2,808,457	3.19	3,714,761	3.90	3,536,731	3.66	5,683,807	5.10
$1.51–$2	2,578,233	2.99	2,241,741	2.55	2,375,625	2.50	2,707,054	2.80	3,799,793	3.41
$2.01–$3	1,568,458	1.82	1,402,063	1.59	1,086,666	1.14	1,298,824	1.35	1,366,792	1.23
Over $3	771,354	.89	272,170	.31	184,004	.19	153,789	.16	204,831	.18
Total	86,345,438	100.00	87,978,624	100.00	95,167,905	100.00	96,625,451	100.00	111,421,505	100.00

PROGRESS IN DYE MANUFACTURE

Progress in dye manufacture in 1929 was in increased production and sales rather than in results achieved in the laboratory, although many new dyes were manufactured during the year. The total production of dyes increased 15.31 per cent as compared with 1.5 per cent in 1928, and the total quantity of sales, 13.68 per cent as contrasted with a decrease of 5.12 per cent in the previous year. The ratio of quantity exported to quantity imported was almost the same in the two years, being 5.3 in 1929 and 5.2 in 1928.

Relation of production to consumption.—Assuming consumption to equal total sales plus imports minus exports, the apparent consumption of coal-tar dyes in 1929 was 78,377,709 pounds, an increase of

10.65 per cent more than in 1928. Of this quantity,[5] 91.79 per cent was supplied by domestic producers; the remaining 8.21 per cent was imported.

In terms of value, the ratio of imports to apparent consumption was slightly greater than in 1928. Three ratios are obtained, each depending upon the evaluation of our imports. Taking the foreign invoice value as the value of imports, the ratio of imports to apparent consumption was 12.23 per cent. Basing imports on foreign invoice value plus the duty paid, imports equaled 19.86 per cent of apparent consumption. Assuming the value of imports to be the foreign invoice value plus the duty paid plus 15 per cent allowance for profits and expenses on the sum of the foreign invoice value and the duty paid, imports equaled 22.18 per cent of apparent consumption.

Number of manufacturers.—The number of firms manufacturing dyes in 1929 (exclusive of those making only stains and indicators) was 49 as compared to 50 in 1928. The decrease from 90 firms in 1919 to 49 in 1929 was undoubtedly caused by severe competition among the many small-scale producers of low-priced dyes and by the merging of others. The elimination of but one manufacturer in 1929 may be taken as an indication that duplication of products is being avoided and that productive capacity more nearly conforms to the demands of the home and export markets.

TARIFF CONSIDERATIONS

With the exception of synthetic indigo, "Colour Index No. 1177" and sulfur black, "Colour Index No. 978," which are dutiable at 3 cents per pound and 20 per cent ad valorem, the rates of duty and the basis for valuation of coal-tar dyes are the same under the act of 1930 as under the act of 1922 beginning September 22, 1924, when, as provided by law, the duty was reduced from 60 per cent to 45 per cent ad valorem (the specific duty remaining at 7 cents per pound). The act of 1930 provides that the ad valorem rate of duty on any imported coal-tar product coming within paragraph 27 or 28 shall be based upon the American selling price (as defined in subdivision (g) of section 402, Title IV) of any similar competitive article manufactured in the United States. As defined by the act, a product is similar or competitive with any imported coal-tar product when it accomplishes results substantially equal to those accomplished by the domestic product when used in substantially the same manner.

On a similar competitive article not manufactured in the United States, the act provides that the ad valorem rate shall be based upon the United States value (as defined in subdivision (e) 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.

The Census of Dyes, 1924 (pp. 41–45), discussed the American selling price as applied to coal-tar products, reviewed the principal features of the administration of these provisions by the Treasury

[5] Imports of coal-tar dyes in 1929 were 6,437,147 pounds with a foreign invoice value of $5,374,085. This poundage is in excess of the net quantity imported. It is, however, comparable with both domestic production and domestic sales as nearly all the vat dyes as well as the rhodamines have been reduced to a single-strength basis in order to facilitate comparison. The Department of Commerce reports the total dye imports (excluding natural indigo, natural alizarin, and color lakes) as 7,317,277 pounds, valued at $8,155,019. The quantity as compiled in Foreign Commerce and Navigation represents the number of pounds on which specific duty of 7 cents was assessed. The value represents the dutiable value.

Department, summarized the major regulations issued by that department, and gave important Treasury Decisions up to G. A. 9004, T. D. 40926, of 1925. Continuing this feature of the report, subsequent issues gave abstracts of decisions up to November, 1929. Decisions up to April 1, 1930, follow.

COURT AND TREASURY DECISIONS, 1929

Orders fixing the standards of strength of coal-tar products under paragraphs 27 and 28 of the act of 1922 signed by an Assistant Secretary of the Treasury have been held to be valid. Abs. (N) 9863, 9884.

Hydron violet was held dutiable on the basis of the actual weight imported. Ab. (N) 10063.

Where merchandise is imported in metal drums which are separately assessable as articles of commerce, there are two articles imported within the purview of section 304 of the act of 1922—the contents and the drums. Each is assessable with 10 per cent additional duty if not marked when imported to indicate the country of origin, provided each is capable of being so marked. Coal-tar colors contained in drums are incapable of being marked. T. D. 43748.

Where dyes "A" and "B" are offered for sale in the United States and the same dyes mixed together to form a new dye are imported, the ad valorem can not be derived from the American selling price of a comparable American article by taking the price at which dyes "A" and "B" are offered for sale in America and calculating from them in the proportions by weight of the imported mixture what price a mixture which accomplishes the same results as the imported mixture would be sold for when no such comparable mixture has been offered for sale, or sold, in the United States market. T. D. 43775.

Where dyes or chemicals are imported under paragraphs 27 and 28, tariff act of 1922, after the deduction in duty therein specified, so that they pay 45 per cent instead of 60 per cent ad valorem, the net United States value as defined in subsection (d) of section 402 is properly determined by deducting 60 per cent duty, if the selling price in the market in the United States from which the United States value is calculated from identical or similar merchandise sold in the American market which on importation paid 60 per cent duty. There is no evidence of a market here for the sale of such or similar merchandise which on entry had paid only 45 per cent ad valorem. This decision is limited to the facts appearing in the record before the court. The selling price, which by deduction makes United States value under said subsection (d), is not the selling price of the merchandise whose dutiable value is in question. That merchandise may not be sold in America until some time subsequently. It is the value of such or similar merchandise sold in the United States at the time of exportation to the United States of the merchandise whose dutiable value is in question. T. D. 43927.

IMPORTS OF DYES, 1920–1930

Table 17 summarizes the quantity and invoice value of imports from 1920 up to and including August, 1930.

TABLE 17.—*Coal-tar dyes: Imports into the United States, 1920–1930 (8 months)*

Period	Quantity	Invoice value	Monthly average	
			Quantity	Value
	Pounds		*Pounds*	
1920	3,402,582	$5,763,437	283,548	$480,286
1921	4,252,911	5,156,779	354,400	429,732
1922	3,982,631	5,243,257	338,850	436,838
1923	3,098,193	3,151,363	258,153	262,614
1924	3,022,539	2,908,778	251,878	242,398
1925	5,315,158	4,791,908	442,930	399,326
1926	4,673,196	4,103,301	389,433	341,941
1927	4,233,046	3,413,886	352,754	284,490
1928	5,351,951	4,321,867	445,996	360,156
1929	6,437,147	5,374,085	536,429	447,840
1930 (8 months)	2,811,466	2,370,212	351,433	296,277

PRODUCTION OF DYES BY CLASSES

Dyes produced in the United States in 1929, classified according to method of application, are: (1) Acid dyes, (2) basic dyes, (3) direct dyes, (4) mordant and chrome dyes, (5) sulfur dyes, (6) vat dyes, subdivided into indigo and other vats, and (7) color-lake and spirit-soluble dyes. Although the classification of a dye in any one of these groups must in certain instances necessarily be arbitrary, because a dye may have properties which permit of its application by more than one method, such classification facilitates a comparison of production and import figures. Overlapping the acid dyes are the food dyes, discussed on page 55.

Comparative data for dyes produced in the United States from 1927 to 1929, inclusive, and those imported in the same years are given according to classes in Table 18.

TABLE 18.—*Comparison of imports of dyes, by classes, with domestic production, calendar years 1927–1929*

Class of dye	1927					
	Domestic				Imports	
	Sales		Production			
	Quantity	Value	Quantity	Per cent of total	Quantity	Per cent of total
	Pounds		*Pounds*		*Pounds*	
Acid	11,805,905	$9,137,790	11,104,533	11.67	654,729	15.47
Basic	4,783,313	3,917,711	4,548,515	4.78	334,526	7.90
Direct	17,682,399	8,681,024	16,265,497	17.09	721,342	17.04
Lake and spirit-soluble	1,559,461	1,380,746	1,540,711	1.62	134,778	3.18
Mordant and chrome	3,494,169	2,100,324	3,604,095	3.79	488,605	11.54
Sulfur	23,183,794	4,392,641	23,404,273	24.59	137,864	3.26
Vats (including indigo)	35,534,646	8,421,616	34,399,854	36.14	1,730,967	40.89
(*a*) Indigo	30,609,134	3,700,192	28,438,166	29.88	6,057	.14
(*b*) Other vats	4,925,512	4,721,424	5,961,688	6.26	1,724,910	40.75
Unclassified and special	295,517	500,943	300,427	.32	30,235	.72
Total	98,339,204	38,532,795	95,167,905	100.00	4,233,046	100.00

TABLE 18.—*Comparison of imports of dyes, by classes, with domestic production, calendar years 1927–1929*—Continued

Class of dye	1928					
	Domestic				Imports	
	Sales		Production			
	Quantity	Value	Quantity	Per cent of total	Quantity	Per cent of total
	Pounds		*Pounds*		*Pounds*	
Acid	12,632,917	$8,861,206	13,469,597	13.94	994,201	18.58
Basic	5,085,165	4,218,213	5,374,099	5.56	424,968	7.94
Direct	18,073,537	8,947,838	19,633,095	20.31	917,728	17.15
Lake and spirit-soluble	1,797,665	1,495,331	1,821,492	1.89	98,550	1.84
Mordant and chrome	3,958,973	2,399,961	4,403,934	4.56	476,872	8.91
Sulfur	19,969,173	4,107,743	19,001,910	19.67	125,350	2.34
Vats (including indigo)	31,310,768	9,156,995	32,375,812	33.51	2,304,104	43.05
(*a*) Indigo	25,556,849	3,585,700	25,861,680	26.77	2,343	.04
(*b*) Other vats	5,753,919	5,571,295	6,514,132	6.74	2,301,761	43.01
Unclassified and special	474,510	604,712	545,512	.56	10,178	.19
Total	93,302,708	39,792,039	96,625,451	100.00	5,351,951	100.00

Class of dye	1929					
	Domestic				Imports	
	Sales		Production			
	Quantity	Value	Quantity	Per cent of total	Quantity	Per cent of total
	Pounds		*Pounds*		*Pounds*	
Acid	13,510,356	$9,381,432	14,196,815	12.74	1,491,313	23.17
Basic	5,565,651	4,485,160	5,899,970	5.30	367,568	5.71
Direct	20,486,890	10,170,774	21,622,907	19.41	977,792	15.19
Lake and spirit-soluble	2,606,685	2,190,511	2,724,712	2.44	204,248	3.17
Mordant and chrome	4,656,901	2,597,742	4,846,228	4.35	545,508	8.47
Sulfur	21,214,680	4,113,233	22,605,799	20.29	142,919	2.22
Vats (including indigo)	37,501,167	12,223,010	38,784,337	34.81	2,694,901	41.87
(*a*) Indigo	29,382,120	4,384,189	29,320,270	26.31		
(*b*) Other vats	8,119,047	7,838,821	9,464,067	8.50	2,694,901	41.87
Unclassified and special	528,557	680,268	740,737	.66	12,898	.20
Total	106,070,887	45,842,130	111,421,505	100.00	6,437,147	100.00

(1) ACID DYES

Description.—The acid dyes, usually the sodium salts of a color acid, are commonly applied in an acid bath. They constitute the most important group used in wool dyeing, especially for hosiery and carpet yarns, suitings, dress goods, and hat materials. Lacking an affinity for vegetable fibers, they are little used on cotton or linen; they are, however, of value in dyeing jute. Appreciable quantities are also used on silk. In general they are used on goods not requiring repeated washings.

Acid dyes yield clear, bright shades. In purity of shade they are superior to the direct and mordant dyes, but are not equal to the basic dyes. They have a wide color range, and in fastness show great individual variation; as a rule they are fairly fast to light and acids, but have a tendency to bleed in washing. They yield faster shades

on wool than on silk. Some of the more complex acid dyes, several of which are of recent origin, produce shades of good general fastness.

The method of applying dyes in an acid bath is simple and of low labor cost. Dyes of this group are for the most part the lowest priced dyes produced.

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. Those known as acid chrome colors are used chiefly on wool, especially on loose wool yarns, and on 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) sulfonated basic dyes (mostly triphenylmethane derivatives), and (4) alizarin derivatives.

Production and imports.—Acid dyes constituted 12.74 per cent of our total output of dyes and ranked fourth in order of production. Comparative data on total production and sales for 1929 and 1928 are shown below.

Year	Production	Sales		
		Quantity	Value	Price [1]
	Pounds	*Pounds*		
1929	14,196,815	13,510,356	$9,381,432	69.44
1928	13,469,597	12,632,917	8,861,206	70.14
Increase:				
Actual	727,218	877,439	520,226	−0.70
Per cent	5.40	6.95	5.87	

[1] Weighted average selling price, cents per pound.

Production and sales data on the five acid dyes produced in greatest quantity are shown in Table 19. The combined output of these five dyes was 43 per cent of the total production of acid dyes.

TABLE 19.—*Production and sales of the five ranking acid dyes, 1929 and 1928*

Name of dye	Production				Sales (1929)		Sales price [1]	
	1929	1928	Change from 1928		Quantity	Value		
			Increase	Decrease			1929	1928
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*			
Orange II	1,615,441	1,419,416	196,025		1,465,937	$382,314	26	26
Nigrosine (water-soluble)	1,517,171	1,625,173		108,002	1,429,133	488,134	34	35
Acid black 10B	1,433,596	1,917,132		483,536	1,564,896	620,206	40	37
Fast cyanine 5R	831,345	807,671	23,674		748,723	396,648	53	67
Metanil yellow	707,395	656,352	51,043		680,411	368,028	54	56

[1] Weighted average selling price, cents per pound.

Imports of acid dyes in 1929, amounting to 1,491,313 pounds, were greater by 497,112 pounds, or by 50 per cent, than in 1928. They constituted 23.17 per cent of our total imports of all dyes and 10.50

per cent of our production of acid dyes. The 15 imported in greatest quantity were:

	Pounds		Pounds
Brilliant wool blue FFB, FFR	88, 858	Polar orange	39, 681
Indocyanine B	85, 373	Neptune green SG	39, 666
Erioglaucine	63, 769	Neolan pink	33, 665
Patent blue A	54, 636	Xylene fast blue FF	33, 273
Neolan blue	52, 675	Neolan yellow	31, 079
Novazol blue B	46, 296	Neolan Bordeaux R	29, 312
Wool fast blue BL, GL	44, 377	Erie green B	27, 031
Polar red, G, R, RS	42, 992		

(2) 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, where bright shades or color tints are desired without special requirements for fastness. They are also used 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. They are chemically basic and are fixed on vegetable fibers with an acid mordant, such as tannic acid, or more recently with a synthetic substitute.

Dyes of this class 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 less important than formerly; for dyeing cotton they have been superseded by direct and sulfur dyes, costing less to apply and, many of them, excelling in fastness. The vat dyes are now being used on cotton for many applications where only basic dyes were formerly used. For dyeing wool, acid dyes have almost entirely displaced basic colors. Chemically, basic dyes include a large number of the triphenylmethane derivatives, and, in addition, members of the following classes: (1) Azines, (2) azos, (3) thiazines, (4) thiazoles, and (5) acridines.

Production and imports.—Basic dyes constituted 5.3 per cent of our total output of dyes, in 1929, and ranked fifth in order of production. Comparative data on total production and sales for 1929 and 1928 are shown below.

Year	Production	Sales		
		Quantity	Value	Price [1]
	Pounds	*Pounds*		
1929	5, 899, 970	5, 565, 651	$4, 485, 160	80. 59
1928	5, 374, 099	5, 085, 165	4, 218, 213	82. 95
Increase:				
Actual	525, 871	480, 486	266, 947	−2. 36
Per cent	9. 79	9. 45	6. 33	

[1] Weighted average selling price, cents per pound.

Production and sales data on the five basic dyes produced in greatest quantity, and which constituted 66.40 per cent of the total production of basic dyes in 1929, are shown in Table 20.

TABLE 20.—*Production and sales of the five ranking basic dyes, 1929 and 1928*

Name of dye	Production				Sales (1929)		Sales price [1]	
	1929	1928	Change from 1928		Quantity	Value	1929	1928
			Increase	Decrease				
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*			
Auramine and base	1,224,158	920,821	303,337		1,083,878	$848,343	78	81
Chrysoidine Y	805,264	736,492	68,772		745,247	231,961	31	31
Methyl violet	788,136	672,878	115,258		732,634	554,122	76	84
Methylene blue	567,795	575,181		7,386	591,597	495,174	84	93
Bismark brown 2R	532,400	491,850	40,550		473,619	181,462	38	40

[1] Weighted average selling price, cents per pound.

Imports of basic dyes, amounting to 367,568 pounds, were 57,400 pounds or 13.51 per cent less than imports in 1928. They constituted 5.71 per cent of our total imports of all dyes and 6.23 per cent of our production of basic dyes. The 15 imported in greatest quantity were:

	Pounds		Pounds
Rhodamine 6GDN, 6GH	59,010	Methylene green W	12,337
Rhodamine B	41,760	Methyl Lyons blue	10,070
Victoria pure blue BO	40,299	Rheonine AL	9,500
Crystal violet	29,975	Rhoduline blue 6G	8,666
Phosphine	27,764	Ethyl violet	6,000
Thioflavine T	18,080	Rhodamine 6G	5,650
Patent phosphine	15,415	Nile blue BX	5,520
Magenta	14,775		

(3) DIRECT DYES

Description.—The direct or substantive dyes were introduced within the last 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 especially adapted to dyeing fabrics containing both cotton and wool, or silk and cotton (union goods). They are also used on silk, linen, and paper, and to some extent on wool, especially for knitting yarns, worsted and shoddy yarns, and loose wool.

On account of their high solubility, dyes of this group when washed have a tendancy to run. Many of them, particulary 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. The developed direct dyes are now manufactured in the United States on a large scale and in a variety of types. They are increasingly used for cotton and silk dyeing, in response to the growing demand of the public for wash goods. Probably the direct dyes whose fastness can not be developed or increased by an after-treatment with metallic salts or formaldehyde will in

future show a distinct trend toward a reduced consumption, and the use of the so-called developed direct dyes will increase.

With a few exceptions, the direct dyes are chemically "azo" compounds and are nearly all derivatives of benzidine, tolidine, diaminostilbene, or a group closely similar to one of these. A small but valuable group of direct colors belongs in the thiazole class.

Production and imports.—Direct dyes constituted 19.41 per cent of our total output of dyes in 1929 and ranked third in order of production. Comparative data on total production and sales for 1929 and 1928 are shown below.

Year	Production	Sales		
		Quantity	Value	Price [1]
	Pounds	*Pounds*		
1929	21,622,907	20,486,890	$10,170,774	49.65
1928	19,633,095	18,073,537	8,947,838	49.51
Increase:				
Actual	1,989,812	2,413,353	1,222,936	.14
Per cent	10.13	13.35	13.67	

[1] Weighted average selling price, cents per pound.

Table 21 gives production and sales data on the eight direct dyes produced in greatest quantity, and which constituted 60.91 per cent of our total production of direct dyes in 1929.

TABLE 21.—*Production and sales of the eight ranking direct dyes, 1929 and 1928*

Name of dye	Production				Sales (1929)		Sales price [1]	
	1929	1928	Change from 1928		Quantity	Value		
			Increase	Decrease			1929	1928
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*			
Direct black EW	6,964,124	7,252,626		288,502	6,991,390	$1,975,762	28	28
Developed black BHN	1,416,659	1,204,098	212,561		1,418,297	497,252	35	39
Direct blue 2B	1,352,732	1,268,150	84,582		1,148,729	294,002	26	25
Chrysophenine G	827,861	797,964	29,897		808,249	395,979	49	50
Direct black RX	795,972	483,365	312,607		625,220	188,441	30	32
Direct brown 3GO	651,232	599,982	51,250		594,126	205,822	35	36
Direct green B	593,831	519,373	74,458		557,409	207,038	37	38
Benzopurpurine 4B	568,070	455,863	112,207		516,225	236,195	46	48

[1] Weighted average selling price, cents per pound.

Imports of direct dyes, amounting to 977,792 pounds, were 60,064 pounds or 6.54 per cent greater than imports in 1928. They constituted 15.19 per cent of our total imports of all dyes and 4.52 per cent of our production of direct dyes. The 15 imported in greatest quantity were:

	Pounds		Pounds
Trisulfon brown B conc	54,967	Chlorantine fast brown	20,937
Benzo fast brown	42,832	Setacyl direct blue	19,166
Rapid fast red	37,520	Benzo fast yellow RL	18,013
Chlorantine fast violet	29,865	Pyrazol orange	16,967
Chlorantine fast green B	26,449	Brilliant sky blue	16,280
Diazo pure blue	22,480	Rapid fast orange	16,000
Diamine fast orange	21,837	Trisulfon brown 2G conc	15,858
Viscolan black B conc	21,252		

Acetate dyes.—These dyes, formerly known as S. R. A. dyes, were developed after intensive research work by the British Celanese Co. (Ltd.), manufacturers of celanese silk, especially for the dyeing of acetate cellulose, known as "acetate silk." They are sold in the form of a 10 per cent paste, consisting of a dispersion of the dye with a highly sulfonated castor oil; that is, sulforicinoleic acid. When mixed with water the dispersed colloidal solution is capable of dyeing cellulose acetate. In mixed fabrics colored with these dyes, the cotton, as well as any artificial silk other than acetate, is left unstained.

Acetate dyes offer a good range of colors, are easy to apply, and possess good general fastness. Twenty-three of these special dyes were manufactured in the United States in 1929. Their production on a large scale is a development of great interest and the large increase in production reported for 1929 is in keeping with the remarkable expansion of the domestic celanese and acetate rayon industry.

(4) 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. On wool the mordant dyes yield shades fast to light, washing, and other agents. They are also important in printing on cotton piece goods, but are little used on silk.

The mordant dyes are frequently designated as chrome colors. Because of the derivation of many of them 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; they constitute a valuable group in the dyeing of wool. When used 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 many 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. For 50 years, alizarin has been prepared synthetically from anthracene. In the United States it has been replaced, to a large extent, for use on cotton by certain of the so-called ice dyes, such as Para red, and more recently by Naphthol AS red.

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

Production and imports.—Mordant and chrome dyes constituted 4.35 per cent of our total output of dyes and ranked sixth in order of production. Comparative data on total production and sales for 1929 and 1928 are shown on the following page.

Year	Production	Sales		
		Quantity	Value	Price [1]
	Pounds	*Pounds*		
1929	4,846,228	4,656,901	$2,597,742	55.78
1928	4,403,934	3,958,973	2,399,961	60.62
Increase:				
Actual	442,294	697,928	197,781	−4.84
Per cent	10.04	17.63	8.24	

[1] Weighted average selling price, cents per pound.

Both Chrome black T and Alizarin registered greater gains in production than Chrome blue black U, the ranking dye of this group, whose production of 1,387,168 pounds was 112,019 pounds more than in 1928. Sales of Chrome blue black U amounted to 1,339,061 pounds, valued at $399,671.

Imports of mordant and chrome dyes, amounting to 545,508 pounds, were 68,636 pounds or 14.39 per cent greater than imports in 1928. They constituted 8.47 per cent of our total imports of all dyes and 11.26 per cent of our production of mordant and chrome dyes. The 15 imported in greatest quantity were:

	Pounds		Pounds
Alizarin, synthetic	69,673	Eriochrome flavine A conc	14,331
Eriochrome azurol BC	41,599	Gallamine blue	12,346
Alizarin cyclamine R	30,599	Eriochrome red G	12,127
Alizarin red S	26,413	Eriochrome violet 3B	12,125
Purpurine	16,181	Modern violet	11,796
Gallazine	16,092	Eriochrome cyanine RC	11,024
Alizarin viridine FF	15,922	Alizarin blue black B	10,477
Eriochrome brilliant violet B	14,883		

(5) SULFUR DYES

Description.—Sulfur dyes are used largely on cotton, especially for dyeing uniform cloths, hosiery, gingham yarns, and cotton warps to be woven with wool and later dyed with acid dyes. They produce heavy shades of blue, green, brown, and black. Their greatly extended use during the war served to increase permanently their application on cotton. On linen and artificial silk they have only limited use.

In cross dyeing, the sulfur dyes possess excellent fastness to washing, fulling, alkalies, and acids. 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 the hypochlorites used in modern laundries. They are applied in a sodium sulfide solution and sometimes an after treatment is given with metallic salts or with other agents 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 sulfide and sulfur. Sulfur dyes are now prepared by the fusion of various intermediates (containing the nitro, amino, or imino groups) with sodium sulfide and sulfur. These dyes are not pure, distinct compounds, and the presence of foreign substances renders them of comparatively low color value. Recent developments, however, have greatly increased the tinctorial value and shade range of many of them.

Production and imports.—Sulfur dyes constituted 20.29 per cent of our total output of dyes and ranked second in order of production. Comparative data on total production and sales for 1929 and 1928 are shown below.

Year	Production	Sales		
		Quantity	Value	Price [1]
	Pounds	*Pounds*		
1929	22,605,799	21,214,680	$4,113,233	19.39
1928	19,001,910	19,969,173	4,107,743	20.57
Increase:				
Actual	3,603,889	1,245,507	5,490	−1.18
Per cent	18.97	6.24	0.13	

[1] Weighted average selling price, cents per pound.

Production and sales data on the six sulfur dyes produced in greatest quantity, and constituting 98.23 per cent of the total production of sulfur dyes, are shown in Table 22.

TABLE 22.—*Production and sales of the six ranking sulfur dyes, 1929 and 1928*

Name of dye	Production				Sales (1929)		Sales price [1]	
	1929	1928	Change from 1928		Quantity	Value	1929	1928
			Increase	Decrease				
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*			
Sulfur black	18,121,621	14,354,755	3,766,866		17,097,563	$2,349,253	14	14
Sulfur brown	1,655,316	1,729,647		74,331	1,496,135	461,793	31	32
Sulfur blue	836,289	1,002,228		165,939	868,600	441,954	51	51
Sulfur maroon	743,210	617,729	125,481		613,664	274,803	45	52
Sulfur green	441,405	433,767		2,362	355,356	317,980	89	93
Sulfur yellow	406,926	469,777		62,851	397,670	154,653	39	41

[1] Weighted average selling price, cents per pound.

The first three of these dyes have maintained their relative position since 1921. Sulfur black, the ranking dye of this group, is an important item in our export trade, being second only to indigo. In 1929, as in the five years preceding, it was second among all dyes in quantity produced.

Imports of sulfur dyes, amounting to 142,919 pounds, showed an increase of 17,569 pounds or 14.02 per cent over 1928 imports. They constituted 2.22 per cent of our total imports of all dyes and 0.63 per cent of our production of sulfur dyes. The six imported in greatest quantity were:

	Pounds		Pounds
Indocarbon	54,639	Sulfide new blue	10,000
Pyrogene pure blue	25,787	Thionol brown	4,479
Pyrogene green GK	22,043	Katigen chrome blue	4,000

(6) VAT DYES

Description.—Vat dyes as a class are exceptionally fast to light, washing, acids, alkalies, and chlorine. Some of them are not fast to all of these agents. The consumption of vat dyes is increasing

with the growing demand for fast-dyed fabrics. Since 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, as compared with the increased life of the fabrics. A European colorist, referring to the vat dyes, has said that Europe is too poor to afford anything but fast dyes—that the loose or fugitive colors are an extravagance. Their superior fastness and the variety and beauty of shades which they yield are largely responsible for a steady increase in their use. They are applied on dyed and printed shirtings, dress goods, ginghams, muslin curtains, and other cotton wash goods, and have a limited application on silk and a still smaller one on wool. Because of their higher cost they are used chiefly for color stripes and small printed patterns on a white background rather than for solid or heavy shades. 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 the Algols, Helindones, Thioindigoes, and Hydrons, and other series produced by different German concerns. Prior to the World War, vat dyes other than indigo were made exclusively in Germany and Switzerland.

Following the outbreak of the World 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 on the market by Swiss and German firms. Since then other Indigosol types, including Indigosol red, orange, yellow, scarlet, pink, violet, and black, have been made in commercial quantity. 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 marks an advance not only in this group but in the whole realm of dye manufacture. These can be used on animal as well as vegetable fibers, and their application by the "direct method," with subsequent oxidation, is less complex than by the alkali hydrosulfite process generally used for the vat dyes. Extended use of these new derivatives will depend in large part on their selling prices.

The leucosol dyes—special types for calico printing—are vat dyes of the anthraquinone group. They were recently placed on the market by a domestic manufacturer and are now being produced on a commercial scale. Members of this group include a black, a light blue, and a navy blue.

Production and imports.—Vat dyes, ranking first in order of production, constituted 34.81 per cent of our total output of dyes in 1929. Comparative data on total production and sales for 1929 and 1928 are shown on the following page.

Year	Production	Sales		
		Quantity	Value	Price [1]
	Pounds	*Pounds*		
1929	38,784,337	37,501,167	$12,223,010	32.59
1928	32,375,812	31,310,768	9,156,995	29.25
Increase:				
Actual	6,408,525	6,190,399	3,066,015	3.34
Per cent	19.79	19.77	33.48	

[1] Weighted average selling price, cents per pound.

Synthetic indigo (20 per cent paste) is the ranking dye of this group. Its output of 29,320,270 pounds, which was 3,458,590 pounds greater than in 1928, constituted 26.31 per cent of all dyes produced. Sales amounted to 29,382,120 pounds, valued at $4,384,189; the price per pound was 15 cents as compared to 14 cents in 1928.

Of the vat dyes other than indigo, anthraquinone vat jade green, bromindigo blue 2B, 2BD, vat orange R, and anthraquinone vat violet RR, showed substantial increases in production; anthraquinone vat blue GCD showed a decrease in production of more than 175,000 pounds.

Imports of vat dyes other than indigo, amounting to 2,694,901 pounds, were 393,140 pounds, or 17.08 per cent greater than in 1928. They constituted 41.87 per cent of our total imports of all dyes and equaled 6.95 per cent of our production of vat dyes. The 14 imported in greatest quantity were:

	Pounds		Pounds
Vat golden yellow GK	441,238	Indanthrene blue GCD	64,230
Anthraflavone GC	280,240	Ciba brown G	53,562
Brilliant indigo 4B	202,375	Indanthrene red-violet	53,305
Vat printing black B	162,800	Cibanone blue 3G	52,999
Algol orange RF	79,290	Indanthrene black	52,702
Brilliant indigo B	70,488	Algol scarlet GGN	51,600
Brilliant indigo 4G	67,448	Hydron pink FF	50,450

TABLE 23.—*Vat dyes other than indigo: Domestic sales, imports, and apparent consumption in the United States, 1914 and 1923–1929*

Year	Domestic sales	Imports	Apparent consumption	Year	Domestic sales	Imports	Apparent consumption
	Pounds	*Pounds*	*Pounds*		*Pounds*	*Pounds*	*Pounds*
1914		1,945,304	1,945,304	1926	2,815,241	1,845,208	4,660,449
1923	1,608,217	1,207,554	2,815,771	1927	4,925,512	1,724,910	6,650,422
1924	1,558,080	1,493,851	3,051,931	1928	5,753,919	2,301,761	8,055,680
1925	2,252,803	2,418,842	4,671,645	1929	8,119,047	2,694,901	10,813,948

(7) COLOR-LAKE AND SPIRIT-SOLUBLE DYES

These dyes, constituting one of the smaller groups, are used in making a class of pigments known as color lakes, discussed in detail on page 56. The spirit-soluble dyes are insoluble in water, but dissolve in oils, fats, and various organic solvents; consequently they find application for coloring varnishes, fats, oils, waxes, and similar products. As many of them are converted by sulfonation and other

chemical treatments into water-soluble dyes for textile dyeing, they may be considered as partly completed dyes.

The output of color-lake and spirit-soluble dyes in 1929 was 2,724,712 pounds, or 2.44 per cent of the total output of all dyes produced. Imports of this group were 204,248 pounds, or 3.17 per cent of all dyes imported.

(8) FOOD DYES

Food dyes include a limited number of selected dyes which meet the specifications of the Bureau of Chemistry, Department of Agriculture.

The total production in 1929 was 356,059 pounds, or 107.08 per cent more than in 1928. In 1921, the first year that figures for this group were separately compiled, production was 50,709 pounds. Sales in 1929 amounted to 324,497 pounds, valued at $908,132, which is an increase of 58.42 per cent in quantity and of 39.03 per cent in value over 1928.

EXPORT TRADE IN DYES

Exports of coal-tar dyes in 1929 amounted to 34,130,325 pounds, valued at $7,279,086, an increase of 6,306,061 pounds, or 22.66 per cent in quantity, and of $747,467, or 11.44 per cent in value, over 1928. The weighted average price per pound was 21.3 cents, as compared with 23.5 cents in 1928; 20.5 cents in 1927, and 23.0 cents in 1926.

China, Japan, Canada, Belgium, and British India were the principal markets for United States dyes in 1929. South American countries were less important.

Table 24 shows the total exports of dyes from the United States from 1920 to 1929, inclusive.

TABLE 24.—*Coal-tar dyes: Exports from the United States, 1920–1929*

Year	Quantity	Value	Year	Quantity	Value
	Pounds			*Pounds*	
1920		$29,823,591	1925	25,799,889	$6,694,360
1921		6,270,139	1926	25,811,941	5,950,159
1922	8,344,187	3,496,443	1927	26,770,560	5,495,322
1923	17,924,200	5,565,267	1928 [1]	27,824,264	6,531,619
1924	15,713,428	5,636,244	1929 [2]	34,130,325	7,279,086

[1] Includes 264,986 pounds put up in packages for household use and valued at $195,441.
[2] Includes 298,242 pounds put up in packages for household use and valued at $223,295.

Details as to the quantity and value of exports to the various countries are shown in Part VI, page 187. In previous issues of the Census of Dyes, monthly exports are shown back to 1909. Table 25 shows, by months, the total exports of dyes from the United States from January, 1927, to June, 1930, inclusive.

TABLE 25.—*Colors, dyes, and stains: Domestic exports, by months, 1927 to 1929, and 1930 (6 months)*

Month	1927		1928		1929 [1]		1930 [1] [2]	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*		*Pounds*	
January	1,865,021	$404,655	1,715,365	$447,984	2,923,382	$651,757	2,051,907	$503,344
February	2,951,057	586,167	2,847,846	641,697	2,959,703	730,631	2,320,430	500,265
March	3,595,342	701,201	1,734,665	507,723	2,331,603	571,225	3,347,440	729,784
April	1,226,538	375,720	1,787,715	448,441	2,199,079	527,690	3,348,162	714,024
May	1,928,170	376,521	1,897,901	460,306	3,765,147	685,424	2,333,887	575,810
June	967,908	292,187	1,719,979	415,103	4,090,145	679,062	2,612,218	515,299
July	1,525,751	331,387	3,841,016	790,662	3,197,870	642,724		
August	2,257,139	527,784	1,350,732	378,858	3,356,022	597,873		
September	4,469,227	614,925	1,329,834	413,179	3,562,453	674,366		
October	1,837,742	399,594	5,194,209	823,693	3,342,311	662,293		
November	1,920,382	456,734	2,456,927	628,879	1,475,723	464,680		
December	2,226,283	428,447	1,948,075	574,844	926,887	391,361		
Total	26,770,560	5,495,322	27,824,264	6,531,619	34,130,325	7,279,086		

[1] Includes dyes put up in packages for household use. [2] Preliminary figures.

OTHER FINISHED COAL-TAR PRODUCTS

COLOR LAKES

Description.—A color lake is an insoluble color pigment, commonly made by precipitating a coloring matter (a coal-tar dye) on a carrier (the base). The desirable 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, aluminum hydroxide, and tannin or tannin tartar emetic. Among the more important carriers are aluminum 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 groups of 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 last-named is Para red, produced from the intermediate 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 production of color lakes in 1929 was 13,244,676 pounds, as compared to 12,127,242 pounds in 1928. Sales amounted to 12,907,914 pounds, valued at $7,262,543, as against 12,045,435 pounds in 1928, valued at $6,589,166.

MEDICINALS

Prior to 1914 Germany was the leading producer of synthetic medicinals and the chief source of our imports. During the last 15 years American chemists have built up an industry which to-day supplies a large part of our domestic requirements. Synthetic medicinals

contribute to the national welfare, both in the prevention and the cure of disease. A partial list of the medicinals developed in the last 10 years follows:

General anesthetics.—Ethylene, propylene, butylene.
Local anesthetics.—Apothesine, butyn, butesin, butesin picrate, tutocaine.
Benzyl esters.—Benzoate, stearate, fumarate, succinate.
Chloramines.—Chloramine, dichloramine, halazone.
Antiseptics.—Dibromin, hexyl resorcinol.
Hypnotics.—Neonal, amytal, ipral, dial, allonal.
Arsenic compounds.—Sulfoarsphenamine, tryparsamide.
Mercury compounds.—Mercurochrome, mercurosal, metaphen.
Bismuth compounds.—Tartrate, salicylate, and others.
Dyes.—Tetraiodophenolphthalein, phenolsulfonphthalein, acriflavine.

Production.—In 1929, 5,000,205 pounds of coal-tar medicinals were produced, or nearly a million pounds more than in 1928. Sales amounted to 4,745,054 pounds, valued at $8,358,526. The average sales value per pound was $1.76, as compared to $2.16 in 1928.

Table 26 gives the production of certain coal-tar medicinals, and the total production of all medicinals from 1922 to 1929, inclusive. For many individual medicinals, production and sales figures can not be published without disclosing confidential information.

TABLE 26.—*Coal-tar medicinals: Production of a selected list, 1922–1929*

Name	1922	1923	1924	1925	1926	1927	1928	1929
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Acetanilide	222,517	564,498	425,950	158,756	458,927	366,842	480,273	355,019
Arsphenamine	865	616	555	278	444	265		
Aspirin	1,482,998	1,525,795	1,366,530	1,499,166	1,823,748	1,715,686	1,8 6,015	2,710,374
Benzocaine	1,658	2,243	2,080	2,446	2,768	3,974	6,300	
Cincophen		32,710	56,003	60,722	79,632	84,212	94,330	99,538
Neoarsphenamine	2,904	3,365	3,220	3,289	4,113	3,889	4,814	5,525
Phenolsulfonates	300,993	208,902	197,644	163,723				
Procaine			3,790		6,702		7,952	
Salol		98,597		118,869	84,182	51,504		
Sodium salicylate	467,264	416,382	412,707	415,465	469,345	492,558	456,195	455,462
Sulfoarsphenamine		164	743	734	847	800	862	792
Total coal-tar medicinals	2,946,347	3,273,085	2,967,944	3,237,796	3,696,196	3,598,839	4,008,393	5,000,205

Aspirin, produced in larger quantity than any other medicinal during the 8-year period covered by the table, showed an increase in production of nearly 50 per cent over the 1928 output.

Arsphenamine, used in the treatment of venereal diseases, is gradually being displaced by neoarsphenamine and other derivatives of arsphenamine. The sales of arsphenamine in 1929 were approximately two-thirds of those in 1928 and amounted to 227 pounds, valued at $49,370. The pre-war price, when this country was dependent upon Germany for its entire supply, was $3.50 per ampoule. The contract price to the Government in 1929 was 18 cents per ampoule. Production of neoarsphenamine was 5,525 pounds, and sales were 4,831 pounds, valued at $1,120,633; of sulfoarsphenamine, 792 pounds, with sales of 730 pounds, valued at $191,003.

Cincophen, prescribed for acute gout and articular rheumatism, has increased in production each year since 1923. Production in 1929 was 99,538 pounds, and sales amounted to 94,392 pounds, valued at $407,711.

Medicinals showing increased production in 1929 over 1928 include acetphenetidin, ampydin, aspirin, calcium sulfophenolate, cincophen, guaiacol liquid, luminal, magnesium salicylate, neocincophen, phenolphthalein, and salol. Those showing decreased production are acetanilide, mercurochrome, phenolsulfonates, and zinc sulfophenolate.

In 1929 dyes were rendering assistance in determining the malignancy of cancerous tumors in the early stages of their development. A polychromatic stain, consisting of a mixture of aqueous solutions of the basic dye Azure A and the acid dye Erie Garnet B, has been developed in the Garvan cancer research laboratories at Johns Hopkins Hospital and University at Baltimore, Md., where it is known as "Metachrome No. 136." This stain, when used on freshly excised tissue obtained by direct freezing and sectioning by the microtome without the employment of any fixative, gives color reactions closely simulating those of hematoxylin and eosin without overstaining and obscuring the finer detail of the cell.

Assuming that a tissue diagnosis is made in the early stages of the growth of a cancerous tumor, a competent diagnostician can determine whether it is malignant or benign. This definite knowledge either permits immediate and radical procedure, which might otherwise be delayed or substituted by insufficient treatment, or it prevents unnecessary mutilating operations for cancer when the condition is benign. Although these dyes are of great value in microscopic tissue diagnosis, their value depends directly upon the pathologic skill of the diagnostician who interprets the microscopic findings.

FLAVORS AND PERFUME MATERIALS

There is no sharp line of demarcation between these two classes of coal-tar chemicals, many of them being used both as flavors for food products and as perfumes for soaps and other toilet articles. Separate classification is therefore in certain cases purely arbitrary.

Production of flavors.—The production of flavors in 1929 was 2,292,450 pounds, an increase of 31.27 per cent over 1928. Sales in 1929 were 2,253,414 pounds, valued at $3,517,182. The weighted average selling price per pound increased from 66 cents in 1928 to $1.56 in 1929.

Vanillin, one of the leading synthetic flavors, is made from guaiacol and also from oil of cloves. When derived from the latter, it commonly requires a coal-tar chemical. The production in 1929 was 337,083 pounds, as compared with 281,694 pounds in 1928. Sales in 1929 amounted to 345,766 pounds, valued at $2,154,839, or $6.23 per pound.

Methyl salicylate, an artificial wintergreen, showed an increase of 233,336 pounds over 1928. The output was 1,572,187 pounds, and sales amounted to 1,510,727 pounds, valued at $526,043.

As in 1928, coumarin was reported by five firms. Production in 1929, amounting to 108,326 pounds, represents a decrease of about 13,000 pounds from 1928. Sales amounted to 120,617 pounds, valued at $396,212.

Production of perfumes.—The output of perfume materials of coal-tar origin in 1929 was 1,599,430 pounds. Sales amounted to 1,480,368 pounds, valued at $1,082,602, or at 73 cents per pound. In 1928,

sales were 1,619,476 pounds, valued at $1,000,001, or at 61 cents per pound.

Diethylphthalate, made in greater quantity than any other perfume material, showed decreased production in 1929. Other perfume materials made in appreciable quantities in 1929 include: amyl phthalate, amyl salicylate, benzophenone, benzyl acetate, benzyl alcohol, benzyl benzoate, diphenyl oxide, and phenylethyl alcohol.

Synthetic musks—ambrette, ketone, and xylene—were made for the first time in 1926. Their production marks an advance in coal-tar perfume materials in the United States. Greater quantities of each of these three musks were produced in 1929 than in 1928.

Perfume materials, other than those mentioned, showing increased production in 1929 include acetophenone, amyl cinnamic aldehyde, and dimethyl phthalate. Products in this group showing decreased output in 1929, as compared with 1928, include amyl phthalate, benzyl acetate, cinnamic aldehyde, and methyl phenyl acetate.

SYNTHETIC RESINS

The total production of 33,036,490 pounds of synthetic resins of coal-tar origin in 1929 represents more than 50 per cent increase over the production of 20,411,465 pounds in 1928. Sales in 1929 were 30,600,513 pounds, valued at $10,393,397, as against 20,778,856 pounds, valued at $7,211,958 in 1928. Production in 1929 consisted of 26,235,792 pounds of phenolic and cresylic resins, of which 25,129,701 pounds were sold; and of 6,800,698 pounds of other types, including those derived from phthalic anhydride and from coumarone and indene, of which 5,530,812 pounds were sold.

TABLE 27.—*Synthetic resins: Production and sales, 1927–1929*

Year	Production	Sales	Value	Unit value of sales	Number of producers
	Pounds	*Pounds*			
1927	13,452,230	13,084,313	$6,094,656	$0.47	7
1928	20,411,465	20,778,856	7,211,958	.35	9
1929	33,036,490	30,660,513	10,393,397	.33	12

The increase in sales of synthetic resins during 1929 is attributed to greater demands from manufacturers of molded products, laminated sheets, and protective coatings. High dielectric strength, shock resistance, low heat conductivity, plasticity, and compatibility with many other materials are the properties that have extended the use of synthetic resins until now they are a component part of a wide variety of useful and ornamental objects.

A major use of molded resinous products is in the manufacture of electrical insulators for the automobile, radio, telephone, and airplane trade. These industries also consume large quantities of resins in the production of dials, ornamental fittings, and noiseless timing gears. Other articles of everyday use, made from resins, are artificial amber beads, costume jewelry, smokers' articles, such as pipe stems and cigar and cigarette holders, hardware, and handles for kitchen utensils. A new use is as a binder for abrasive materials in the formation of high-speed cutting and grinding wheels.

Laminated sheets are widely used as panels for supporting other fittings such as in instrument boards. A familiar use is in radio panels, still used in table models. Panels for use in interior decorating are now laminated so as to simulate the grain in various woods and in ivory. Resins in combination with wood flour have been used instead of wood in the manufacture of furniture.

Lacquers composed of synthetic resins and a solvent are largely confined to insulating uses. In recent years there has been an increased use of these resins in other types of varnishes and in conjunction with other varnish materials. The spraying and brushing lacquers used on automobiles and on various small objects usually contain a synthetic resin to enhance the adhesiveness of the nitrocellulose film. The phthalic anhydride-gylcerin resins are being used in quick drying oil varnishes. They are frequently combined with rosin or with other natural resins.

Declining prices of phenol, cresol, formaldehyde, and glycerin, used in the manufacture of synthetic resins, have favored the extension of these resins to other products.

Synthetic resins other than those of coal-tar origin are discussed in Part IV of this report.

PHOTOGRAPHIC CHEMICALS

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

Photographic chemicals were made in considerably greater quantities in 1929 than in 1928. Production amounted to 580,947 pounds, and sales to 580,150 pounds, valued at $790,981. The production of hydroquinol, the leading chemical in this group, and of amidol was markedly greater than in 1928; that of p-hydroxy phenylglycine and metol decreased.

SYNTHETIC TANNING MATERIALS

The synthetic tanning materials known as syntans have come into commercial use in Germany and England since 1912. They have not yet been used extensively in this country, but they probably will be used in the tanning of leather, together with natural tanning extracts. The output in 1929 was a large increase over 1928. Neither production nor sales figures can be published without disclosing confidential information.

Synthetic tans are especially satisfactory for producing light colors on leathers. They 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, and are commonly used in conjunction with natural tanning extracts. Less time is required to tan with the synthetic than with the natural tanning materials.

STATISTICS OF IMPORTS, PRODUCTION, AND SALES

TABLE 28.—*Medicinals and pharmaceuticals: Imports into the United States, 1929*

Name	Quantity	Name	Quantity
	Pounds		*Pounds*
Acetophenone, medicinal	11	Lucidol	220
Acetphenetidin	112	Mercury chlorophenolbarbituric acid	67
Acetyl salicylic acid	263	Methylaminopropiophenone	110
Acroleine	15	Methylene blue	9
Allylphenylcinchoninic ester	55	Methylphenylcinchoninic acid	110
p-Aminobenzoyldiethyl hydrochloride	5	Monomethylaminoacetopyrocatechol hydrochloride	26
p-Aminobenzoyldiethylaminoethanol hydrochloride	400	b-Naphthol aluminum disulfonate	22
Amino hydroxy arsinic acid	1,102	b-Naphthol compound	55
Aminophenyl salicylate	1,653	Neoarsphenamine	8.6
Aminopyrine	8,827	Neocaine	26
Antalgol	6	Neosilverarsphenamine	[1] 350
Antifebrin	8.5	Neumol	99.5
Antipyrine	96,082	Nevral	75
Arsphenamine	[1] 149	Phenic acid	198
Benzaldehyde, medicinal	1,464	Phenobarbyl	6
Benzoylguaiacol	33	Phenolphthalein	1,984
Bismuth guaiacol carbonate	88	Phenylethylbarbituric acid	208
Bismuth subsalicylate	3	Phenylethylbartiburic acid sodium salt	5
Camphro salyl	147	Phenylmethylaminopropanol hydrochloride	220
Cardiazol powder	44	Phloroglucinol	157
Causyth tablets	79	Phloroglucinol diresorcinol	5.5
Chinosol tablets	275	Physostigmine salicylate	[1] 74
Colchicine salicylate	[2] 5	Potassium sulfoguaiacolate	5,963
Croleine	13	Pyoktanin blue	25
Cyclohexatriensulfonic acid pyrazol	11	Pyrocatechine crystals	551
Diethylaminoethylether-2-methoxy-6-allyl-phenol hydrochloride	11	Resorcinol, medicinal	9,002
Diethylaminoisopentyl-8-amino-6-methoxy quinoline and salts	376	Salicylic acid methylhydroxymethyl ester	55
Dimethylhydroxy quinizine crystals	7.714	Sodium-p-aminophenylarsinate	134
Dimol, pure	45	Sodium phenyldimethylpyrazolon methylaminomethane sulfate	1
Epinine hydrochloride	3.5	Sodium phenyldimethylpyrazolon methylaminomethane sulfonate	10
2-Ethoxy-6:9-diaminoacridin lactate	2	Sodium salicylate	588
Ethylbenzene sulfonate	220	Sulfarsenol	[3] 200
Eupthalmine hydrochloride	2	Theocyl	15
Fluorescein	5	Toxinicon	3
Gaiarsine	9	Triketohydrindene hydrate	1
Guaiacol carbonate	3,146	Uraseptine	160
Hexamethylenetetramine sulfosalicylate	551	Vigorit	129
Homotropine hydrobromide USP	2.2	Vioform powder	22
p-Hydroxydiphenylmethane carbaminic acid ester	32	Viterol	110
b-Hydroxynaphthyl-o-hydroxy-m-tolylic acid, pure	6	Yatren	27
o-Hydroxyquinolinesulfonate potassium salt	300	Zinc sulfanilate	200
Iodohydroxyquinolinesulfonic acid (Quinoxyl)	12.5	All other	154
Isopropylbromophenylbarbituric acid	37	Total:	
Leucotropine	10	Quantity	143,942
		Value	$201,896

[1] Grams. [2] Ounces. [3] Ampoules.

TABLE 29.—*Synthetic aromatic chemicals of coal-tar origin: Imports into the United States, 1929*

Name	Quantity	Name	Quantity
	Pounds		*Pounds*
Acetophenone	141	Benzyl isoeugenol	37
Ambrogene	13,815	Benzyl propionate	193
Amyl cinnamic aldehyde	101	Benzyl salicylate	542.5
Amyl salicylate	1,321.5	Benzylidene acetone	333
Anisic aldehyde	2,076	Bromstyrol	710
Aurantiol	16.5	Butyl ketone	3,571
Benzaldehyde, f. f. c	50	Butyl xylene	14,111
Benzoic acid	225	Centaurea crystals	10
Benzophenone	41	Cinnamic acid ethyl ester	10
Benzyl acetate	9,904	Cinnamic acid methyl ester	100
Benzyl alcohol	1,160	Cinnamic alcohol	1,051
Benzyl benzoate	4,227.5	Cinnamic aldehyde	3,423
Benzyl butyrate	78.5	Coumarin	7,756
Benzyl formate	45.5	Coumarin extra	150

TABLE 29.—*Synthetic aromatic chemicals of coal-tar origin: Imports into the United States, 1929.*—Continued.

Name	Quantity	Name	Quantity
	Pounds		*Pounds*
p-Cresyl acetate	34.5	Musk ambrette residue	175
p-Cresyl methyl ether	75	Musk ketone	178.5
p-Cresyl phenylacetate	115	Musk xylene	628
Diethyl phthalate	47	Musk xylene residue	364
Dimethyl benzyl carbinol	2	Nerolin	1,917
Dimethyl hydroquinone	100	Nitrodibromobutyl-m-cresol methyl ether	11
Diphenyl methane	101	Phenylacetic acid	825
Diphenyl oxide	2,463.5	Phenylacetic acid methyl ester	100
Ethyl cinnamate	229	Phenylacetic aldehyde	3,251.5
Ethyl methylphenyl glycidate	22	Phenyl benzoate	19
Ethyl phenylacetate	1,132	Phenylethyl acetate	144.5
Ethyl vanillin	2,359	Phenylethyl alcohol	27,588
Flosal	903	Phenylethyl butyrate	35
Floxine	80	Phenylethyl formate	37.5
Heliotropine	2,505	Phenylethyl isobutyrate	4
Indol	345	Phenylethyl propionate	15
Isobutyl benzoate	122	Phenylethyl salicylate	13
Jacinthe	30	Phenylethyl valerianate	7
Jacinthe compound	75	Phenylglycol methylene acetal	11
Jasmine aldehyde	35	Phenylglycol valerate	2
Linalyl acetate	35	Phenylpropyl acetate	70
Linalyl benzoate	33.5	Phenylpropyl alcohol	29
Methyl acetophenone	212.5	Phenylpropyl isobutyrate	2
Methyl anthranilate	10,242	Skatol	1.25
Methyl benzoate	450	Vanillin	17,506
Methyl cinnamate	1,590	Vertena D	99
Methyl-p-cresol	132	Yara yara	501
Methyl methyl anthranilate	72	All other	690.5
Methyl naphthyl ketone	520.5		
Methylphenyl acetate	808		
Methylphenyl alcohol	22	Total:	
Methylphenyl carbinol acetate	5	Quantity	144,349
Muscogene	4.5	Value	$210,562
Musk ambrette	22.5		

TABLE 30.—*Photographic chemicals, intermediates, and other coal-tar products: Imports into the United States, 1929.*

Name	Quantity	Name	Quantity
	Pounds		*Pounds*
Acetic acid compound (sulfureted chlorotolyl acid amide)	28,000	b-Chloroanthraquinone	72,593
Acetic acid compound (sulfureted phenetol carbonic acid amide)	41,053	o-Chlorobenzaldehyde	550
Aceto-acetate-asymmetrical-m-xylidid	200	p-Chloro-m-cresol	3,263
Acetyl m-cresotinic acid	100	o-Chloro-p-nitroaniline	200
Activol	144	m-Chlorotoluene	11,026
Aeternol	441	m-Chlorotoluenethioglycolic acid	12,962
b-Aminoanthraquinone	6,819	Chloroxylyl-thioglycolic acid	2,696
Aminoazobenzene	6,495	Coal-tar products, similar to naphthalene, diluted with ethylene oxide	1,100
Aminopyrazolon	1,120	Cresidine	1,238
o-Aminotoluene	2,142	Cresol	10,316
p-Anisidine	2,498	m-Cresol	116,801
Anisidine hydrochloride	8,472	m-p-Cresol	1,102
Anthranilic acid	2,000	o-Cresol	219,249
Anthrapyridon	9,809	p-Cresol	2,587
Anthraquinone	100	Cresylic acid	1,564,224
Antinonnin	200	Cyclohexanon	777
Benzaldehyde, tech	9,300	Diamino-a-a-dianthrimid	14,891
Benzanthrone	440	Diaminophenol hydrochloride	438
Benzanthrone sulfide	6,614	Diazo compound	1,415
Benzidine disulfonic acid	1,975	Diazodiphenyl ether	441
Benzyl chloride	2,293	2-2-Dibenzanthronyl	1,786
p-Bromo-a-monomethylaminoanthraquinone	15,137	Dibenzoylamino-1:1-dianthrimid	4,264
Carbazole	5,147	Dibromo-a-aminoanthraquinone	2,077
Carbonal	70	Dichlorohydroxythionaphthene	3,518
Celloxane	300	Dichloroisatin	3,628
Chemicals for diazo type	496	Diethyl-m-toluidine	5,996
Chemical products (60 per cent ester of oxybenzoic acid: 40 per cent chlorinated phenols)	154	Dihydroxyphenyl indolinon	661
Chloramine T	104	Dimethyl phthalate	441
Chloroaminophenolsulfonic acid	12,377	Dinaphthyl dicarbonic acid	19,218
		Diphenyl black base I	20,300
		Dissolving salt B new	40,602
		Edinol	224
		Ethyl-b-naphthylamine	750

TABLE 30.—*Photographic chemicals, intermediates, and other coal-tar products: Imports into the United States, 1929.*—Continued.

Name	Quantity	Name	Quantity
	Pounds		*Pounds*
Eunaphtol K	925	Naphthol AS-G	7,375
Fast black LB base	1,550	Naphthol AS-OL	550
Fast black salt B	32,076	Naphthol AS-RL	771
Fast black salt K	7,500	Naphthol AS-SW	2,200
Fast blue salt B	3,700	Naphthol AS-TR	700
Fast Bordeaux salt GP	35,350	a-Naphthol	17,864
Fast garnet GBC base	550	Naphthol sulfonic acid	5,191
Fast orange GC base	100	b-Naphthol monosulfonic acid F	2,750
Fast orange salt GC	19,440	Naphthosol K	50
Fast orange salt GG	2,040	a-Naphthylamine sulfaminic acid	4,072
Fast orange salt GR	1,150	Naphthylamine sulfonic acid	3,500
Fast orange salt R	100	Nekal AEM	2,000
Fast red B base	1,700	o-Nitroaniline	200
Fast red KB base	14,012	p-Nitro-o-anisidine	25
Fast red RL base	2,925	Nitrochlorotoluene	40,858
Fast red TR base	2,450	p-Nitro-o-toluidine	1,350
Fast red salt AL	9,950	Paratol FF	6,390
Fast red salt B	38,300	Perlano KB	2,000
Fast red salt GLA	200	Phenanthrene	110
Fast red salt RC	200	Phenol	168,269
Fast red salt RL	1,425	Phenyl gamma acid	1,294
Fast red salt TR	3,900	Phenyl J acid	2,071
Fast scarlet RC base	100	Phenylhydrazine base	25
Fast scarlet salt GG	23,050	Phenylketonehydroxynaphthalene	430
Fast scarlet salt R	39,099	Photographic chemicals, miscellaneous	205
Fast violet B base	25	Photozylin	110
Fast violet salt B	150	Pinacyanol	[1] 25
Fast yellow salt GC	2,150	Pinakryptol green	3.5
Feltron C	19,000	Pinakryptol yellow	350
Fur developer EG	50	Piperidine piperidyl dithiocarbamate	1,250
Fur developer ER	100	Plastol C 11	1,997
Glycin	1,266	Quinone, pure	3,306
Hertolan	708	Rapidogene G paste, double conc	2,500
Hydroquinone	114	Resins, synthetic	119,235
a-Hydroxynaphthoic acid	150	Resorcinol, tech	47,760
Hygrolit	5,059	Rodinal	3,653
Indaphor A	200	Sctamol WS	1,250
Irgatan	14,311	Silver salt, dry	100
Katanol LF	500	Soap solution, in coal-tar solvent	200
Katanol O	23,066	Sodium alizarinsulfonate	15
Katanol W	54,856	Sodium-p-toluolsulfochloramid	551
Katanol WL	2,150	o-Sulfobenzaldehyde	4,603
Kollamin	1,657	Tanesco	882
Laventine BL	2,500	Tannin	10,650
Laventine KB	4,800	Tecetol	441
Leonil S	44,500	Tetrachlorophthalic acid	4,654
Leukorit	102	Tetralix, special	13,575
Ludigol	4,600	Tobias acid	1,500
Mercerol	23,003	o-Toluidine	13
Methyl-p-aminophenol	8,600	Toluidine disulfonic acid	2,093
Methylanon	7,196	Toluidine sulfanilid	2,567
Methylcyclohexanon	8,077	m-Toluidine sulfonic acid calcium salt	1,755
Methyl-p-hydroxybenzoic acid, tech	386	p-Toluolsulfochloramine, tech	551
Methylphenyl pyrazolon	8,300	Tricresylphosphate M	441
Metinol	24	Triphenylphosphate	9,110
Monomethyl-p-aminophenol sulfate	10,683	Variamine blue salt B	5,450
Mononitronaphthalene	441	Verdinol	37
Naphthol AS	3,634	All other	417
Naphthol AS-BG	600		
Naphthol AS-BO	440	Total:	
Naphthol AS-BS	650	Quantity	3,324,930
Naphthol AS-D	11,936	Value	$947,483
Naphthol AS-E	550		

[1] Grams.

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*

[The number in the first column identifies the dyes according to the Colour Index number. 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 p. 188. 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].

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	Total finished coal-tar products[1]		*Pounds* 158,698,300	$77,247,361	$0.49	*Pounds* 167,175,703
	NITROSO COLORING MATTERS					
5	Naphthol green	7, 53				
	NITRO COLORING MATTERS					
10	Naphthol yellow S	29, 38, 79				45,588
14	Lithol fast yellow GG	29				
	AZO COLORING MATTERS					
	Monoazo coloring matters					
16	Acid yellow G	8, 53, 79, 103				
17	Spirit yellow R	8, 21, 40, 103, X	45,050	38,054	.84	57,038
19	Butter yellow	8, 21, 40, 69, 79, X	21,311	16,989	.80	20,497
20	Chrysoidine Y	29, 52, 69, 79, 103	745,247	231,961	.31	805,264
21	ChrysoidineR	7, 52, 69, 79, 106				
22	Oil yellow AB	79				
23	Oil orange	40				
24	Sudan I	840, 69, 79, 106, 110, X	59,372	42,192	.71	64,050
26	Croceine orange	8, 38, 106, 134	17,568	9,536	.54	27,397
27	Orange G	52, 69, 86, 106, 134				
28	Ponceau G	69				
29	Chromotrope 2R	106, 110				
30	Fast acid fuchsine B	8, 106, 110, 113				
31	Amido naphthol red G	7, 8, 38, 40, 52, 69, 106, 118.	241,172	82,816	.34	277,748
32	Brilliant acid red B	113				
35	Brilliant lake red R	29, 69				
36	Chrome yellow 2G	8, 29, 38, 46, 69, 106, 113, 117.	133,832	62,383	.47	140,124
40	Chrome yellow R	7, 8, 29, 36, 38, 40, 52, 69, 110, 117, 134.	62,514	35,793	.57	59,118
44	Para red	X				
45	Chromotrope 2B	110				
52	Mordant yellow 4G	8				
53	Victoria violet	7, 38, 69, 106, 110, 118	46,192	31,696	.69	45,557
54	Lana fuchsine	52, 110, 134				
55	Azo coralline	66, 69				
56	Chromotrope 6B	7, 106, 110				
57	Amido naphthol red 6B	7, 8, 38, 52, 69, 106, 110, 117, 118.	171,169	81,650	.48	173,416
61	Oil yellow OB	79				
69	Toluidine red RL	X, X				
73	Sudan II	8,40, 69, 79, 106	26,535	24,932	.94	
79	Ponceau 2R	7, 8, 29, 38, 52, 69, 106, 110, 134.	527,923	227,457	.43	541,036
81	Oil brown	8				
82	Lake claret	40				
84	Double ponceau R	52				
88	Bordeaux B	7, 8, 29, 38, 40, 52, 106	110,616	54,740	.49	107,301
90	Chromotrope 10B	110				
101	Chromate brown B	29, 117				
105	Acid chrome brown R	7, 52, 69	33,695	27,252	.81	43,770
110	Chrome flavine G	69, 117				
112	Chrome fast yellow 5G	53				
113	Oil red S	110				
114	Azo eosine G	8, 110				
119	Eosamine G	110				
122	Chrome yellow 5G	7				

[1] Totals for tanning materials, research, and miscellaneous products not included.

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	AZO COLORING MATTERS—con.					
	Monoazo coloring matters—Con.		*Pounds*			*Pounds*
126	Direct pink E2GN	110				
128	Direct pink	106				
130	Direct pink EBN	110				
138	Metanil yellow	8, 38, 52, 69, 79, 106	680,411	$368,028	$0.54	707,395
143	Orange IV	29, 38				
145	Azo flavine 2R	69				
146	Azo yellow	8, 29, 52, 69, 106	82,456	57,321	.70	74,978
148	Resorcin yellow	40, 79				
151	Orange II	29, 38, 69, 79, 106	1,465,937	382,314	.26	1,615,441
156	Permanent orange R paste	8				
160	Hansarubin	69				
161	Orange R	52, 79, 106				
163	Lake red 4B	8, 38, 52, 134				
165	Lake red C (100 per cent)	8, 29, 52, 69, 134, X	357,097	417,583	1.17	364,226
167	Acid chrome brown B	69, 106				
168	Acid chrome garnet R	7, 69, 106				
169	Chrome violet B	52, 69, 106, 117				
170	Chrome black PV	52, 69, 106	47,758	26,738	.56	71,778
175	Acid chrome brown N	69				
176	Fast red A	29, 38, 69, 79, 106, 110, 113, 117, 134, X.	128,209	72,612	.57	129,376
179	Azo rubine	38, 52, 69, 106, 110	193,218	117,947	.61	191,918
180	Fast red VR	7, 8, 38, 40, 69, 106, 110, 113, X.	239,197	140,591	.59	259,462
182	Fast red E	7				
183	Croceine scarlet 3BX	38				
184	Amaranth	8, 38, 69, 79, 106	34,276	22,064	.64	33,191
185	Cochineal red	38, 69, 106, 113, 134	112,046	55,560	.50	125,338
189	Lake red R (100 per cent)	38, 69, 134, 137, X, X	714,076	572,881	.80	724,022
195	Mordant yellow	7, 8, 38, 106				
197	Chrome yellow RN	106				
201	Chrome blue black B	8, 21, 38, 52, 69, 106				
202	Chrome blue black U	7, 21, 36, 38, 40, 52, 69, 106, 117.	1,339,061	399,671	.30	1,387,168
203	Chrome black T	38, 52, 69, 106, 117				
204	Chrome black A	38, 52, 69, 106, 117	344,623	128,190	.37	326,858
208	Fast acid blue R	7, 52, 69, 106, 110	209,468	109,913	.52	228,358
209	Fast acid blue B	7, 106, 110				
214	Lake red D	69				
216	Chrome red B	7, 8, 36, 38, 40, 52, 69, 106, 117, X.	73,793	47,660	.65	48,393
225	Direct pink R	66, 110				
228	Direct scarlet G	66				
	Disazo coloring matters					
234	Resorcin brown B	7, 8, 38, 40, 52, 69, 79, 106, 113, 117, 118.	199,386	121,932	.61	230,989
235	Resorcin dark brown	7, 8, 40, 79, 106, 113	30,563	21,056	.69	
238	Acid chrome brown G	52				
245	Chrome green SW	46				
246	Acid black 10B	7, 8, 38, 40, 52, 69, 106, 110, 113, 117.	1,564,896	620,206	.40	1,433,596
247	Acid dark green A	40, 110				
248	Sudan red	69				
252	Brilliant croceine	8, 38, 52, 69, 79, 106	335,488	256,198	.76	348,270
254	Ponceau 5R	69				
256	Cloth red 3G	52				
258	Sudan IV	8, 38, 40, 52, X				
262	Cloth red 2B	8, 21, 38, 69, 106, 117	58,945	40,829	.69	66,302
267	Neutral gray G	66, 110				
271	Fast acid black R	69				
274	Milling orange G	7, 8, 66				8,229
275	Cloth scarlet G	53, 79				
278	Direct fast red 8BL	7, 29, 36 110, 113, 118	37,258	67,112	1.80	44,222
280	Scarlet EC	8, 53, 106				
288	Fast cyanine G	7				
289	Fast cyanine 5R	7, 36, 52, 69, 106, 110	748,723	396,648	.53	831,345
294	Acid black B	106				
299	Chrome black F	7, 8, 38, 52, 69, 106, 110	267,473	163,118	.61	299,829

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	AZO COLORING MATTERS—CON.					
	Disazo coloring matters—Contd.		*Pounds*			*Pounds*
302	Chrome blue green B	7, 52, 69	17,404	$12,396	$0.71	
304	Fast acid black N2B	38, 110				
306	Fast acid black F	69				
307	Fast cyanine black B	7, 52, 69, 106	233,920	154,943	.66	287,415
308	Naphthylamine black D	52, 69, 110	4,687	3,572	.76	
315	Naphthol black 2B	40				
316	Developed blue NA	106, 110				
317	Developed blue B	52, 69, 106				
319	Direct fast heliotrope 2B	52, 110				
324	Developed brilliant orange GR	52				
326	Direct fast scarlet	7, 38, 52, 106, 110	342,162	381,172	1.11	418,998
331	Bismarck brown	52, 69, 79, 106	121,926	47,656	.39	127,412
332	Bismarck brown 2R	7, 38, 52, 69, 79, 106	473,619	181,462	.38	532,400
336	Acid chrome black F	8, 69, X				
343	Chrome fast yellow C	7, 69				
346	Direct fast yellow 5GL	52, 110				
349	Direct fast yellow 4GL	110				
353	Direct fast pink 2BL	7, 36, 52, 66, 106, 113	17,937	34,023	1.90	22,160
364	Paper yellow	8, 29, 52, 106, 110, 118	137,725	108,990	.79	169,280
365	Chrysophenine G	29, 52, 106, 110	808,249	395,979	.49	827,861
370	Congo red	52, 106, 110				
374	Direct orange TA	106				
375	Congo corinth G	8, 52, 69, 106, 110, 113				
376	Direct rubine	38, X				
382	Direct scarlet B	7, 8, 38, 53, 69, 106, 113, 118, X.	253,978	286,523	1.13	278,804
385	Bordeaux	36, 38				
387	Direct violet B	7, 38, 106, 110	35,936	28,942	.81	43,210
390	Direct brilliant blue R	113				
393	Direct violet O	110				
394	Direct violet N	8, 38, 52, 69, 106, 110, 113.	46,053	44,149	.96	34,962
395	Developed black RO	8				
400	Direct fast red 9BL	52				
401	Developed black BHN	7, 8, 38, 46, 52, 69, 106, 110, 113.	1,418,297	497,252	.35	1,416,659
405	Direct cyanine R	40, 106				
406	Direct blue 2B	7, 8, 38, 40, 46, 52, 69, 106, 110, 113, 117, 118, X.	1,148,729	294,002	.26	1,352,732
409	Direct orange BD	110				
410	Chrysamine G	8, 38, 52, 106, X	1,267	771	.61	1,526
411	Cresotine yellow G	106				
415	Direct orange R	7, 38, 52, 69, 110	34,060	22,797	.67	40,139
419	Direct fast red F	7, 8, 38, 40, 52, 69, 106, 110, 113, 118.	159,248	104,659	.66	141,928
420	Direct brown M	7, 8, 38, 40, 52, 69, 106, 110, 113, 118.	185,477	108,384	.58	186,978
423	Direct brown B	7, 113				
431	Acid chrome red	110				
436	Direct brilliant red 8B	38				
443	Milling red 2G	8, 66				
446	Direct orange RT	8, 52, 106				
448	Benzopurpurine 4B	38, 52, 106, 110	516,225	236,195	.46	568,070
464	Direct blue R	110				
468	Direct mauve B	106				
471	Direct blue 3R	106				
472	Direct blue BX	38, 106, 110	26,386	11,235	.43	
473	Direct blue G	52				
477	Direct blue 3B	8, 38, 40, 106, 110	106,116	41,425	.39	
478	Direct orange G	8, 69, 106, 110				
487	Acid milling red B	8, 66, 69				15,301
493	Developed black BO	8				
495	Benzopurpurine 10B	38, 52, 106, 110	27,351	29,249	1.07	45,468
502	Direct azurine G	8, 38, 52, 106, 110	68,446	44,486	.65	81,918
508	Direct brilliant blue G	110				
512	Direct blue RW	8, 38, 52, 106, 110	193,071	141,000	.73	251,144
515	Direct blue B	106				
518	Direct pure blue 6B	38, 52, 106, 110	517,956	307,972	.59	546,914
520	Direct pure blue	7, 38, 40, 52, 106, 110, 118.	193,447	100,704	.52	242,039

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	AZO COLORING MATTERS—con.					
	Trisazo coloring matters		*Pounds*			*Pounds*
533	Direct fast blue FR	52, 69				
539	Direct fast black FF	7, 8, 38, 52, 69, 106	257, 389	$132, 942	$0. 52	250, 528
552	Diazo black RS	106, 110				
561	Direct brown BT	7, 106, 110				
576	Direct fast blue B	52, 106				
577	Direct brown T2G	7				
581	Direct black EW	7, 38, 52, 69, 106, 110, 113.	6, 991, 390	1, 975, 762	. 28	6, 964, 124
582	Direct black RX	8, 38, 52, 69, 106, 110, 113.	625, 220	188, 441	. 30	795, 972
583	Direct green ET	7, 8, 38, 69, 106, 110, 113.	92, 531	44, 135	. 48	143, 732
589	Chloramine green B	7, 8, 110, 113	60, 626	30, 883	. 51	66, 159
590	Direct steel blue G	110				
592	Direct black HW	113				
593	Direct green B	7, 8, 38, 52, 69, 106, 110, 113, 117.	557, 409	207, 038	. 37	593, 831
594	Direct green G	7, 38, 52, 113				
596	Direct brown 3GO	7, 8, 38, 40, 52, 69, 106, 110, X.	594, 126	205, 822	. 35	651, 232
597	Direct brown R	8, 113				
598	Congo brown G	38, 52, 69, 106, 110, X	130, 435	88, 737	. 68	
601	Congo brown R	7, 52				
	Tetrakisazo coloring matters					
606	Direct brown G	40, 69, 113				
608	Direct brown B	110				
	All other azo coloring matters		3, 270, 440	2, 997, 507	. 92	3, 661, 926
	Total azo coloring matters.		35, 248, 950	17, 837, 854	. 51	37, 095, 838
	STILBENE COLORING MATTERS					
620	Direct yellow R	7, 29, 38, 106, 110, 118	431, 722	150, 879	. 35	427, 800
621	Chloramine orange G	7, 29, 106, 110, 118				81, 677
622	Stilbene yellow	29, 38, 52, 110, 118				
	All other stilbene coloring matters.	106				
	Total stilbene coloring matters.		714, 821	374, 339	. 52	771, 655
	PYRAZOLONE COLORING MATTERS					
631	Direct chrysoine G	38				
636	Fast light yellow 2G	8, 29, 52, 69, 106, 121	56, 848	68, 153	1. 20	
639	Fast light yellow	7, 8, 36, 38, 110, 121				
640	Tartrazine	29, 69, 106, 121				
652	Chrome red B	38, 52, 66, 69				
653	Direct orange GR	8, 121				
654	Developed fast yellow 2G	52				
	Total pyrazolone coloring matters.		888, 968	755, 404	. 85	959, 616
	KETONIMINE COLORING MATTERS					
655	Auramine and base	29, 52, 97, 106	1, 083, 878	848, 343	. 78	1, 224, 158
	TRIPHENYLMETHANE AND DIPHENYL NAPHTHYLMETHANE COLORING MATTERS					
657	Malachite green	29, 52, 79, 106	235, 753	292, 562	1. 24	258, 064
662	Brilliant green	29, 106				
666	Acid green B	38, 52, 106, 118	76, 045	66, 823	. 88	86, 297
667	Fast acid green B	106				
670	Acid light green	52				

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	TRIPHENYLMETHANE AND DIPHENYLNAPHTHYLMETHANE COLORING MATTERS—con.		*Pounds*			*Pounds*
671	Acid glaucine blue	52, 106				
677	Magenta	38, 79, 134, X	32,067	$60,104	$1.87	35,990
680	Methyl violet and base	52, 79, 81, 86, 87, 106	732,634	554,122	.76	788,136
681	Crystal violet and base	52				
689	Spirit blue	79, 106				
696	Fast acid violet 10B	52				
698	Acid violet	36, 38, 52, 69, 106, 118	265,089	259,155	.98	251,790
699	Acid fast violet BG	106				
704	Alkali blue	79, 86, 106, 134, X, X				
706	Methyl cotton blue	79				
707	Soluble blue	79, 106, X				
712	Patent blue	106				
714	Patent blue A	106				
724	Aurine	52				
729	Victoria blue B and base	52, 106				
733	Fast acid blue B	52				
735	Naphthalene green V	52, 106				
737	Wool green S	52, 69, 106, 118	99,757	73,154	.73	108,662
	All other triphenylmethane and diphenylnaphthylmethane coloring matters.	106, 134				
	Total triphenylmethane and diphenylnaphthylmethane coloring matters.		2,370,333	2,786,590	1.18	2,502,923
	XANTHENE COLORING MATTERS					
749	Rhodamine B and base	52, 97, 110				
752	Rhodamine 6G	52				
758	Fast acid violet A2R	52				
766	Uranine	79, 86				
768	Eosine	47, 79, 86	160,105	283,943	1.77	160,989
773	Erythrosine B	8, 52, 79	1,094	3,553	3.25	
778	Phloxine	52, 79				
779	Rose bengale B	52, 79				
	Total xanthene coloring matters.		761,056	822,346	1.08	731,489
	ACRIDINE COLORING MATTERS					
785	Acridine yellow R	121				
787	Coriphosphine O	121				
788	Acridine orange A	79, 121				
789	Brilliant phosphine G	121				
793	Phosphine	38, 52, 79, 106, 121	170,936	183,307	1.07	174,582
794	Phosphine 2G	121				
797	Euchrysine 2G	121				
	QUINOLINE COLORING MATTERS					
801	Quinoline yellow	28, 106				
	THIAZOLE COLORING MATTERS					
812	Primuline	21, 38, 106, 110	204,753	78,942	.39	
813	Direct pure yellow M	110				
814	Direct fast yellow	21, 38, 66, 106, 110, 119.	235,854	213,889	.91	233,763
815	Thioflavine T	110				
816	Direct brilliant flavine S	119				
	INDOPHENOL COLORING MATTERS					
821	Indophenol	79				

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	AZINE COLORING MATTERS		*Pounds*			*Pounds*
841	Safranine	29, 52, 106	233,321	$291,791	$1.20	263,671
842	Methylene violet	81				
843	Safranine MN	106				
860	Induline (spirit-soluble)	69, 79, 106				
861	Induline (water-soluble)	21, 69, 79, 106				324,213
862	Para blue	117				
864	Nigrosine (spirit-soluble)	29, 69, 79, 106	684,131	256,068	.37	728,937
865	Nigrosine (water-soluble)	29, 69, 79, 106	1,429,133	488,134	.34	1,517,171
	All other azine coloring matters.	52, 79, 106	168,039	118,041	.70	167,931
	Total azine coloring matters.		2,833,143	1,347,694	.48	3,041,003
	ANILINE BLACK AND ALLIED COLORING MATTERS					
873	New fast gray	29, 110				
875	Fur black	29, 67, 69, 134				
	OXAZINE COLORING MATTERS					
878	Delphine blue B	106				
883	Gallocyanine	29, 106, X				
909	Cotton blue	8, 90, 106				
	THIAZINE COLORING MATTERS					
922	Methylene blue	29, 52, 79, 106	591,597	495,174	.84	567,795
924	Methylene green B	29, 106				
926	Thionine blue	29				
927	New methylene blue	29				
931	Brilliant chrome blue	66, 69				
	SULFIDE COLORING MATTERS					
969	Carbazole vat blue R	52	(1)			
971	Carbazole vat blue G	52	(1)			
	Sulfur black	52, 69, 90, 106	17,097,563	2,349,253	.14	18,121,621
	Sulfur blue	7, 20, 36, 38, 52, 69, 106.	868,600	441,954	.51	836,289
	Sulfur brown	2, 8, 20, 36, 38, 52, 69, 81, 90, 106, 146, X.	1,496,135	461,793	.31	1,655,316
	Sulfur green	7, 20, 52, 69, 106, 146, X.	355,356	317,980	.89	441,405
	Sulfur maroon	7, 20, 36, 52, 69, 106	613,664	274,803	.45	743,210
	Sulfur olive	21, 36, 52, 69, 106, 146, X.	144,070	40,103	.28	146,818
	Sulfur orange	20, 38, 69, 106	38,301	14,967	.39	45,498
	Sulfur tan	7, 36, 38, 69, 146, X	203,321	57,627	.28	208,716
	Sulfur yellow	2, 20, 56, 38, 52, 69, 106, X.	397,670	154,653	.39	406,926
	Total sulfide coloring matters.		21,214,680	4,113,133	.19	22,605,799
	ANTHRAQUINONE COLORING MATTERS					
1027	Alizarin	20, 106				
1033	Alizarin orange	20, 106				
1035	Alizarin brown	20, 52, 106, 117, X				
1039	Alizarin GI	110				
1040	Alizarin SX	106				
1053	Acid alizarin blue SE	69, 110				
1054	Acid alizarin blue B	69, 106, 110	360,437	723,458	2.01	
1056	Acid alizarin green G	69				
1062	Anthracene blue WR	36, 106				
1075	Alizarin astrol B	69				
1078	Alizarin cyanine green E	7, 36, 69, 106, 110, X	40,088	103,643	2.59	21,032

[1] Totals not included under sulfide coloring matters. In the dyes classified by method of application, these two dyes are included in the vat dyes.

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	ANTHRAQUINONE COLORING MATTERS—continued		*Pounds*			*Pounds*
1080	Acid anthraquinone violet B	110				
1085	Anthraquinone blue black B	36, 69, 106, 110, X	87,781	$134,580	$1.53	81,113
1088	Acid anthraquinone blue B	69, 110				
1091	Acid alizarin rubine	69				
	All other anthraquinone coloring matters.	8, 69, 110, 117, X	20,276	86,294	4.27	34,207
	Total anthraquinone coloring matters.		1,001,354	1,693,740	1.69	1,005,289
	ANTHRAQUINONE VAT COLORING MATTERS (SINGLE STRENGTH)					
1095	Anthraquinone vat yellow GC	110				
1096	Anthraquinone vat golden orange G.	69, 110, X				105,337
1097	Anthraquinone vat golden orange R.	52, X				
1098	Anthraquinone vat scarlet G	69				
1099	Anthraquinone vat dark blue BO.	52, 69, 106, 110, 119	51,448	72,396	1.41	58,834
1101	Anthraquinone vat jade green	110				
1102	Anthraquinone vat green B and black.	52, 69, 106, 110, 119	249,724	138,931	.56	300,304
1103	Anthraquinone vat violet R	110				
1104	Anthraquinone vat violet RR	52, 69, 106				222,631
1107	Anthraquinone vat blue RS	52, 69, 110	57,309	57,675	1.01	85,624
1109	Anthraquinone vat blue 3G	52, 110				
1113	Anthraquinone vat blue GCD	52, 69, 106, 110	782,768	538,764	.69	674,805
1114	Anthraquinone vat blue BCS	52, 69, 106				
1118	Anthraquinone vat yellow G	52, 106, 110	539,069	615,680	1.14	590,510
1120	Anthraquinone vat brown B	110				
1132	Anthraquinone vat yellow GK.	52, 110				
1133	Anthraquinone vat red FF	52, 110				
1146	Anthraquinone vat Bordeaux B.	110				
1150	Anthraquinone vat olive R	52, 69, 110	75,445	111,598	1.48	121,421
1151	Anthraquinone vat brown R	52, 69, 110	113,871	202,237	1.78	125,503
1152	Anthraquinone vat brown G	69, 110				
1161	Anthraquinone vat red violet RRN.	52, 69, 110				34,476
1162	Anthraquinone vat red BN	52, 110				
1163	Anthraquinone vat violet BNX.	110				
1169	Anthraquinone vat orange R	110				
1170	Anthraquinone vat yellow 3G	110, 119				
	All other anthraquinone vat coloring matters.	52, 69, 110, X				
	Total anthraquinone vat coloring matters.		4,189,501	5,684,812	1.35	4,917,296
	INDIGOID COLORING MATTERS					
1177	Indigo, synthetic, 20 per cent paste.	50, 52, 106	29,382,120	4,384,189	.15	29,320,270
1178	Indigo white	106				
1180	Indigo extract	36, 52, 106				
1183	Tribromindigo RB	50				
1184	Bromindigo blue 2B, 2BD	8, 50, 69				
1186	Bromindigo 6B	50				
1207	Indigo vat red B	52				
1208	Vat Bordeaux B	8				
1212	Vat red 3B	50, 52, 69, 110	102,207	132,765	1.30	178,217
1217	Vat orange R	52, 69, 110, X	374,047	590,600	1.58	454,779
1222	Vat violet BR	50, 52				
1228	Vat scarlet G	50				
1229	Vat red R	50				
	All other indigoid and thioindigoid coloring matters.	52, 110, X				

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	PHOTOCHEMICAL COLORING MATTERS		*Pounds*			*Pounds*
	Dicyanine A	56				
	Kryptocyanine	56				
	Naphthocyanole	56				
	Neocyanine	56				
	Orthochrome T	56				
	Pinnacyanole	56				
	FOOD COLORING MATTERS					
10	Naphthol yellow S	X	8,757	$14,120	$1.61	
22	Yellow AB	8, 54, 79, 106	12,074	17,245	1.43	
61	Yellow OB	8, 54, 79, 106, X	30,947	123,936	4.00	32,853
80	Ponceau 3R	18, 106, 140, X	87,894	165,831	1.89	92,873
150	Orange I	8, 18, 106, 140, 155, X	89,605	189,106	2.11	104,554
184	Amaranth	8, 18, 106, 140, 155, X	74,476	160,673	2.16	79,049
640	Tartrazine	8, 18, 106, 155, X				
666	Guinea green B	106, 155, X				
670	Light green SF (yellowish)	18, 106, 155				
773	Erythrosine	18, 106, 140, X	2,677	31,785	11.87	2,963
1180	Indigo disulfonic acid	8, 18, 106, 140, X				
	Brilliant blue FCF	106				
	Fast green FCF	140, 155				
	Ponceaux SX	106, 155				
	Sunset yellow FCF	8, 106, 155				
	Total food coloring matters.		324,497	908,132	2.80	356,059
	Bacteriological stains and indicators.	16, 39, 56, 83, 92, 106, 124.				
	All other dyes	52, 106				
	Total dyes		106,070,887	45,842,130	.43	111,421,505
	COLOR LAKES					
	Black lakes	13, 25, 77, 78, 98, X, X.	52,628	32,992	.63	58,591
	Blue lakes	4, 13, 25, 31, 37, 55, 60, 77, 78, 81, 86, 91, 98, 135, 137, 142, 160, X, X, X, X, X, X, X.	1,146,098	820,172	.72	1,157,761
	Brown lakes	13, 25, 37, 60, 91, 98, 134, 137, 142, X, X, X.	107,720	44,137	.41	107,050
	Eosine Lakes	13, 25, 31, 37, 55, 60, 77, 78, 86, 91, 98, 135, 137, 142, X, X, X, X, X, X, X, X, X.	756,359	716,797	.95	758,632
	Green lakes	4, 13, 25, 31, 37, 55, 60, 77, 79, 81, 91, 98, 134, 135, 137, 142, 160, X, X, X, X, X, X, X.	474,065	247,489	.52	488,251
	Lithol red lakes	4, 13, 25, 60, 77, 78, 81, 86, 88, 91, 98, 134, 137, 142, 160, X, X, X, X, X, X, X, X, X, X.	1,440,152	928,932	.65	1,424,280
	Maroon lakes	4, 13, 25, 31, 37, 55, 77, 78, 81, 88, 91, 101, 122, 134, 135, 137, 142, 156, 160, X, X, X, X, X, X, X.	1,446,676	738,653	.51	1,500,869

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	COLOR LAKES—continued		*Pounds*			*Pounds*
	Orange lakes	4, 13, 25, 37, 55, 60, 77, 78, 86, 91, 98, 134, 137, 142, X, X, X, X, X, X, X, X, X.	718,968	$182,676	$0.25	738,088
	Para red lakes	4, 13, 25, 31, 55, 78, 81, 86, 88, 91, 98, 122, 137, 156, 160, X, X, X, X, X, X, X, X, X.	1,958,745	844,359	.43	2,063,201
	Red lakes	4, 13, 25, 31, 37, 55, 60, 77, 78, 81, 88, 91, 98, 101, 122, 134, 135, 137, 142, 156, 160, X, X, X, X, X, X, X, X, X, X, X, X.	3,064,112	1,713,608	.56	3,202,213
	Scarlet lakes	4, 13, 25, 31, 55, 60, 81, 91, 98, 122, 134, 137, 142, 156, 160, X, X, X, X, X, X, X, X.	827,163	292,225	.35	843,153
	Violet lakes	13, 25, 31, 37, 55, 60, 77, 78, 79, 81, 86, 87, 91, 98, 135, 137 142, 160, X, X, X, X, X, X, X, X.	459,182	396,183	.86	456,859
	Yellow lakes	13, 31, 60, 78, 81, 86, 91, 98, 135, 137, 142, 160, X, X, X, X, X, X.	456,046	304,320	.67	445,728
	Total color lakes		12,907,914	7,262,543		13,244,676
	PHOTOGRAPHIC CHEMICALS					
	Diaminophenol hydrochloride (amidol).	56, 158				
	Hydroquinol	56, X, X				
	p-Hydroxy phenylglycine	X, X				
	Methyl p-aminophenol sulfate (metol) (rhodol).	X				
	Total photographic chemicals.		580,150	790,981	1.36	580,947
	MEDICINALS					
	Acetanilide, USP	100, 105, 109	348,121	116,665	.34	355,019
	Acetphenetidin	50, 105				
	Acetyl m-cresotinic acid	19				
	Acriflavine and neutral acriflavine (3:6-diamino-10-methyl acridine chloride).	1, 106				
	p-Aminobenzoyldimethylaminomethylbutanol.	19				
	Ammonium o-iodoxybenzoate	1				
	Ammonium salicylate	80, 96				
	Ampydin (4-dimethylamino antipyrine) (amidopyrine).	104, 106				
	Anesthesine. (See *benzocaine.*)					
	Apothesine (hydrochloride of diethylaminopropyl-cinnamate).	X				
	Arsphenamine	1, 49, 96, 102, 104, 139	227	49,370	217.49	
	Aspirin (acetyl salicylic acid)	19, 50, 80, 105	2,533,958	1,991,574	.79	2,710,374
	Benzoate of aluminum	133				
	Benzoate of ammonia	133				
	Benzocaine (anesthesine) (ethyl-p-amino benzoate).	1, 104, 115, 133	4,687	38,733	8.26	
	Benzocaine benzoate	133				

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	MEDICINALS—continued		*Pounds*			*Pounds*
	Benzyl succinate	102, 133				
	Bismuth betanaphthol	102, 109				
	Bismuth salicylate and subsalicylate.	96				
	Bismuth tribromophenol	102, 109				
	Brilliant green	106				
	Bromeikon (tetrabromophenolphthalein, sodium salt).	96				
	Butesin (n-butyl-p-aminobenzoate).	1				
	Butesin picrate (di-n-butyl-p-aminobenzoate-trinitrophenol).	1				
	Butyn (di-n-butylaminopropyl-p-aminobenzoate).	1				
	Caffeine sodium benzoate	96				
	Caffeine sodium salicylate	96				
	Calcium-cresol sulfonate	19				
	Calcium-guaiacol sulfonate	19				
	Calcium sulfophenolate	96				
	Chloramine T (sodium p-toluene sulfochloramide).	105				
	Cinchophen (2-phenylquinoline-4-carboxylic acid) (phenyl cinchoninic acid).	1, 29, 50, 93, X, X, X	94,392	$407,711	$4.32	99,538
	Copper sulfophenolate	96				
	Creosote carbonate	80				
	Cyclohexenylethylbarbituric acid.	19				
	Dichloramine T (p-toluene sulfodichloramide).	105				
	Formidine (methylene disalicylic acid derivative).	X				
	Guaiacol liquid	80, 105				
	Hydroxyquinoline sulfate	102				
	Iodeikon (antinosin) (tetraiodophenolphthalein sodium salt).	56, 96				
	Lithium benzoate	100				
	Luminal (phenylethylmalonylurea) (phenylethylbarbituric acid).	19				
	Luminal sodium (phenylethylmalonyl urea sodium salt) (phenylethylbarbituric acid sodium salt).	19				
	Magnesium salicylate	50, 80, 96				
	Mercurochrome (dibromohydroxy mercury fluorescein sodium salt).	83				
	Mercurosal (disodiumhydroxymercurisalicyloxy acetate).	X				
	Mercury salicylate	96				
	Methylhydroxy-p-amino benzoate.	104				
	Methyl violet	106				
	Methylene-citrylsalicylic acid	19				
	Monoglycol ester of salicylic acid.	19				
	b-Naphthol benzoate	133				
	Neoarsphenamine	1, 49, 96, 102, 104, 139	4,831	1,120,633	231.97	5,525
	Neocinchophen (p-methylphenyl cinchoninic ethyl ester).	1, 29, X				
	Parafuchsine	106				
	Peralga 1-diethylbarbituric acid 2-aminopyrene).	X				
	Phenacaine (ethenyl-p-diethoxydiphenylamidine hydrochloride).	104				
	Phenobarbital	1,102				

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	MEDICINALS—continued		*Pounds*			*Pounds*
	Phenolphthalein	105, 130, X				
	Phenolsulfonates (calcium, sodium, zinc, etc.)	102				
	Phenylethyl malonic methyl ethyl ester	1				
	Potassium acid phthalate	96				
	Potassium salicylate	96				
	Potassium sulfophenolate	96				
	Procaine (p-amino-benzoyl diethyl aminoethanol)	1.104,115				
	Proflavine (3:6-diamino acridine sulfate)	1, 106				
	Proposote (creosote phenylpropionate)	X				
	Resorcinol monoacetate	56				
	Salol	50				
	Salophen (acetylparaminophenyl salicylate)	19				
	Scarlet red extra	106				
	Silver arsphenamine	104				
	Sodium salicylate	50, 80, 102, 105	513,863	$208,023	$0.40	455,462
	Stovarsol	102				
	Strontium salicylate	80, 96				
	Sulfoarsphenamine	1, 96, 102, 104, 139	730	191,003	261.65	792
	Sulfophenolate sodium	96				
	Trypan blue	106				
	Tryparsamide	102				
	Zinc benzoate	133				
	Zinc salicylate	96				
	Zinc sulfophenolate	96				
	Total medicinals		4,745,054	8,358,526	1.76	5,000,205
	FLAVORS					
	Coumarin, synthetic	50, 61, 99, 100, 105	120,617	396,212	3.28	108,326
	Ethyl anthranilate	59				
	Ethyl benzoate	61, 65, 143, X				
	Ethyl cinnamate	61, 65				
	Ethyl salicylate	61, 65, 143				
	Ethyl vanillin	99, X				
	Methyl cinnamate	61, 65				
	Methyl salicylate	50, 80, 105, X	1,510,727	526,043	.35	1,572,187
	Propyl cinnamate	59				
	Saccharin	105				
	Vanillin	61, 65, 72, 99, 100, 105, 152	345,766	2,154,839	6.23	337,083
	Total flavors		2,253,414	3,517,182	1.56	2,292,450
	PERFUME MATERIALS					
	Acetophenone	61, 72, X				
	Amyl benzoate	59				
	Amyl cinnamic aldehyde (buxine)	61, 72, 143, 149				
	Amyl phenyl acetate	59				
	Amyl phthalate	148				
	Amyl salicylate	59, 72, 136, 143, 149, X	24,174	20,625	.85	27,765
	Aubepine (anisic aldehyde). (See *Part 2.*)	61, 65, 72				
	Benzophenone	61, 72				
	Benzyl acetate	61, 100, 136, 149, X				
	Benzyl alcohol	82, 100, 136, 149				
	Benzyl anthranilate	61				
	Benzyl benzoate	61, 136, 149				
	Benzyl butyrate	59				
	Benzyl cinnamate	61, X				
	Benzyl formate	59, 149				
	Benzyl isoeugenol	59				
	Benzyl propionate	59, 61, 149				
	Benzyl valerate	59				

TABLE 31.—*Dyes and other finished coal-tar products: Production and sales, 1929*—Continued

Colour Index No.	Name of dye	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
			Quantity	Value	Average price per pound	
	PERFUME MATERIALS—contd.		*Pounds*			*Pounds*
	Benzylidine acetone	149				
	Benzylphenyl acetate	59				
	Bromstyrol	65				
	Butylphenyl acetate	59				
	Cinnamic acid	65				
	Cinnamic alcohol	72, 143				
	Cinnamic aldehyde	65, 72				
	p-Cresyl acetate	59, 149				
	p-Cresylphenyl acetate	61				
	Diethyl phthalate	23, 61, 72, 89, 148, X				
	Dimethylhydroquinone	61				
	Dimethylhydroquinone ether	X				
	Dimethylbenzyl carbinol	61				
	Dimethyl phthalate	148, X				
	Diphenylmethane	143				
	Diphenyl oxide	50, 72				
	Guaiacol acetate	59				
	Guaiacol phenyl acetate	61				
	Hydrotropic aldehyde	143				
	Indol	61				
	Isobutyl anthranilate	61				
	Isobutyl indol	61				
	Isobutyl phenyl acetate	61, 72				
	Isobutyl salicylate	59				
	Methyl acetophenone	72, X				
	Methyl anthranilate	50, 61, X				
	Methylbenzoate	61, 143				
	Methyl cinnamate	72				
	Methyl-p-cresol (p-cresyl methyl ether)	149				
	Methylmethyl anthranilate	59, 61				
	Methylphenyl acetate	61, 72, 143, X				
	Methylphenyl glycidate	61				
	Methyl-p-toly ketone	61				
	Musk ambrette	72				
	Musk ketone	72				
	Musk xylene	72				
	b-Naphthyl anthranilate	61				
	Nonyl anthranilate	61				
	Phenylacetic aldehyde	72				
	Phenylacetic ketone	61				
	Phenylethyl acetate	59, 61, 72, 143, 149				
	Phenylethyl alcohol	61, 72				
	Phenylethyl butyrate	59				
	Phenylethyl cinnamate	59				
	Phenylethyl formate	59				
	Phenylethylphenyl acetate	59				
	Phenylethyl propionate	59, 149				
	Phenylethyl valerate	59				
	Phenylglycol acetate	61				
	Phenylpropyl acetate	59, 143				
	Phenylpropyl alcohol	143				
	p-Quinoline	61				
	Skatol (methyl indol)	61				
	Tetrahydroparamethyl quinoline	61				
	Total perfume materials		1, 480, 368	$1, 082, 602	$0. 73	1, 599, 430
	SYNTHETIC RESINS					
	Derived from phenol and cresol	9, 41, X, X, X, X, X	25, 129, 701	9, 869, 274	. 39	26, 235, 792
	Derived from other sources	17, 52, 70, 108, X	5, 530, 812	524, 123	. 09	6, 800, 698
	Total		30, 660, 513	10, 393, 397	. 33	33, 036, 490
	Synthetic tanning materials	17, X				
	Miscellaneous coal-tar products	1				
	Research chemicals	10, 56, 124				

DYES NOT CLASSIFIED BY COLOUR INDEX NUMBER

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

Common name	Manufacturers' identification numbers according to list on p. 188
A	
Acetate (SRA) black IV, IV Hy. spl	8
Acetate (SRA) blue III, IV, V	8
Acetate (celanthrene vat) blue R	110
Acetate (celanthrene vat) brilliant red	110
Acetate (celanthrene vat) fast light yellow	110
Acetate (SRA) golden orange I, III	8
Acetate (SRA) golden yellow, VIII, IX, XI	8
Acetate (SRA) heliotrope I	8
Acetate (celanthrene vat) orange	110
Acetate (SRA) orange I, II, III	8
Acetate (SRA) pink II	8
Acetate (SRA) pure yellow I, II	8
Acetate (SRA) red, I, III, V, VII	8
Acetate (SRA) violet II	8
Acid alizarin green	X
Acid alizarin irisol R	110
Acid anthracene brown PG	69
Acid anthracene red B	8
Acid anthracene yellow GR	66
Acid anthraquinone blue SAWSA	110
Acid (Buffalo) black AR,RB,8B, 3G, GRF conc	106
Acid black DB conc	X
Acid black J conc., 396, 640, 773	40
Acid (amacid) blue black 2 BN conc	8
Acid (amacid) brilliant blue 3B	8
Acid (amacid) brilliant red 5B	8
Acid (azanol) brown N	X
Acid chrome (palaside) black G conc	117
Acid chrome (palaside) brown B	117
Acid (erio) chrome brown R	38
Acid chrome (palaside) green	117
Acid (empire) coralline	117
Acid (amacid) fast orange LW	8
Acid (naphthol) green black B	38
Acid (amacid) lake Bordeaux BL	8
Acid (pontacyl) light red 4 BL	52
Acid (amacid) milling brown R supra	8
Acid (amacid) milling yellow extra	8
Acid naphthol blue black	38
Acid navy blue	113
Acid (amacid) navy blue B	8
Acid red OA	38
Acid red OTH	110
Acid (azanol) red brown R	X
Acid (pontacyl) rubine BR	52
Acid (amacid) yellow RS	8
Acid (erio) violet RL	38
Algol scarlet 3B	69
Alizarin astrole, soluble in oil	69
Alizarin black	X
Alizarin blue N, oil soluble paste	8
Alizarin hematite brown 5R	X
Alkali blue for ink	134
Anthracene red ECB extra, 3B	36
Anthraquinone vat blue 3BCS	69
Anthraquinone vat blue G	110
Anthraquinone vat blue RCX	110
Anthraquinone vat brilliant orange RK	69
Anthraquinone vat brilliant pink R	69
Anthraquinone vat brilliant yellow 4G	52
Anthraquinone vat brown GG, RT	69
Anthraquinone vat golden orange RRT [1]	69, 110, X
Anthraquinone vat golden orange 4R	110
Anthraquinone vat yellow 8G	52
Artificial silk black G	38
Azo eosine 2B	110
Azo fast blue G high conc	106
Azo fast violet	106
Azo violet BS, 2B, 2RL	7
B	
Basic (jet) black APX	52
Brilliant milling blue B	36
Bordeaux BP	69
C	
Chromate (monochrome) blue black	38
Chromate (monochrome) brown BC conc	69
Chromate brown (anthracene chromate brown) EB [2]	7, 8, 52, 110
Chromate brown (anthracene chromate brown) EBS	36
Chromate brown R, 2R, 3R	X
Chrome (alizarol) black 3G	7, 106
Chrome black DNW	36
Chrome black SWR	7
Chrome blue ATX	52
Chrome brown B, O	38
Chrome (alizarol) brown B, G, EBR, RII conc	106
Chrome (chromaven) brown BG	8
Chrome brown (anthracene chrome brown) RL	X
Chrome (palachrome) garnet	117
Chrome green	29
Chrome (serichrome) green B, G	38, 106
Chrome green CB	106
Chrome (mordant) green SN	7
Chrome (palachrome) maroon	117
Chrome orange GR extra	36
Chrome (alizarol) orange 3R	106
Chrome (palizarin) red	117
Chrome red SW	46
Chrome yellow	29
Chrome yellow DS	38
Chrome yellow SS	69
Chrome (pontachrome) yellow SW	52
Chrome (superchrome) yellow 2G	106
Chrome (alizarol) yellow 3G	106
Chrysamine K	38
Cloth red R, 2R	106
Croceine scarlet DYP, FP conc	106

[1] Sales, 66,496 pounds; value, $105,885; production, 93,509 pounds.
[2] Sales, 27,559 pounds; value, $29,594; production, 27,521 pounds.

Common name	Manufacturers' identification numbers according to list on p. 188
D	
Developed (diazine) beta black N	106
Developed (zambesi) black BG [3]	38
Developed (zambesi) black D [3]	38, 69, 106
Developed (cindiazo) black G [3]	38
Developed black 2BN [3]	110
Developed black (oxydiaminogen) OB [3]	106
Developed (zambesi) black V [3]	38, 106, 110
Developed (cindiazo) blue B	38, 40
Developed blue R	40
Developed (diazamine) blue BR	38
Developed (diazo) Bordeaux 7B	52
Developed (diazine) Bordeaux 7B conc	106
Developed (pontamine diazo) brown R	52
Developed (diazo) fast blue 2RW	38
Developed (pontamine diazo) fast red 5BL	52
Developed (diazo) fast red 7BL	52
Developed (pontamine diazo) green 2GL	52
Developed (diazo) indigo blue	7
Developed (diazo) indigo blue 4GL	52
Developed (pontamine diazo) orange RR	52
Developed (cindiazo) red 2B	38
Developed (pontamine diazo) scarlet 2BL	52
Developed diazo seal brown	X
Developed (pontamine diazo) violet BL	52
Dipyrazo orange conc	121
Direct (benzanol) art black	X
Direct (cotton) black G, 3G	113
Direct black 3G, 3GR	38
Direct (pluto) black JC	7
Direct (solamine) (solantine) blue FF	52, 106, 110
Direct (solamine) blue FFR	7
Direct (solantine) blue R	106
Direct (Niagara) blue NR	106
Direct blue 3RX	38
Direct (diamine) Bordeaux B	106
Direct Bordeaux BT	113
Direct (benzo) Bordeaux 6B	69
Direct (pontamine) brilliant violet B	52
Direct brown CN	113
Direct (erie) brown GB	106
Direct brown G2R, G3R	38
Direct brown 3G	113
Direct brown K	7
Direct (diamine) catechine	52, 106
Direct (erie) catechine G conc	106
Direct (amanil), chrome brown GR	8
Direct (benzo), chrome brown 5G	7
Direct (amanil) chrome dark brown	8
Direct (oxamine) copper blue RRX	52
Direct (dianol) dark blue B	52
Direct diazo blue BL	7
Direct fast black B	38
Direct (benzo) fast black L [4]	7, 8, 52, 69, 106, 110
Direct fast blue B, R	38
Direct fast blue 2B	110
Direct (fastusol) fast blue G	69
Direct (Niagara) fast blue RL	106
Direct (chlorantine) fast blue 2GL, 4GL	38
Direct (pontamine) fast blue 8GL	52
Direct fast brown B conc	121
Direct (benzanol) fast brown FW	X
Direct (chlorazol) fast brown RK	52
Direct (erie) fast gray M	106
Direct fast (fastusol) gray R	69
Direct fast light blue FF	38
Direct fast (rosanthrene) orange	52
Direct (pontamine) (paranol) (diamine) fast orange ER	8, 36, 52
Direct (paranol) (diamine) fast orange EG	36, 52
Direct (diamine) fast orange GG	52
Direct fast orange GL	36
Direct fast orange R, 2R, RCL	38
Direct fast pink FB	69
Direct fast red (rosanthrene) A, R	52
Direct (erie) fast rubine B conc	106
Direct fast scarlet 4BA	38
Direct fast seal brown BB	121
Direct fast violet F	7
Direct (chlorantine) fast yellow 5GL, RL	38
Direct gray G conc	40
Direct (solantine) gray GL	106
Direct (chloramine) green Y	110
Direct green special	7
Direct (pontamine) light brown 4G	52
Direct (pontamine) light gray BL, GG	52
Direct (pontamine) light orange GG	52
Direct navy blue R	7, 113
Direct (solantine) orange 4G	106
Direct pink G	21
Direct red SG	36
Direct (solantine) red 8BLN	106
Direct (benzo) rhoduline red B	52
Direct scarlet 3B	7
Direct (chlorantine) violet BB	106
Direct (solantine) yellow 4GL	106
Duraval colors	52
F	
Fast acid blue CM	69
Fast acid light red B	38
Fast acid red BL (Guinea fast red BL)	52, 66
Fast acid red GL	113
Fast acid (supramine) red 2G, 3B	69
Fast acid (supramine) yellow R	69
Fast acid violet ERR extra	52
Fast brilliant blue EA	7
Fast chrome brown PG	110
Fast crimson R	106
Fast (sulfon) cyanine 2B	66
Fast light red B	69
Fast milling orange RN	110
Fast milling yellow GN	110
Fast wool red BL, GL	106
Fast wool violet B	106
Fuchsine azo b-naphthol	79
H	
Hansa yellow	78, 86
Hansa yellow G	52
Helio Bordeaux BL	69
Helio fast blue BL	69
Helio red RMT	69
I	
Indigo vat (thianthrene) pink FB	110
Indigo vat (hydron) pink FF	52, 110, X
Induline (fat soluble)	79
L	
Lacquer maroon light	134
Lake scarlet G	8
Leather yellow	106

[3] Total sales and production of Developed blacks are as follows: Sales, 542,224 pounds; value, $348,112; production, 548,415 pounds.

[4] Sales, 194,450 pounds $174,283; production, 224,584 pounds.

Common name	Manufacturers' identification numbers according to list on p. 118
Light fast blue 4GL	110
Light fast brown R, 3YL	110
Light fast wool red BL	110
M	
Milling yellow X	21
N	
Nigrosine base B, N, NB, R, 2R	106
Nigrosine (fat soluble)	79
O	
Oil brown	X
Oil brown D, M, Y	106
Oil brown H, I	79
Oil (penetrating benzene) brown R	40
Oil brown 2R	69
Oil orange RR	40
Oil orange Y	79
Oil orange 30	X
Oil pink B	106
Oil red	69, 160
Oil red C, G	40
Oil red F	21
Oil red I, N, 1700	79
Oil red O, RO, GRO	106
Oil (special fast) red mahogany	40
Oil red 322	X
Oil soluble yellow	160
Oil yellow D	69
Oil yellow X	21
P	
Paper red AP	69
Patent blue (alphazurine) B conc	106
Pentaway fast rubinol	36
Pigment (permanent) Bordeaux 2BL	8
Pigment (lithol) fast orange	29, X
Pigment green B	69
Pigment (permanent) orange LK paste	8
Pigment (lithol) red RR	134
Pigment (permanent) red R extra	29, X
S	
Safranine 8B	106
Scarlet 3B	66
Scarlet ink	134
Silk black 4BF	38
Silk brown G	X
Silk navy blue D	110
Silk red brown R	X
Sudan T	69
T	
Thioindigo red 3B	X
V	
Vat printing (leucosol) colors	52
W	
Wool black B, GRF	110
Wool blue CB, CG	106

Employees and Rates of Pay

The number of employees receiving specified rates of pay on December 18, 1929, or on the nearest representative date for which this information could be obtained, as reported by 131 firms manufacturing coal-tar products in 1929, is shown in Table 32. The 37 firms for which data are omitted either conducted a business in which coal-tar products were not the primary articles of manufacture or did not have separately organized departments dealing with them.

In 1914 only seven firms in the United States manufactured coal-tar colors and other products. These gave employment to 528 persons. The 131 firms reporting in 1928 gave employment to 11,270 persons. In recent years, with the exception of 1929, there has been a steady integration of plants and a decrease in employees. Comparative figures are as follows:

Year	Number of firms	Number of employees	Year	Number of firms	Number of employees
1929	131	11,270	1925	154	10,971
1928	131	10,271	1924	158	12,569
1927	133	9,893	1923	181	14,841
1926	139	10,142			

Chemists and technically trained employees in 1929 constituted 15.1 per cent of all employees, as compared with 15.3 per cent of all employees in 1928 and 14.2 per cent in 1927. Of the 1,701 employees in this group in 1929, 32.51 per cent received $75 or more per week, 24.51 per cent between $50 and $75, 8.7 per cent between $45 and $50, 9.76 per cent between $40 and $45, and 10.29 per cent between $35 and $40. For employees without technical training, the scale of compensation was as follows: 25.52 per cent received between $30 and $35 per week, 22.14 per cent between $25 and $30 per week, and 17.18 per cent between $20 and $25 per week. In general, rates of pay were slightly lower in 1929 than in 1928. Table 33 compares specified rates of pay of technically trained employees with rates paid to employees not having such training.

Among the technically trained employees, the pay (in percentages) of each group was as follows: An increase of 1.25 per cent in the group receiving $30 to $35 per week, 1.33 per cent in the group receiving $35 to $40 per week, and a decrease of 1.52 per cent in the group receiving $40 to $45 per week. In the pay of the employees without technical training the decrease was 1.21 per cent in the group receiving $45 to $50 per week and 0.12 per cent in the group receiving $50 to $75 per week. Decreases in rates of pay were general for employees without technical training who received $35 or more per week. Higher salaried chemists and technically trained employees receiving $40 per week or more also suffered small decreases.

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

TABLE 32.—*Employees and rates of pay in the coal-tar dye and chemical industry, 1929*

Wage 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 employees	Employees without technical training	All employees	Chemists and technically trained employees	Employees without technical training	Chemists and technically trained employees	Employees without technical training
Under $10	1	27	28	0.06	0.28	100.00	100.00
$10 but under $15	4	178	182	.24	1.86	99.94	99.72
$15 but under $20	14	476	490	.82	4.97	99.71	97.86
$20 but under $25	30	1,644	1,674	1.76	17.18	98.88	92.88
$25 but under $30	68	2,119	2,195	4.00	22.14	97.12	75.70
$30 but under $35	125	2,442	2,559	7.35	25.52	93.12	53.56
$35 but under $40	175	1,239	1,414	10.29	12.95	85.77	28.04
$40 but under $45	166	761	927	9.76	7.95	75.49	15.09
$45 but under $50	148	322	470	8.70	3.37	65.73	7.14
$50 but under $75	417	323	740	24.51	3.38	57.03	3.77
$75 and over	553	38	591	32.51	.40	32.51	.40
Total	1,701	9,569	11,270	100.00	100.00		

TABLE 33.—*Employees and rates of pay in the coal-tar dye and chemical industry, 1929, as compared with 1928*

Wage per week	Percentage receiving each specified wage or more					
	Chemists and technically trained employees			Employees without technical training		
	1929	1928	Increase	1929	1928	Increase
Under $10	100.00		100.00	100.00	100.00	
$10 but under $15	99.94	100.00	[1] .06	99.72	99.44	0.28
$15 but under $20	99.71	99.94	[1] .23	97.86	96.82	1.04
$20 but under $25	98.88	99.05	[1] .17	92.88	90.85	2.03
$25 but under $30	97.12	96.44	.68	75.70	74.00	1.70
$30 but under $35	93.12	91.87	1.25	53.56	52.84	.72
$35 but under $40	85.77	84.44	1.33	28.04	29.70	[1] 1.66
$40 but under $45	75.49	77.01	[1] 1.52	15.09	15.54	[1] .45
$45 but under $50	65.73	67.30	[1] 1.57	7.14	8.35	[1] 1.21
$50 but under $75	57.03	59.24	[1] 2.21	3.77	3.89	[1] .12
$75 and over	32.51	33.33	[1] .82	.40	.49	[1] .09

[1] Decrease.

RESEARCH WORK

Of the 168 firms manufacturing dyes and other coal-tar chemicals in 1929, 42 had separately organized research laboratories. The total cost of the research work done in these laboratories, together with that done in laboratories not separately organized for research, was $3,244,736. This figure is an increase of $567,854 over expenditures in 1928. The data obtained by the Tariff Commission include in 1929, as in 1928, 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 $2,988,769 reported as the net cost in 1929, 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 the manufacturing operations but not charged against research on the books of the company.

The total sales of the finished coal-tar products in 1929 exceeded $77,000,000. This high research expenditure, amounting to 3.8 per cent of the total sales, gives some indication of the large amount considered necessary for such work in this industry.

PART III

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1929

Part III

DYES IMPORTED FOR CONSUMPTION IN THE UNITED STATES, 1929

Introduction

Beginning with 1919 the United States Tariff Commission has annually compiled a detailed census of dye imports.

The commission first compiled such statistics for use in the administration of section 501, Title V, 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 tariff aspects of the coal-tar chemical industry, the annual census of imports has been continued.

Imports for consumption for the year 1929, including warehouse withdrawals for dyes and other products within paragraphs 27 and 28, have been compiled and published each month under a cooperative arrangement between the chemical divisions of the Department of Commerce and the Tariff Commission. Certain discrepancies will be found to exist between the final figures published under this arrangement for the year 1929 and the preliminary figures published in the monthly reports for the reason that in checking the preliminary figures, minor errors were corrected and a few additions made.

In tabulating the dye statistics the commission has followed in the main the "Colour Index," issued by the British Society of Dyers and Colourists, and other sources of information in the files.

Such dyes as could not be identified by Colour Index numbers are classified by the ordinary method of application, as follows: Acid, basic, direct, lake and spirit soluble, mordant and chrome, sulfur, and vat. The classification of a dye by its method of application is often purely 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 is either the rate given on the invoice, or, in compartively few cases, the exchange value published by the Treasury Department for the month in which consular certification occurred.

Summary of Imports of Dyes

The total import of coal-tar dyes in 1929 was 6,437,147 pounds, valued at $5,374,085, as compared with 5,351,951 pounds in 1928, with an invoice value of $4,321,867. The dutiable value in 1929 of coal-tar dyes imported for consumption, as reported by Foreign

Commerce and Navigation of the United States, was $8,176,836. (For comparison of imports with domestic production and effect of change of duty on imports, see pp. 44 and 45.)

TABLE 34.—*Dyes: Imports into the United States, by country of shipment, 1927–1929*

Country of shipment	Percentage of total quantity		
	1927	1928	1929
Germany	58	65	67.0
Switzerland	26	25	28.8
England	4	2	1.4
France	4	1	.7
Belgium	4	2	.9
Canada	2	2	.7
Italy	2	2	.3
Netherlands	----------	1	.2

IMPORT STATISTICS

Table 35 is a summary of dyes imported from 1924 to 1929, inclusive, classified according to method of application. Table 36 compares the volume of the 1929 imports of the leading dyes in each class by application with corresponding imports in the period 1926 to 1928 and in the fiscal year 1914. Table 38, page 88, shows the quantity and value (when publishable) of individual dyes imported in 1929.

TABLE 35.—*Dyes imported into the United States, classified by method of application, 1924–1929*

Class of dye	1924		1925	
	Pounds	Per cent of total	Pounds	Per cent of total
Acid	324,538	10.74	589,959	11.32
Vat:				
(*a*) Indigo	5,471	.18	1,952	.04
(*b*) Vat (other than indigo)	1,493,851	49.43	2,416,890	46.39
Total	1,499,322	49.61	2,418,842	46.43
Mordant and chrome:				
(*a*) Alizarin	42,695	----------	75,174	1.45
(*b*) Mordant and chrome	371,207	----------	566,924	10.88
Total	413,902	13.69	642,098	12.33
Direct	421,538	13.95	759,024	14.57
Sulfur	87,764	2.90	122,230	2.35
Basic	249,068	8.24	607,637	11.66
Spirit-soluble and color-lake	17,334	.57	57,540	1.10
Unidentified, unclassified special	9,073	.30	12,271	.24
Total	3,022,539	100.00	5,209,601	100.00

TABLE 35—*Dyes imported into the United States, classified by method of application, 1924–1929*—Continued

Class of dye	1926		1927		1928	
	Pounds	Per cent of total	Pounds	Per cent of total	Pounds	Per cent of total
Acid	793,855	16.99	654,729	15.47	994,201	18.58
Vat:						
(*a*) Indigo	2,806	.06	6,057	.14	2,343	.04
(*b*) Vat (other than indigo)	1,845,208	39.49	1,724,910	40.75	2,301,761	43.01
Total	1,848,014	39.55	1,730,967	40.89	2,304,104	43.05
Mordant and chrome:						
(*a*) Alizarin	86,606	1.85	89,210	2.11	102,826	1.92
(*b*) Mordant and chrome	413,398	8.85	399,395	9.43	374,046	6.99
Total	500,004	10.70	488,605	11.54	476,872	8.91
Direct	805,848	17.24	721,342	17.04	917,728	17.15
Sulfur	149,723	3.20	137,864	3.26	125,350	2.34
Basic	406,732	8.70	334,526	7.90	424,968	7.94
Spirit-soluble and color-lake	86,106	1.84	134,778	3.18	98,550	1.84
Unidentified, unclassified special	82,914	1.78	30,235	.72	10,178	.19
Total	4,673,196	100.00	4,233,046	100.00	5,351,951	100.00

Class of dye	1929			
	Pounds	Per cent of total	Invoice value	Per cent of total
Acid	1,491,313	23.17	1,521,898	28.32
Vat (including indigo)	2,694,901	41.87	1,825,547	33.97
Mordant and chrome:				
(*a*) Alizarin	69,673	1.08	10,574	.20
(*b*) Mordant and chrome	475,835	7.39	444,710	8.27
Total	545,508	8.47	455,284	8.47
Direct	977,792	15.19	942,261	17.53
Sulfur	142,919	2.22	72,550	1.35
Basic	367,568	5.71	386,851	7.20
Spirit-soluble and color-lake	204,248	3.17	156,522	2.91
Unidentified, unclassified special	12,898	.20	13,472	.25
Total	6,437,147	100.00	5,374,085	100.00

TABLE 36.—*Dyes of each class, according to method of application, imported in largest quantity during the calendar year 1929, compared with corresponding imports in 1928, 1927, 1926, and the fiscal year 1914*

Colour Index No.	Class and type name of dye [1]	1929	1928	1927	1926	1914
	ACID DYES	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
	Brilliant wool blue FFB, FFR	88,858	45,361	29,073	8,681	6,579
	Indocyanine B	85,373	49,128	13,574	51,295	20,741
671	Erioglaucine	63,769	85,989	57,684	71,562	66,526
714	Patent blue A	54,636	58,010	33,037	29,899	63,744
	Neolan blue	52,675	15,813	10,139	16,090	----------
	Novazol blue B	46,296	22,269	10,470	2,425	----------
833	Wool fast blue BL, GL	44,377	22,868	22,041	29,468	19,238
430	Polar red G, R, RS	42,992	34,176	19,843	26,145	2,204
	Polar orange	39,681	23,812	12,236	11,021	805

[1] The type name represents, in most cases, the principal color imported in 1929.

TABLE 36.—*Dyes of each class, according to method of application, imported in largest quantity during the calendar year 1929, compared with corresponding imports in 1928, 1927, 1926, and the fiscal year 1914*—Continued

Colour Index No.	Class and type name of dye	1929	1928	1927	1926	1914
	ACID DYES—continued	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
667	Neptune green SG	39,666	16,908	16,111	14,977	10,868
	Neolan pink	33,665	7,880	551	11,548	
	Xylene fast blue FF	33,273	23,060	9,118	6,001	
	Neolan yellow	31,679	9,366	771	12,235	
	Neolan Bordeaux R	29,312	771	429		
735	Erio green B	27,031	23,131	17,137	18,539	22,144
	Polar yellow 2G, R	26,567	13,999	4,463	6,614	727
	Alkali fast green 10G	23,550	7,375	2,192	2,483	
	Brilliant indocyanine	23,371	3,724	100		
	Cloth fast yellow	21,049	11,296	3,800	2,091	
487	Brilliant milling red R	19,981	12,720	7,588	10,911	14,120
	VAT DYES [2]					
	Vat golden yellow GK	441,238	208,765	65,880	1,000	
1095	Anthraflavone GC	280,240	157,742	74,173	11,002	7,143
1184	Brilliant indigo 4B	202,375	130,812	96,271	65,711	16,880
	Vat printing black B	162,800	68,800	2,416	7,679	
1217	Algol orange RF	79,290	72,653	32,740	22,740	14,489
1190	Brilliant indigo B	70,488	69,760	16,863	32,920	8,175
1189	Brilliant indigo 4G	67,448	29,622	6,027		
1113	Indanthrene blue GCD	64,230	91,376	82,268	134,832	478,980
	Ciba brown G	53,562	17,856	[3]		
1212	Indanthrene red-violet	53,305	82,220	62,988	111,779	27,874
1173	Cibanone blue 3G	52,999	25,684	18,682	18,266	24
1102	Indanthrene black	52,702	56,649	23,887	14,546	122,261
1098	Algol scarlet GGN	51,000	[4] 564		500	99
	Hydron pink FF	50,450	68,500	43,150	21,041	
1118	Indanthrene yellow G	49,658	34,110	45,142	63,326	12,683
	Indanthrene orange RRT	39,063	43,449	15,562	53,826	
	Indanthrene brilliant violet 4R	37,764	19,747	1,300	[3]	
1188	Brilliant indigo 2B	33,289	16,464	6,629	5,988	4,518
	Indanthrene golden orange 3G	32,990	21,848	14,298	7,255	
	Vat printing brown R	30,977	27,859		14,822	
	MORDANT AND CHROME DYES					
1027	Alizarin, synthetic	69,673	102,826	89,210	86,606	202,392
720	Eriochrome azurol BC	41,599	12,311	19,898	19,886	21,060
1064	Alizarin cyclamine R	30,599	20,470	20,399	8,372	
1034	Alizarin red S	26,413	23,969	14,463	11,119	53,154
1037	Pupurine	16,181	6,413	10,000	19,948	
905	Gallazine	16,092	9,151	1,874	2,646	
1084	Alizarin viridine FF	15,922	25,331	31,188	17,634	
	Eriochrome brilliant violet B	14,883	3,857	3,114	1,763	
219	Eriochrome flavine A conc	14,331	7,816	7,714	4,408	
894	Gallamine blue	12,346	13,944	29,132	18,197	2,756
	Eriochrome red G	12,127	6,612	6,612	4,959	
	Eriochrome violet 3B	12,125	1,211	110	[3]	
892	Modern violet	11,796	11,751	5,618	8,315	
722	Eriochrome cyanine RC	11,024	4,540	4,409	3,306	2,249
1085	Alizarin blue-black B	10,477	10,054	11,078	18,145	54,706
1033	Alizarin orange	9,584	17,379	16,662	7,098	14,239
1019	Alizarin black S	9,500	5,096	6,041	3,727	136,461
	Eriochrome blue S	8,818	4,408	2,997	2,204	
	Modern black	7,605	7,275	660		
	Chromoxane brilliant violet	6,791	4,650	630	2,460	
	DIRECT DYES					
561	Trisulphon brown B conc	54,967	30,006	21,022	18,509	16,781
	Benzo fast brown	42,832	30,920	21,308	17,496	9,782
	Rapid fast red	37,520	30,800	19,050	2,850	
	Chlorantine fast violet	29,865	21,379	23,199	37,576	
	Chlorantine fast green B	26,449	14,323	10,912	6,061	
	Diazo pure blue	22,480	31,216	19,996	22,599	6,370
	Diamine fast orange	21,837	20,600	17,957	11,938	17,387
	Viscolan black B conc	21,252	500			
	Chlorantine fast brown	20,937	15,648	14,709	15,431	
	Setacyl direct blue	19,166	5,535	5,399	6,907	
	Benzo fast yellow RL	18,013	16,340	8,985	6,667	4,299
653	Pyrazol orange	16,967	10,577	11,200	5,806	1,256
	Brilliant sky-blue	16,280	16,657	9,455	[5] 20,939	1,250

[2] Single strength basis.
[3] Separate figures not obtainable.
[4] Figures incomplete.
[5] Includes brilliant sky-blue 8G.

TABLE 36.—*Dyes of each class, according to method of application, imported in largest quantity during the calendar year 1929, compared with corresponding imports in 1928, 1927, 1926, and the fiscal year 1914*—Continued

Colour Index No.	Class and type name of dye	1929	1928	1927	1926	1914
	DIRECT DYES—continued					
		Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
	Rapid fast orange	16,000	46,450	19,350	700	----------
577	Trisulfon brown 2G conc.	15,858	3,675	16,002	11,015	7,562
	Brilliant pure yellow 6G extra	14,492	6,924	5,384	2,942	849
	Diazo brilliant scarlet	13,630	11,328	2,215	9,136	38,909
403	Chlorantine fast gray B	13,005	6,061	7,826	1,655	441
	Diamine catechine	12,765	8,200	4,100	1,910	66,876
	Diazo brown	12,218	13,615	8,231	4,815	5,134
	BASIC DYES					
	Rhodamine 6GDN, 6GH [6]	59,010	89,020	36,500	61,050	----------
749	Rhodamine B [6]	41,760	109,980	102,945	133,945	58,339
729	Victoria pure blue BO	40,299	34,655	19,858	18,057	127,769
681	Crystal violet	29,975	19,925	6,550	4,190	33,653
793	Phosphine	27,764	18,700	17,625	10,250	101,858
815	Thioflavine T	18,080	12,200	7,485	4,500	35,224
797	Patent phosphine	15,415	20,825	20,100	18,080	15,403
677	Magenta	14,775	17,167	11,190	12,777	87,102
924	Methylene green W	12,337	4,441	1,440	21,328	30,812
706	Methyl Lyons blue	10,070	8,377	9,259	7,716	55
795	Rheonine AL	9,500	5,000	5,300	2,520	19,704
658	Rhoduline blue 6G	8,666	8,709	6,978	5,750	597
682	Ethyl violet	6,000	3,500	8,100	3,000	51,933
752	Rhodamine 6G [6]	5,650	1,250	1,655	5,000	37,460
913	Nile blue BX	5,520	5,501	3,250	2,750	1,518
	SULFUR DYES					
	Indocarbon	54,639	41,794	33,901	9,950	(7)
	Pyrogene pure blue	25,787	13,445	4,629	4,408	----------
	Pyrogene green GK	22,043	----------	1,103	5,511	----------
	Sulfide new blue	10,000	18,284	3,841	765	----------
	Thionol brown	4,479	6,720	11,289	18,110	----------
	Katigen chrome blue	4,000	6,746	4,809	1,752	1,407

[6] Single strength basis except 1914.

[7] Included in Schultz No. 748.

TABLE 37.—*Dyes and intermediates remaining in bonded customs warehouse, January 31, 1929, to March 31, 1930*

Date	Coal-tar dyes and colors	Coal-tar intermediates	Date	Coal-tar dyes and colors	Coal-tar intermediates
	Pounds	*Pounds*		*Pounds*	*Pounds*
Jan. 31, 1929	513,231	2,598,317	Sept. 30, 1929	895,316	1,999,347
Feb. 28, 1929	541,002	2,276,018	Oct. 31, 1929	795,756	2,081,241
Mar. 31, 1929	705,392	2,301,100	Nov. 30, 1929	867,781	2,198,240
Apr. 30, 1929	945,312	2,288,158	Dec. 31, 1929	891,720	2,110,561
May 31, 1929	1,060,195	2,295,090	Jan. 31, 1930	808,424	1,950,799
June 30, 1929	1,158,617	2,120,839	Feb. 28, 1930	694,706	1,964,504
July 31, 1929	1,013,225	2,026,258	Mar. 31, 1930	782,074	1,878,173
Aug. 31, 1929	932,120	1,968,837			

KEY TO ABBREVIATIONS USED IN TABLE 38

1. GERMAN COMPANIES

IG------ Interessen Gemeinschaft Farbenindustrie A. G.
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.
GrE----- Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
K------- Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M------ Farbwerke, vormals Meister Lucius & Brüning, Höchst-on-the-Main. Founded 1862.

2. FRENCH COMPANIES

CN------ Compagnie Nationale des Matières Colorantes et Produits Chimiques. Founded 1917.
StD----- Société Anonyme des Matières Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

3. 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.

4. ENGLISH COMPANIES

BAC----- British Alizarine Co. (Ltd.), London and Trafford Park.
BC------ British Celanese (Ltd.), Spondon, near Derby.
BDC---- British Dyestuffs Corporation (Ltd.), Huddersfield and Manchester.
Bro----- Brotherton & Co. (Ltd.), Port Rainbow, Bromborough Port, near Birkenhead.
CAC----- Clayton Aniline Co. (Ltd), Clayton, Manchester.
LBH---- L. B. Holliday & Co. (Ltd.), Huddersfield.
Lo------ Charles Lowe & Co., Manchester.
SD------ Scottish Dyes (Ltd.), Grangemouth.

5. SOURCE UNKNOWN

Q------- Importations of, through dealers in colors.

TABLE 38.—*Imports of dyes, calendar year 1929*

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
	Total		*Pounds* 6,437,147	$5,374,085
10	Naphthol yellow SXX	IG	12,000	
16	Fast yellow S	IG	100	
27	Orange GG	IG	50	
32	Brilliant sulfon red		5,601	5,151
	Brilliant sulfon red B	S		
	Brilliant sulfon red 5B	S		
	Brilliant sulfon red 10B	S		
	Polar brilliant red 3B conc	G		
44	Nitrosamine red paste	IG	1,500	
54	Sorrel red X	IG	3,250	
58	Azo wool blue SE	IG	750	
59	Azo acid blue B conc	S	484	
69	Stone fast scarlet RN pdr	IG	50	
70	Rapid fast red GL paste	IG	8,000	
77	Palatine scarlet A	IG	150	
79	Scarlet 2R	S	500	
104	Metachrome olive brown G	IG	200	
105	Acid authracene brown R	IG	1,750	
114	Kiton fast red R		1,812	
	Guinea fast red RR	IG		
	Kiton fast red R	I		
118	Fast scarlet R	IG	13	
124	Chromazone red new conc	G	331	
127	Geranine G	IG	200	
130	Erika B extra		947	
	Erika B conc	S		
	Erika B extra	IG		
131	Erika GN	IG	550	
134	Black JI (Janus black)	IG	3,200	
135	Blue JG (Janus blue G)	IG	400	
138	Orange MNO	CAC	5	
145	Jasmine high conc	G	5,510	
157	Eriochrome phosphine RR	G	4,630	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
167	Pilatus (Palatine) chrome brown RX	IG	1,150	
172	Acid alizarin black R	IG	2,500	
173	Metachrome violet B	IG	2,300	
195	Alizarin yellow GD	S	500	
196	Acid ponceau E	G	662	
202	Chromanol blue NR	DH	330	
219	Eriochrome flavine A conc	G	14,331	
224	Stanley red	CAC	110	
225	Thiazine red RXX	IG	800	
234	Resorcin brown F	IG	100	
236	Yellow JG (Janus yellow G)	IG	400	
241	Wool black 6B	IG	50	
252	Cotton scarlet extra	IG	150	
256	Cloth red 3G extra	IG	800	
257	Cloth red 3B extra	IG	40	
266	Red JB (Janus red B)	IG	250	
267	Neutral gray G	IG	50	
273	Diphenyl brown GS	G	551	
278	Chlorantine fast red		10,647	$11,980
	Benzo fast rubine BL	IG		
	Chlorantine fast red 5BL	I		
	Chlorantine fast red 7BL	I		
	Direct light red 8B	StD		
288	Sulfoncyanine G conc	IG	220	
289	Coomassie navy blue		310	
	Cloth fast blue GTB	I		
	Coomassie navy blue GNS	BDC		
292	Eriochrome verdone S	G	4,410	
298	Fast violet B	IG	700	
307	Acid milling black B	G	55	
315	Brilliant black BX		4,700	
	Brilliant black BX	IG		
	Naphthol black BD	IG		
316	Diaminogen blue		4,300	
	Blue NA	IG		
	Diazo indigo blue BR extra	IG		
317	Diaminogen extra		5,882	
	Black extra	IG		
	Diaminogen extra	C		
319	Benzo fast heliotrope		11,346	13,636
	Benzo fast heliotrope BL	IG		
	Benzo fast heliotrope 2RL	IG		
	Brilliant fast blue B	IG		
	Chlorazol fast helio BK	BDC		
	Chlorazol fast helio BKS	BDC		
321	Diamine fast scarlet GG	IG	200	
324	Diazo brilliant orange GR extra	IG	200	
325	Brilliant benzo violet B		9,088	
	Brilliant benzo violet B	IG		
	Direct fast violet B	By		
326	Benzo fast orange		8,945	5,609
	Benzo fast orange P	IG		
	Benzo fast orange S	IG		
	Benzo fast orange WS	IG		
	Benzo fast scarlet 5BS	IG		
	Benzo fast scarlet 8BS	IG		
	Benzo fast scarlet GS	IG		
	Chlorazol fast scarlet GS	BDC		
	Chlorazol fast scarlet 8GS	BDC		
327	Benzo fast scarlet 4BS	IG	300	
331	Bismarck brown	Q	55	
346	Cotton yellow GX extra	IG	250	
349	Benzo fast yellow 4GL	IG	250	
353	Fast cotton rubine B	IG	50	
368	Ignamine (Pyramine) orange 3G	IG	2,600	
369	Ignamine (Pyramine) orange 2R	IG	150	
371	Developing black OB	IG	3,500	
377	Congo orange G	IG	50	
382	Diamine scarlet 3B	IG	1,700	
388	Chlorazol violet		240	
	Chlorazol violet R	BDC		
	Chlorazol violet RS	BDC		
403	Chlorantine fast gray B		13,005	
	Chlorantine fast gray B	I		
	Diphenyl fast gray BC	G		
409	Diamine orange B	IG	9,180	
425	Minaxo (Oxamine) red 3BX	IG	900	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
430	Polar red		42,992	$29,716
	Milling red NJ	CN		
	Polar red G conc	G		
	Polar red R conc	G		
	Polar red RS conc	G		
436	Chloramine red 8BS		4,412	3,100
	Acetopurpurine 8B conc	A		
	Chloramine red 8BS	By		
	Chloramine red 8BS	IG		
439	Sulfon azurine D	IG	450	
440	Ignamine (Pyramine) orange R	IG	3,415	
441	Chromocitronine R		3,211	
	Chrome fast yellow RD	IG		
	Chromocitronine R	DH		
443	Acid anthracene red G	IG	365	
448	Cotton red		1,834	
	Cotton red 4BFX	IG		
	Cotton red 4BXA	IG		
449	Diazo brilliant black B	IG	1,676	
451	Deltapurpurine 5B	IG	900	
459	Congo orange R		7,785	
	Congo orange R	IG		
	Diamine orange F	IG		
487	Acid milling red R		19,981	12,294
	Acid milling red R conc	G		
	Brilliant milling red R	IG		
	Milling scarlet 4R	IG		
	Wool fast red 3B	IG		
488	Diamine yellow N	IG	300	
503	Benzoazurine 3G	IG	25	
518	Diamine sky-blue FF	IG	250	
536	Brown JR (Janus brown R)	IG	100	
559	Diamine bronze G	C	448	
561	Trisulfon brown B conc		54,967	
	Trisulfon brown B conc	S		
	Trisulfon brown BP conc	S		
577	Trisulfon brown 2G conc	S	15,858	
581	Cotton black E extra conc	IG	75	
582	Cotton black RW extra high conc	IG	75	
588	Chloramine black N	S	220	
590	Polyphenyl blue GC	G	2,204	
596	Benzo chrome brown G	IG	2,000	
597	Benzo chrome brown R	IG	1,250	
621	Chloramine orange G	IG	1,300	
622	Stilbene yellow 3GX	IG	400	
628	Diphenyl catechine G supra	G	11,024	
629	Diphenyl fast brown GF	G	551	
632	Diphenyl fast yellow		385	
	Diphenyl fast yellow GL supra	G		
	Diphenyl fast yellow RL supra	G		
636	Fast light yellow		3,260	
	Fast light yellow E2G	IG		
	Fast light yellow 2G	IG		
639	Xylene light yellow		2,547	2,288
	Acid chrome yellow GL	IG		
	Supra light yellow 2GL	IG		
	Xylene light yellow R conc	S		
642	Polar yellow 5G conc	G	1,102	
645	Kiton fast yellow 3G	I	7,935	
649	Triazogene orange R	IG	400	
652	Omega chrome red B conc	S	2,000	
653	Pyrazol orange		16,967	13,637
	Pyrazol orange G conc	S		
	Pyrazol orange R conc	S		
	Pyrazol orange RR conc	S		
	Direct fast orange K	I		
654	Diazo fast yellow GG		3,451	
	Diazo fast yellow GG	IG		
	Developed fast yellow 2G	By		
655	Auramine		13	
	Auramine O	Q		
	Auramine O conc	CAC		
656	Auramine G	G	110	
658	Rhoduline blue 6G		8,666	12,264
	Basic blue 6G	By		
	Rhoduline blue 6G	IG		
	Setoglaucine conc	G		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
661	Turquoise blue		250	
	Turquoise blue BB	IG		
	Turquoise blue G	IG		
663	Setocyanine		2,867	$4,238
	Brilliant silk blue B	I		
	Setocyanine	G		
	Setopaline conc	G		
664	Acronol brilliant blue S	BDC	60	
667	Poseidon green		39,666	36,398
	Benzyl green B	I		
	Brilliant milling green B	C		
	Erioviridine B supra	G		
	Erioviridine B supra I	G		
	Poseidon green SGX	IG		
670	Light green SF yellowish XX	IG	6,424	
671	Erioglaucine		63,769	61,020
	Brilliant acid blue EG conc	IG		
	Erioglaucine AP	G		
	Erioglaucine EP	G		
	Erioglaucine supra conc	G		
	Erioglaucine X high conc	G		
	Kiton blue L	I		
672	Xylene blue VS		7,976	
	Kiton pure blue V	I		
	Xylene blue VS conc	S		
673	Xylene blue AS		10,248	
	Brilliant acid blue NAS conc	CN		
	Xylene blue AS conc	S		
677	Magenta		14,775	12,089
	Diamond magenta I	IG		
	Magenta A pdr	IG		
	Magenta AB pdr	IG		
680	Methyl violet		4,200	3,384
	Methyl violet base	IG		
	Methyl violet NFB	IG		
	Violet for ink pencils extra fine	IG		
681	Crystal violet		29,975	
	Crystal violet base	IG		
	Crystal violet extra pdr	IG		
	Crystal violet crystals	IG		
682	Ethyl violet	IG	6,000	
690	Victoria blue 4R		2,470	
	Victoria blue 4R	I		
	Victoria blue 4R high conc	IG		
691	Fast green extra blue shade conc	IG	11,334	
692	Acid magenta		3,341	3,537
	Acid fuchsine	Q		
	Acid magneta II	BDC		
	Acid magenta IIS	BDC		
	Magenta S	IG		
695	Acid violet 4BLO	IG	100	
696	Kiton fast violet 10B	I	1,984	
698	Benzyl violet 5BN	I	440	
699	Eriocyanine AC	G	4,408	
700	Alkali violet A extra conc	IG	100	
702	Acid violet 7B conc	IG	105	
704	Alkali blue		5,640	6,562
	Alkali blue 2B	IG		
	Alkali blue No. 4	IG		
	Alkali blue 3R conc	I		
	Alkali blue 3R conc	IG		
	Brilliant milling blue FG	IG		
706	Methyl Lyons blue		10,070	
	Methyl Lyons blue	G		
	Pure blue conc	IG		
707	Soluble blue		18,635	26,890
	Ink blue BITBN	IG		
	Silk blue BSIC	IG		
	Soluble blue I old	IG		
	Soluble blue 3R	IG		
	Soluble blue T	IG		
710	Brilliant sky-blue		10,962	16,164
	Brilliant dianil blue 6G	IG		
	Brilliant sky-blue 5G	IG		
	Brilliant sky-blue 8G extra	IG		
	Direct brilliant blue 8B	I		
	Direct sky-blue 8G extra	By		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
712	Patent blue V		16,489	$10,479
	Acid blue BG	B		
	Acid blue V conc	Q		
	Patent blue V	IG		
	Patent blue V conc	IG		
	Patent blue V extra	IG		
713	Cyanine B	IG	75	
714	Patent blue A		54,636	36,086
	Acid blue A conc	Q		
	Acid pure blue A conc	Q		
	Kiton blue A	I		
	Patent blue A	IG		
	Patent blue A extra	IG		
	Poseidon blue BR conc	IG		
	Poseidon blue BR extra	IG		
	Poseidon blue BXX	IG		
715	Cyanol		18,693	20,946
	Blue extra	IG		
	Blue FF	IG		
	Cyanol extra	C		
	Cyanol FF	C		
	Xylene cyanol FF extra conc	S		
717	Acid violet		5,639	10,390
	Acid violet 6BN	I		
	Acid violet 6BNG	G		
	Acid violet 6BNOO	IG		
720	Eriochrome azurol BC		41,599	49,122
	Brilliant blue G	By		
	Chrome pure blue B	By		
	Chromoxane pure blue B	IG		
	Eriochrome azurol BC	G		
721	Polytrop blue 2B	DH	882	
722	Eriochrome cyanine RC	G	11,024	
723	Chrome azurol S conc	G	5,510	
724	Aurine	Lo	448	
727	Chrome violet		826	
	Chrome violet	G		
	Chrome violet CG	DH		
728	Victoria blue R		615	
	New Victoria blue B	IG		
	Victoria blue R	I		
729	Victoria pure blue BO		40,299	75,539
	Brilliant Victoria blue RS conc	S		
	Victoria blue B	I		
	Victoria blue B base	IG		
	Victoria blue B conc	CAC		
	Victoria blue B high conc	IG		
	Victoria pure blue BO	IG		
731	Night blue		526	
	Night blue	I		
	Night blue	IG		
733	Intensive blue B		1,197	
	Intensive blue B	By		
	Intensive blue B	IG		
735	Erio green B		27,031	23,078
	Alkali fast green 3G	IG		
	Erio green B supra	G		
	Kiton fast green B	I		
	Kiton fast green V	I		
	Naphthalene green high conc	IG		
	Naphthalene green NV	CN		
	Naphthalene green VN	Q		
	Xylene fast green B conc	S		
748	Sulfo rhodamine B		4,704	16,516
	Acid rhodamine B extra	MLB		
	Brilliant kiton red B	I		
	Sulfo rhodamine B extra	IG		
	Xylene red B conc	S		
749	Rhodamine B extra (single strength)		41,760	10,723
	Rhodamine B extra	I		
	Rhodamine B extra	IG		
	Rhodamine B extra base	I		
	Rhodamine B extra base	IG		
	Rhodamine B extra conc	I		
	Rhodamine B extra special	I		
751	Rhodamine 3B extra	IG	25	
752	Rhodamine 6G extra (single strength)		5,650	
	Rhodamine 6G conc	G		
	Rhodamine 6G extra	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
758	Erio fast brilliant fuchsine		10,228	$11,392
	Acid violet 4RNOO	IG		
	Fast acid violet ARR	I		
	Fast acid violet R	IG		
	Guinea rubine 4R	IG		
	Erio fast brilliant fuchsine BBL	G		
	Erio fast fuchsine BBL	G		
	Xylene fast violet R	S		
762	Chromorhodine		1,432	3,294
	Chromorhodine BB	DH		
	Chromorhodine BN	DH		
	Chromorhodine BR	DH		
767	Chrysoline A pdr	IG	650	
768	Eosine extra GFF	IG	300	
773	Erythrosine extra	IG	350	
786	Auracine G		505	1,330
	Auracine G	G		
	Auracine G	IG		
	Auracine G base	IG		
787	Coriphosphine OX extra	IG	3,000	
788	Rhoduline orange		1,260	
	Acridine orange P conc	I		
	Rhoduline orange NO	IG		
789	Patent phosphine M		5,048	
	Patent phosphine M	I		
	Saba phosphine S conc	S		
793	Phosphine		27,764	27,844
	Leather yellow A	I		
	Leather yellow GC	G		
	Phosphine O	IG		
	Phosphine 3R	IG		
795	Runic (Rheonine) AL conc	IG	9,500	
797	Patent phosphine		15,415	
	Patent phosphine GRNTN	IG		
	Patent phosphine RRDX	IG		
800	Quinoline yellow (spirit soluble)		10,002	10,573
	Quinoline yellow	G		
	Quinoline yellow	S		
	Quinoline yellow base	I		
801	Quinoline yellow		7,873	5,671
	Quinoline yellow	I		
	Quinoline yellow conc	S		
	Quinoline yellow extra	IG		
	Quinoline yellow S extra	IG		
802	Quinoline yellow KT extra	IG	175	
813	Mimosa Z conc	S	1,653	
814	Chloramine yellow GG	IG	590	
815	Thioflavine T		18,080	22,537
	Basic yellow T	IG		
	Rhoduline yellow 6G	IG		
	Rhoduline yellow 6GT	By		
	Tannoflavine T	S		
	Thioflavine TCN	IG		
828	Azocarmine GX	IG	3,300	
829	Azocarmine BX		1,500	
	Azocarmine BX	IG		
	Azo orseille BB	IG		
833	Wool fast blue BL, GL		44,377	55,852
	Benzyl fast blue GL	I		
	Wool fast blue BL	IG		
	Wool fast blue BL conc	IG		
	Wool fast blue GL	IG		
	Wool fast blue GL conc	IG		
	Wool fast violet B	IG		
	Xylene milling blue BL conc	S		
	Xylene milling blue GL conc	S		
	Xylene milling blue AE	S		
	Xylene milling violet B conc	S		
841	Safranine G conc	CAC	2	
842	Methylene violet 3RA extra	IG	250	
845	Methylene heliotrope		225	
	Methylene heliotrope extra strong	IG		
	Rosolane extra strong	IG		
846	Rosolane paste	StD	50	
851	Diphene blue		4,900	
	Diphene blue B	IG		
	Diphene blue R	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
853	Acid cyanine		4,260	
	Acid cyanine BF	IG		
	Acid cyanine G conc	IG		
861	Induline NN		450	
	Induline NN	IG		
	Solid blue, water soluble S	IG		
864	Japan black extra	IG	150	
865	Nigrosine T		3,800	
	Nigrosine T	IG		
	Silver gray P	IG		
873	Malta gray J	StD	2,645	
873	New fast gray	IG	200	
875	Ursol		7,062	$7,410
	Fouramine OP	StD		
	Fur blue-black, A, B, SB	IG		
	Fur blue-gray O	IG		
	Fur dye SC	IG		
	Fur brown PR, PY, RR, SK, SO, SP	IG		
	Fur gray ALA, BC, DMG, G, R, RB, Sp. I	IG		
	Fur gray-brown SLA	IG		
	Fur olive 3G	IG		
	Fur yellow 4G	IG		
	Fuscamine G	IG		
878	Brilliant delphine blue B	S	1,000	
879	Chromazurine		2,093	4,479
	Chromazurine E	DH		
	Chromazurine G	DH		
	Chromazurine G	I		
882	Modern heliotrope DH	DH	221	
884	Chromacetin blue S		5,843	
	Chromacetin blue S extra	DH		
	Modern royal blue	DH		
888	Chromocyanine BC paste	DH	624	
892	Blue 1900 TCD		11,796	
	Blue 1900 TCD	DH		
	Modern violet	DH		
893	Prune pure		555	
	Prune pure	S		
	Violet PDH	DH		
894	Gallamine blue extra paste	G	12,346	
905	Gallazine No. 90	DH	16,092	
909	Meldola's blue		2,055	1,192
	Cotton blue R extra conc	IG		
	Meldola's blue 3R conc	S		
	New blue RS	I		
	New fast blue RS	I		
913	Nile blue BX		5,520	
	Danubia blue BX	IG		
	Nile blue BX	IG		
922	Methylene blue		175	
	Methylene blue B conc	IG		
	Methylene blue BGF highly conc	IG		
924	Methylene green		12,337	11,636
	Methylene green G conc	S		
	Methylene green G extra	I		
	Methylene green W	G		
925	Toluidine blue	IG	25	
926	Thionine blue		3,360	
	Thionine blue G	I		
	Thionine blue GO	IG		
927	New methylene blue		5,000	
	New methylene blue N f. f. s	IG		
	New methylene blue NS conc	S		
969	Hydron blue R			
	Ciba blue 2RH	I	440	
	Hydron blue R pdr. (single strength)	IG	2,334	
971	Hydron blue G paste	IG	1,100	
1006	Pyrogene green 3G	I	1,213	
1019	Alizarin black S paste	IG	9,500	
1027	Alizarin, synthetic			69,673
	Alizarin paste bluish	I		
	Alizarin red IP pdr. (single strength)	BAC		
	Alizarin red VI extra pure paste	IG		
	Alizarin red VI old paste	IG		
1032	Alizarin claret red RL paste	IG	500	
1033	Alizarin orange		9,584	
	Alizarin orange A paste	IG		
	Alizarin orange AO paste	BDC		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
1034	Alizarin red S		26,413	$21,123
	Alizarin red S pdr	BAC		
	Alizarin red S pdr	IG		
	Alizarin red SW	I		
	Alizarin red SWB	IG		
	Alizarin red SZ	S		
1035	Alizarin brown			2,174
	Alizarin brown HD paste	IG	150	
	Alizarin brown R pdr	IG	1,700	
	Anthracene brown SW pdr	IG		
	Anthracene brown RD paste	IG	1,102	
1037	Purpurine		16,181	
	Purpurine	IG		
	Purpurine pdr	BAC		
1039	Alizarin red XGP paste	IG	3,625	
1040	Alizarin red SX		6,165	
	Alizarin red SX paste	IG		
	Alizarin red WR paste	IG		
1045	Alizarin Bordeaux		1,000	
	Alizarin Bordeaux BD paste	IG		
	Alizarin Bordeaux BP paste	IG		
1050	Alizarin cyanine 2R	IG	600	
1051	Alizarin cyanine G		262	
	Alizarin cyanine G extra	By		
	Alizarin cyanine GG pdr	IG		
1053	Alizarin light blue SE		9,256	15,669
	Alizarin light blue ESE conc	S		
	Alizarin light blue SE conc	S		
	Alizarin sapphire blue G	I		
1054	Alizarin light blue B		19,466	
	Alizarin light blue B	S		
	Alizarin light blue B conc	S		
1056	Alizarin emeraldole G	IG	20	
1058	Alizarin uranol BB pdr	IG	175	
1060	Anthracene blue SWGG pdr	IG	1,200	
1063	Anthracene blue SWR pdr	IG	1,850	
1064	Alizarin cyclamine R paste	IG	30,599	
1067	Alizarin blue S		4,610	
	Alizarin blue S	I		
	Alizarin blue S pdr	IG		
1071	Alizarin green S		2,834	
	Alizarin green S paste	BDC		
	Alizarin green S paste	IG		
1073	Alizarin irisol R		7,660	17,384
	Alizarin direct violet ER	IG		
	Alizarin irisol B pdr	IG		
	Alizarin irisol R pdr	IG		
	Alizarin light violet RS conc	S		
1075	Alizarin astrol blue B		520	
	Alizarin astrol blueB	By		
	Alizarin light blue 3G conc	S		
1076	Alizarin direct blue		5,225	14,425
	Alizarin direct blue RBX	IG		
	Alizarin direct blue RXO	IG		
	Alizarin light blue R conc	S		
1077	Alizarin direct blue BGAOO	IG	6,000	
1078	Alizarin light green GS		550	
	Alizarin cyanine green 3G pdr	IG		
	Alizarin light green GS conc	S		
1080	Special violet B pdr	IG	4,250	
1081	Anthraquinone green GXNO	B	93	
1082	Anthraquinone blue green BXO pdr	IG	560	
1084	Alizarin viridine (single strength)		15,922	6,900
	Alizarin viridine FF paste	IG		
	Alizarin viridine FF pdr	DH		
	Alizarin viridine FF pdr	IG		
1085	Alizarin blue-black B		10,477	
	Alizarin blue-black B pdr	IG		
	Alizarin light gray BS conc	S		
1087	Alizarin direct blue BC	IG	80	
1088	Wool fast blue BR	I	551	
1089	Anthraquinone blue SR extra pdr	IG	5,250	
1091	Alizarin rubinol		5,451	14,928
	Alizarin direct red 3G	By		
	Alizarin fast rubine R	I		
	Alizarin light red R conc	S		
1092	Alizarin geranol B pdr	IG	3,550	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
1093	Indanthrene blue WB pdr	IG	1,170	
1095	Anthraflavone GC (single strength)		280,240	$229,064
	Algol yellow GC paste	IG		
	Algol yellow GC dbl. paste	IG		
	Algol yellow GCN pdr	IG		
	Anthra yellow GCpaste	B		
	Anthra yellow GC dbl. paste	B		
	Anthra yellow GCN pdr	B		
	Vat yellow GC dbl. paste	B		
	Vat yellow GCN pdr	B		
1096	Indanthrene golden orange G			12,765
	Cibanone golden orange GK paste	I	331	
	Cibanone golden orange GK pdr	I	551	
	Vat golden orange G dbl. paste fine (single strength)	IG	14,388	
	Vat golden orange G pdr. (single strength)	IG		
1098	Algol scarlet GGN paste	IG	51,600	
1099	Indanthrene dark blue			
	Vat dark blue BGO paste	IG	968	
	Vat dark blue BOA paste	IG	1,964	
1102	Indanthrene black BB			16,753
	Anthra green B pdr. (single strength)	IG	1,600	
	Cibanone black 2B pdr	I	330	
	Vat black BB dbl. paste (single strength)	IG	48,772	
	Vat black BB pdr. (single strength)	IG		
	Vat black BGA dbl. paste (single strength)	IG	2,000	
1104	Indanthrene brilliant violet RR			13,109
	Cibanone violet R pdr	I	110	
	Vat brilliant violet RR paste	IG		
	Vat brilliant violet RR pdr. (single strength)	IG		
	Vat violet RR paste	B	17,660	
	Vat violet RR extra dbl. paste (single strength)	B		
	Vat violet RR extra pdr. (single strength)	B		
1105	Indanthren violet B		488	
	Vat violet B paste	B		
1106	Indanthrene blue RS (single strength)		5,450	
	Vat blue RS dbl. paste	IG		
	Vat blue RSN pdr	IG		
	Vat blue RSP triple pdr	IG		
1108	Indanthrene blue RK		100	
	Vat blue RK paste	IG		
1109	Indanthrene blue 3G (single strength)		1,750	
	Vat blue 3G pdr	IG		
1110	Indanthrene blue GGSL (single strength)		9,350	
	Vat blue GGSL pdr	IG		
	Vat blue GGSNL dbl. paste	IG		
	Vat blue GGSZ dbl. paste	IG		
1111	Indanthrene blue 5G			2,320
	Grelanone blue 3G pdr	GrE	110	
	Vat blue 5G paste	IG	4,688	
	Vat blue 5G pdr. (single strength)	IG		
1113	Indanthrene blue GCD (single strength)		64,230	18,147
	Cibanone blue GCD dbl. paste	I		
	Vat blue GCD dbl. paste	IG		
	Vat blue GCD pdr. fine	IG		
	Vat blue GCDN pdr	IG		
1114	Indanthrene blue BCD (single strength)		17,028	4,794
	Vat blue BCD dbl. paste	IG		
	Vat blue BCS pdr	B		
	Vat blue BCSO pdr	IG		
1115	Cibanone blue G			10,104
	Alizanthrene blue RC paste	BAC	200	
	Cibanone blue G paste	I	3,305	
	Cibanone blue G pdr	I	2,645	
	Cibanone blue GL	I	220	
1116	Indanthrene green BB (single strength)		6,150	
	Vat green BB paste	IG		
	Vat green BB pdr	IG		
1118	Indanthrene yellow G (single strength)		49,658	31,415
	Vat yellow G dbl. paste	IG		
	Vat yellow G pdr	IG		
	Vat yellow G pdr. fine	IG		
1123	Indanthrene gray B (single strength)		3,600	
	Algol gray R dbl. paste	IG		
	Algol gray R pdr	IG		
1128	Algol pink R (single strength)		6,400	
	Algol pink R paste	IG		
	Algol pink R pdr	IG		
1129	Algol scarlet G (single strength)		1,600	
	Algol scarlet G pdr	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
1131	Indanthrene red 5GK (single strength)		1,200	
	Vat red 5GK pdr	IG		
1132	Indanthrene yellow GK (single strength)		15,600	$3,756
	Cibanone yellow GK paste	I		
	Cibanone yellow GK pdr	I		
	Vat yellow GK paste	IG		
	Vat yellow GK pdr	IG		
1133	Algol red R (single strength)		1,280	
	Algol red R extra pdr	By		
	Algol red BK pdr	IG		
1134	Indanthrene brilliant violet BBK (single strength)		2,400	
	Vat brilliant violet BBK paste	IG		
	Vat brilliant violet BBK pdr	IG		
1135	Indanthrene brilliant violet RK (single strength)		16,024	11,248
	Grelanone violet BR paste	GrE		
	Vat brilliant violet RK paste	IG		
	Vat brilliant violet RK pdr	IG		
	Vat violet BR paste	GrE		
1136	Indanthrene orange RRK (single strength)		4,345	
	Grelanone orange R paste	GrE		
	Vat orange RRK pdr	IG		
1137	Indanthrene orange 6RTK		541	
	Vat orange R	By		
	Vat orange 6RTK paste	IG		
1138	Algol yellow 4GK pdr	IG	100	
1139	Vat (Algol) yellow 3G paste	IG	100	
1142	Indanthrene red R (single strength)		5,658	3,394
	Algol red GT pdr	IG		
	Anthra red RT dbl. paste	B		
	Anthra red RT pdr	B		
1143	Indanthrene Bordeaux B extra (single strength)		1,600	
	Algol Bordeaux RT pdr	IG		
1144	Indanthrene corinth RK (single strength)		1,280	
	Vat corinth RK pdr	IG		
1145	Indanthrene gray (single strength)		4,786	2,667
	Vat gray GK paste	IG		
	Vat gray GK pdr	IG		
	Vat gray K paste	IG		
	Vat gray K pdr	IG		
1149	Indanthrene brown GR			
	Vat brown GR dbl. paste	IG	5,850	
	Vat brown GR pdr	IG	450	
1150	Indanthrene olive R (single strength)		17,444	10,068
	Vat olive R paste	IG		
	Vat olive R pdr	IG		
	Grelanone olive B pdr	GrE		
1151	Indanthrene brown R (single strength)		18,141	13,746
	Vat brown BR paste	IG		
	Vat brown BR pdr	IG		
	Vat brown R paste	By		
	Vat brown R pdr	By		
1152	Indanthrene brown G (single strength)		16,140	10,845
	Grelanone brown B pdr	GrE		
	Vat brown G paste	IG		
	Vat brown G pdr	IG		
1155	Algol red B (single strength)		5,209	3,351
	Algol red B paste	IG		
	Algol red BTK paste	IG		
	Algol red BTK pdr	IG		
1161	Indanthrene red violet RRK (single strength)		7,300	5,633
	Vat red violet RRK paste	IG		
	Vat red violet RRK pdr	IG		
	Vat red violet RRN new paste	IG		
	Vat red violet RRN new pdr	IG		
1162	Indanthrene red RK (single strength)		17,390	9,893
	Vat red RK paste	IG		
	Vat red RK paste fine	IG		
	Vat red RK pdr	IG		
	Vat red RKP pdr	IG		
1163	Indanthrene violet RN (single strength)		9,981	
	Vat violet BN paste	IG		
	Vat violet BN pdr	IG		
1171	Cibanone brown B pdr	I	220	
1172	Cibanone black			4,203
	Cibanone black B paste	I	331	
	Cibanone black B pdr	I	220	
	Cibanone black 2G pdr	I	661	
1173	Cibanone blue 3G (single strength)		52,999	31,596
	Cibanone blue 3G paste	I		
	Vat blue green B paste	B		
	Vat blue green B dbl. paste	IG		
	Vat blue green B pdr	IG		

TABLE 38.—*Imports of dyes, calendar yeor 1929*—Continued

Colour Index No.	Name of dye	Manufacturer	Imports	
			Quantity	Invoice value
			Pounds	
1175	Cibanone olive			
	Cibanone olive B pdr	I	110	
	Cibanone olive G paste	I	220	
[1176	Indigosol yellow IICG		2,324	
	Indigosol yellow IICG	DH		
	Indigosol yellow HCG	IG		
1178	Indigosol		1,080	
	Indigo vat BASF	IG		
	Indigosol O	DH		
1182	Indigosol OR		1,096	$1,324
	Indigo vat BASF/RR	IG		
	Indigosol OR	DH		
	Indigosol OR	IG		
1183	Indigo pure BASF/RB	IG	125	
1184	Brilliant indigo 4B			64,496
	Brilliant indigo 4B paste	IG	188,989	
	Brilliant indigo 4B pdr (single strength)	IG		
	Indigosol O4B	DH	13,386	
	Indigosol O4B	IG		
1188	Brilliant indigo 2B (single strength)		33,289	
	Brilliant indigo 2B paste	IG		
	Brilliant indigo 2B pdr	IG		
1189	Brilliant indigo 4G (single strength)		67,448	
	Brilliant indigo 4G paste	IG		
	Brilliant indigo 4G pdr	IG		
1190	Brilliant indigo B paste	IG	70,488	
1196	Ciba yellow G paste	I	5,509	
1199	Helindone green G (single strength)		11,591	5,382
	Helindone green G paste	IG		
	Vat green G dbl. paste	M		
	Vat green G dbl. paste	IG		
1200	Algol blue 5R paste	IG	500	
1202	Indigosol AZG		1,302	
	Indigosol AZG	DH		
	Indigosol AZG	IG		
1207	Algol red 5B		21,688	13,638
	Algol red 5B paste	IG		
	Ciba pink B paste	I		
	Helindone red BB vat	IG		
1209	Algol rubine B			
	Algol rubine B paste	IG	300	
	Algol rubine B pdr	IG	225	
1211	Algol pink B (single strength)		13,551	11,078
	Algol pink B paste	IG		
	Algol pink BG paste	IG		
	Helindone pink BN pdr	IG		
	Vat pink BG paste	IG		
1212	Indanthrene red-violet RH		53,305	31,959
	Vat (Helindone) red 3B pdr. (single strength)	M		
	Vat red-violet RH paste	IG		
	Vat red-violet RH pdr. (single strength)	IG		
	Indigosol red-violet IRH	DH		
1217	Algol orange RF			58,115
	Algol orange RF paste	IG	75,462	
	Algol orange RF pdr. (single strength)	IG		
	Algol orange RF pressed cakes	IG		
	Vat orange R paste	M		
	Indigosol orange HR	DH	3,828	
	Indigosol orange HR	IG		
1218	Helindone fast scarlet R (single strength)		7,975	
	Vat scarlet R paste	IG		
	Vat scarlet R pdr	IG		
1219	Algol violet RR (single strength)		500	
	Algol violet RR pdr	IG		
1223	Algol brown 3R (single strength)		735	
	Algol brown 3R pdr	IG		
1226	Ciba red G (single strength)		1,100	
	Ciba red G pdr	I		
1227	Vat printing brown GN paste	IG	14,000	
1228	Algol scarlet GG (single strength)			3,261
	Algol scarlet GG paste	IG	4,933	
	Algol scarlet GG paste conc	IG		
	Algol scarlet GG pdr	IG		
	Anthra scarlet GG paste	IG		
	Thioindigo scarlet 2G paste	IG	500	
1247	Indigo, natural		2,137	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED ACID DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Acid black		25,265	
Acid black R	IG		
Acid black RR	IG		
Acid blue RBF	I	13,225	
Acid brown RN	G	662	
Acid leather brown		12,250	$10,119
Acid leather brown EG	IG		
Acid leather brown EGB	IG		
Acid leather brown ER	IG		
Acid light green AEJ	DH	6,946	
Acid milling yellow		15,955	
Acid milling yellow G	S		
Acid milling yellow P	S		
Acid pure blue		6,612	
Acid pure blue BR supra	G		
Acid pure blue R supra	G		
Acid rhodamine		1,211	
Acid rhodamine R	I		
Acid rhodamine 3R	I		
Acid violet		2,815	3,720
Acid violet ACS conc	S		
Acid violet BW	By		
Acid violet 8B extra	IG		
Acid violet C10B	IG		
Acid violet R extra	IG		
Acid violet RN	G		
Alizarin astrol violet B pdr	IG	850	
Alizarin cyanine green 5G pdr	IG	300	
Alizarin cyanol gray G	IG	25	
Alizarin direct blue		3,975	
Alizarin direct blue A2G	IG		
Alizarin direct blue AR	IG		
Alizarin fast violet R	I	330	
Alizarin night blue AG conc	S	1,000	
Alizarin sky-blue		75	
Alizarin sky-blue G	IG		
Alizarin sky-blue NA	IG		
Alizarin supra blue		4,613	
Alizarin supra blue A	IG		
Alizarin supra blue A3R	IG		
Alizarin supra sky-blue R	IG	2,450	
Alkali fast green 10G	IG	23,550	
Alkali violet 10B	IG	55	
Alphanol brown B	IG	400	
Amido naphthol brown 3G	IG	1,475	
Azo acid black B	IG	100	
Azo acid blue BF	IG	100	
Benzyl fast blue 3GL	I	1,653	
Benzyl red B	I	330	
Blue black HF	IG	100	
Brilliant acid blue		3,065	3,228
Brilliant acid blue FF	IG		
Brilliant acid blue FF conc	By		
Brilliant acid blue FF conc	IG		
Brilliant acid blue 5G	Q		
Brilliant acid orange G	Q	228	
Brilliant indocyanine		23,371	
Brilliant indocyanine 6B	IG		
Brilliant indocyanine G	IG		
Brilliant milling blue B	IG	14,825	
Brilliant sulfo flavine FF	IG	25	
Brilliant wool blue		88,858	73,117
Brilliant wool blue FFB extra	IG		
Brilliant wool blue FFR extra	By		
Brilliant wool blue FFR extra	IG		
Cashmire black TN	IG	1,800	
Cloth fast brilliant red		880	
Cloth fast brilliant red 2B	I		
Cloth fast brilliant red 4B	I		
Cloth fast green G	I	771	
Cloth fast orange		1,322	
Cloth fast orange G	I		
Cloth fast orange R	I		
Cloth fast red		5,729	7,631
Cloth fast red B	I		
Cloth fast red 3B	I		
Cloth fast red R	I		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED ACID DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Cloth fast yellow		21,049	
Cloth fast yellow G	I		
Cloth fast yellow 5G conc	I		
Croceine scarlet A	CAC	5	
Dark nut brown	IG	60	
Erio carmine		771	
Erio carmine 2BC	G		
Erio carmine 2BF supra	G		
Erio fast black B	G	276	
Erio fast brown R	G	551	
Erio fast red G conc	G	385	
Erioglaucine		380	
Erioglaucine AFF	G		
Erioglaucine FL supra	G		
Fast acid green BB extra	IG	400	
Fast jasmine G conc	G	11,023	
Fast silk yellow SG	Q	25	
Gloria yellow G	IG	100	
Guinea brown		1,650	
Guinea brown GRL	IG		
Guinea brown RR	IG		
Guinea fast green B	IG	1,800	
Indocyanine B		85,373	
Indocyanine B	A		
Indocyanine B	IG		
Ink fast black A extra	IG	1,000	
Kiton fast green A	I	550	
Kiton fast red 4BL	I	992	
Lanasol violet		1,543	
Lanasol violet BB	I		
Lanasol violet R	I		
Luxine orange R	DH	331	
Metanil red 3B extra	IG	5,500	
Milling brown R	IG	200	
Milling orange		5,050	
Milling orange G	IG		
Milling orange GN	IG		
Milling red		5,250	$4,515
Milling red 4BA	IG		
Milling red 6BA	IG		
Milling red GA	IG		
Milling yellow		11,708	10,598
Milling yellow HG	IG		
Milling yellow H5G	IG		
Milling yellow O	IG		
Milling yellow OO	IG		
Minaxo (Oxamine) acid brown G	IG	2,600	
Naphthol blue-black FG	IG	750	
Neolan black		17,192	
Neolan black GG	I		
Neolan black RR	I		
Neolan blue		52,675	49,413
Neolan blue B	I		
Neolan blue BR	I		
Neolan blue G	I		
Neolan blue GG	I		
Neolan blue GR	I		
Neolan blue RR	I		
Neolan Bordeaux R	I	29,312	
Neolan brown R	I	441	
Neolan gray		220	
Neolan gray BS	I		
Neolan gray RS	I		
Neolan green LBN	I	7,714	
Neolan orange		18,625	26,220
Neolan orange G	I		
Neolan orange GRE	I		
Neolan orange R	I		
Neolan pink		33,665	
Neolan pink B	I		
Neolan pink G	I		
Neolan red		991	
Neolan red B	I		
Neolan red R	I		
Neolan verdone B	I	2,312	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED ACID DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Neolan violet		5,067	
Neolan violet R	I		
Neolan violet 3R	I		
Neolan violet brown B	I	1,873	
Neolan yellow		31,079	$31,436
Neolan yellow G	I		
Neolan yellow GR	I		
Neolan yellow R	I		
Neotolyl black TL extra	IG	9,250	
Neutral brown RX	G	2,149	
Neutral red BX	G	1,433	
Novazol acid blue		7,714	
Novazol acid blue BL supra	G		
Novazol acid blue GL supra	G		
Novazol blue B	G	46,296	
Novazol violet B	G	2,204	
Onis (Anthosine)		8,696	
Onis B	IG		
Onis 3B	IG		
Palatine black		450	
Pilatus black SF	IG		
Palatine fast black		50	
Pilatus fast black GG	IG		
Palatine fast blue		4,600	3,720
Pilatus fast blue BN	IG		
Pilatus fast blue BR	IG		
Pilatus fast blue G	IG		
Pilatus fast blue GGN	IG		
Pilatus fast blue GR	IG		
Pilatus fast blue X	IG		
Palatine fast brown		200	
Pilatus fast brown BRRNO	IG		
Palatine fast claret		1,100	
Pilatus fast claret RNX	IG		
Palatine fast dark green		25	
Pilatus fast dark green BNOO	IG		
Palatine fast gray		600	
Pilatus fast gray B	IG		
Palatine fast green		3,750	
Pilatus fast green BL conc	IG		
Palatine fast orange		475	
Pilatus fast orange GN	IG		
Pilatus fast orange R	IG		
Palatine fast pink		3,075	
Pilatus fast pink B	IG		
Pilatus fast pink BNOO	IG		
Pilatus fast pink G	IG		
Palatine fast red		100	
Pilatus fast red RN	IG		
Palatine fast violet		800	
Pilatus fast violet R	IG		
Pilatus fast violet 3RN	IG		
Palatine fast yellow		3,250	
Pilatus fast yellow G	IG		
Pilatus fast yellow GRN	IG		
Pilatus fast yellow 3GN	IG		
Polar blue G supra	G	55	
Polar brilliant red		13,227	
Polar brilliant red B conc	G		
Polar brilliant red 3B conc	G		
Polar gray	G	6,062	
Polar maroon VC	G	2,204	
Polar orange		39,681	
Polar orange GS conc	G		
Polar orange R conc	G		
Polar red		7,715	
Polar red B conc	G		
Polar red 3B conc	G		
Polar yellow		26,567	
Polar yellow 2G conc	G		
Polar yellow R conc	G		
Polytrop blue		220	
Polytrop blue 3G	DH		
Polytrop blue R	DH		
Radio brown B	IG	700	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED ACID DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Radio navy blue B	IG	250	
Selan printing brown 3R	IG	4,800	
Sella acid brown		66	
Sella acid brown B	G		
Sella acid brown G	G		
Sella acid brown R	G		
Silk yellow		3,950	
Silk yellow GF	IG		
Silk yellow R	IG		
Sulfo rhodamine			$8,796
Sulfo rhodamine BG	IG	3,750	
Sulfo rhodamine 3B extra	IG	25	
Sulfo rhodamine G extra	IG	400	
Acid rhodamine BG extra	M	110	
Acid rhodamine G	M	152	
Sulfon orange G	IG	16,050	
Sulfon yellow		2,250	
Sulfon yellow 5G	IG		
Sulfon yellow R	IG		
Supra light rubine BL	IG	25	
Supramine black		6,361	
Acid black BR	By		
Supramine black BR	IG		
Supramine blue		5,400	
Supramine blue FB	IG		
Supramine blue R	IG		
Supramine Bordeaux B	IG	3,500	
Supramine brown		4,290	6,403
Acid brown G	By		
Supramine brown G	IG		
Supramine brown R	IG		
Supramine green		950	
Supramine green BL	IG		
Supramine green G	IG		
Supramine red		7,718	9,052
Acid red 2G	By		
Supramine red B	IG		
Supramine red 2G	IG		
Supramine violet R	IG	350	
Supramine yellow		5,600	7,667
Acid yellow R supra	By		
Supramine yellow G	IG		
Supramine yellow 3G	IG		
Supramine yellow R	IG		
Wool black GRF		8,624	
Wool black GRF	A		
Wool black GRF	IG		
Wool blue		2,558	3,145
Wool blue 5B f. f. s	IG		
Wool blue N extra	IG		
Wool blue R extra	IG		
Acid blue 5B	A		
Wool fast orange G		1,784	
Wool fast orange G	By		
Wool fast orange G	IG		
Wool fast yellow 5G	By	1,102	
Xylene brilliant blue FFRX conc	S	632	
Xylene fast blue FF conc	S	33,273	
Xylene milling orange R conc	S	500	
Xylene milling red B conc	S	2,000	

UNIDENTIFIED VAT DYES

Algol blue 3RP pdr	IG	1,708	
Algol blue 4R paste	IG	2,500	
Algol Bordeaux B (single strength)		1,200	
Algol Bordeaux B pdr	IG		
Algol printing violet RR extra	IG	25	
Algol scarlet B			
Eridan brilliant scarlet B paste	IG	6,200	
Eridan brilliant scarlet B pdr	IG	150	
Algol scarlet 3B (single strength)		21,360	
Hydron scarlet 3B paste	IG		
Hydron scarlet 3B pdr	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED VAT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Algol scarlet RB		11,000	
Hydron scarlet 2B paste	IG		
Algol violet BBN			
Hydron violet BBF dbl. paste (single strength)	IG	400	
Hydron violet BBF pdr	IG	650	
Algol violet R (single strength)		800	
Algol violet R pdr	IG		
Algol yellow GR (single strength)		2,100	
Algol yellow GR pdr	IG		
Alizanthrene navy blue paste	BAC	5,200	
Alizanthrene yellow 6R paste	BAC	200	
Anthra yellow 8G paste	IG	500	
Ciba blue BR paste	I	441	
Ciba brown G paste	I	53,562	
Ciba pink BG			
Ciba pink BG paste	I	20,232	
Ciba pink BG pdr	I	110	
Ciba violet (single strength)		990	
Ciba violet 6R paste	I		
Ciba violet 6R pdr	I		
Cibanone black			
Cibanone black BA pdr	I	330	
Cibanone black EA pdr	I	441	
Cibanone brown R pdr	I	110	
Cibanone golden orange G pdr	I	220	
Cibanone golden orange 2R (single strength)		770	
Cibanone golden orange 2R paste	I		
Cibanone golden orange 2R pdr	I		
Cibanone green GG pdr	I	110	
Cibanone navy blue RA (single strength)		1,430	
Cibanone navy blue RA paste	I		
Cibanone navy blue RA pdr	I		
Cibanone orange 6R			
Cibanone orange 6R paste	I	993	
Cibanone orange 6R pdr	I	220	
Cibanone orange 8R (single strength)		1,870	
Cibanone orange 8R paste	I		
Cibanone orange 8R pdr	I		
Cibanone red			$7,103
Cibanone red 4B paste	I	551	
Cibanone red B pdr	I		
Cibanone red 4B pdr	I	880	
Cibanone red 3G pdr	I		
Cibanone red G pdr	I	220	
Cibanone red RK pdr	I	220	
Cibanone violet			2,601
Cibanone violet 2R paste	I	1,212	
Cibanone violet 4R paste	I		
Cibanone violet 4R pdr	I	110	
Cibanone yellow			
Cibanone yellow 3G paste	I	882	
Cibanone yellow 2GR pdr	I	110	
Grelanone red			
Grelanone red 2B paste	IG	4,850	
Grelanone red 2B pdr	IG	600	
Helindone black		400	
Helindone black 3B vat (in grains)	IG		
Helindone black T vat (in grains)	IG		
Helindone blue 3G pdr	IG	100	
Helindone brilliant green		4,861	
Vat brilliant green 5G paste	M		
Helindone brilliant yellow G conc. pdr	IG	55	
Helindone brown		300	
Helindone brown CV vat pdr	IG		
Helindone brown CRD vat pdr	IG		
Helindone green B vat	IG	75	
Helindone red CR vat	IG	150	
Helindone violet BBN dbl. paste (single strength)	IG	2,000	
Hydron blue BBF paste	IG	50	
Hydron brown R (single strength)		1,920	
Hydron brown R pdr	IG		
Vat brown R pdr	C		
Hydron pink FB (single strength)		11,384	
Vat brilliant pink B paste	IG		
Vat brilliant pink B pdr	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED VAT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Hydron pink FF (single strength)		50,450	
Vat brilliant pink R paste	IG		
Vat brilliant pink R pdr	IG		
Hydron yellow olive GG paste	IG	100	
Indanthrene Blue 8GK (single strength)		125	
Vat blue 8GK paste	IG		
Vat blue 8GK pdr	IG		
Indanthrene blue RZ (single strength)		12,400	
Vat blue RZ dbl. paste	IG		
Indanthrene brilliant blue (single strength)		7,053	
Vat brilliant blue 3G paste	IG		
Vat brilliant blue 3G pdr	IG		
Vat brilliant blue R paste	IG		
Vat brilliant blue R pdr	IG		
Indanthrene brilliant green GG (single strength)		19,864	
Vat brilliant green GG dbl. paste	IG		
Indanthrene brilliant orange			$9,959
Vat brilliant orange GK paste	IG	1,000	
Vat brilliant orange GK pdr	IG	45	
Vat brilliant orange RK paste	IG	7,713	
Vat brilliant orange RK pdr	IG	450	
Indanthrene brilliant violet (single strength)			61,541
Vat brilliant violet 3B paste	IG	1,100	
Vat brilliant violet 3B pdr	IG		
Vat brilliant violet RRP	IG	1,876	
Vat brilliant violet 4R paste	IG	37,764	
Vat brilliant violet 4R pdr	IG		
Indanthrene brown FFR paste	IG	225	
Indanthrene brown GG (single strength)		28,850	
Vat brown GG paste	IG		
Vat brown GG pdr	IG		
Indanthrene golden orange 3G (single strength)		32,990	
Vat golden orange 3G paste	IG		
Vat golden orange 3G pdr	IG		
Indanthrene gray (single strength)		18,014	17,847
Vat gray 3B paste	IG		
Vat gray 3B pdr	IG		
Vat gray RRH paste	IG		
Vat gray RRH pdr	IG		
Indanthrene green (single strength)		27,070	
Vat green GG paste	IG		
Vat green GG pdr	IG		
Indanthrene khaki (single strength)		15,600	
Vat khaki GG paste	IG		
Vat khaki GG pdr	IG		
Indanthrene orange RRT (single strength)		39,063	
Vat orange RRT paste	IG		
Vat orange RRTS pdr	IG		
Indanthrene orange 3R (single strength)		27,086	22,743
Vat orange F3R paste	IG		
Vat orange F3R pdr	IG		
Vat orange 3R paste	IG		
Vat orange 3R pdr	IG		
Indanthrene orange 4R (single strength)		3,625	
Vat orange 4R paste	IG		
Vat orange 4R pdr	IG		
Indanthrene pink B (single strength)		7,600	
Vat pink B dbl. paste	IG		
Vat pink B pdr	IG		
Indanthrene red (single strength)		14,399	11,371
Vat red BK paste	IG		
Vat red BK pdr	IG		
Vat red GG paste	IG		
Vat red GG pdr	IG		
Indanthrene red-brown (single strength)		2,380	2,157
Vat red-brown R pdr	IG		
Vat red-brown 5RF paste fine	IG		
Vat red-brown 5RF pdr	IG		
Indanthrene yellow FFRK (single strength)		3,600	
Vat yellow FFRK paste	IG		
Vat yellow FFRK pdr	IG		
Indanthrene yellow RK (single strength)		375	
Vat yellow RK pdr	IG		
Indanthrene yellow 3RT (single strength)		3,500	
Vat yellow 3RT paste	IG		
Vat yellow 3RT pdr	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED VAT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Indanthrene yellow-brown 3G (single strength)		5,431	
Vat yellow-brown 3G paste	IG		
Vat yellow-brown 3G pdr	IG		
Indigosol		1,310	$3,264
Indigosol O6B	DH		
Indigosol O6B	IG		
Indigosol HB	DH		
Indigosol black		2,993	
Indigosol black IB	DH		
Indigosol black IB	IG		
Indigosol golden yellow		1,826	
Indigosol golden yellow IGK	DH		
Indigosol golden yellow IGK	IG		
Indigosol green		1,446	
Indigosol green AB	DH		
Indigosol green AB	IG		
Indigosol pink IR extra	DH	2,670	
Indigosol red HR	DH	245	
Indigosol scarlet		2,465	
Indigosol scarlet HB	DH		
Indigosol scarlet HB	IG		
Indigosol violet		1,092	
Indigosol violet AZB	DH		
Indigosol violet AZB	IG		
Paradone gray B paste	LBH	896	
Thioindigo black B		1,102	
Vat black B paste	K		
Vat blue green FFB paste	IG	1,010	
Vat brilliant pink RF	IG	778	
Vat brown 3GT paste	IG	300	
Vat brown RRD paste	IG	5,450	
Vat brown RT paste	IG	10,800	
Vat direct black RB (single strength)		9,154	
Vat direct black RB paste	IG		
Vat direct black RB pdr	IG		
Vat golden yellow GK (single strength)		441,238	
Vat golden yellow GK dbl. paste	IG		
Vat green GT paste	IG	950	
Vat navy blue (single strength)		3,625	
Vat navy blue R paste	IG		
Vat navy blue R pdr	IG		
Vat olive 3G paste	IG	250	
Vat olive GN (single strength)		5,600	
Vat olive GN paste	IG		
Vat olive GN pdr	IG		
Vat printing black B paste	IG	162,800	
Vat printing blue B paste	IG	5,550	
Vat printing brown R paste	IG	30,977	
Vat printing deep black BD paste		2,609	
Vat printing purple R paste	IG	175	
Vat printing red G paste	IG	300	
Vat printing violet		6,550	
Vat printing violet BBF paste	IG		
Vat printing violet RF paste	IG		
Vat scarlet B			
Vat scarlet B paste	IG	11,800	
Vat scarlet B pdr	IG	400	
Vat violet (single strength)		1,696	
Vat violet FFBN paste	IG		
Vat violet FFBN pdr	IG		
Vat yellow (single strength)		20,871	10,630
Vat yellow GF paste	IG		
Vat yellow GF pdr	IG		
Vat yellow 3GF dbl. paste	IG		
Vat yellow 3GF pdr	IG		
Vat yellow NF paste	C		
Vat yellow 5GK (single strength)		13,064	
Vat yellow 5GK dbl. paste	IG		
Vat yellow 3R paste	IG	100	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED MORDANT AND CHROME DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Acid alizarin gray G	IG	5,150	
Acid anthracene brown		4,937	
Acid anthracene brown PG	IG		
Acid anthracene brown WSG	IG		
Acid anthracene red		5,258	
Acid anthracene red 3BL	IG		
Acid anthracene red 5BL	IG		
Acid chrome red B	IG	1,750	
Acid chrome yellow RL extra	IG	2,150	
Alizarin blue-green		3,382	
Alizarin blue-green BB conc	S		
Alizarin blue-green BBS conc	S		
Alizarin carmoisine	DH	771	
Alizarin fast gray BBL pdr	IG	1,550	
Alizarin fast light brown GL pdr	IG	50	
Anthracene blue SWG pdr	IG	500	
Anthracene chromate brown		6,001	
Anthracene chromate brown EB	IG		
Omega chrome brown EB	S		
Anthracene chrome blue G	IG	40	
Azol printing Bordeaux B extra	IG	50	
Azol printing red R extra	IG	25	
Azol printing violet RR extra	IG	45	
Brilliant chrome blue		551	
Brilliant chrome blue 2B	DH		
Brilliant chrome blue S	DH		
Brilliant chrome violet		275	
Brilliant chrome violet 4B	DH		
Brilliant chrome violet 6B	DH		
Brilliant delphine blue NS	S	1,000	
Chromal violet RCX	G	165	
Chromanol black RVI	DH	331	
Chromanol violet RI	DH	110	
Chromazurine DN	DH	440	
Chrome deep brown RRN	DH	55	
Chrome fast brown EB	I	110	
Chrome fast garnet R	I	551	
Chrome fast orange RD pdr	IG	100	
Chrome fast phosphine B	DH	991	
Chrome fast vesuvine BB	DH	110	
Chrome fast xanthine 2R	DH	1,100	
Chrome gray III	DH	77	
Chrome green DC	DH	55	
Chrome olive JCS	DH	1,761	
Chrome printing orange		132	
Chrome printing orange BW	DH		
Chrome printing orange 2R	I		
Chrome printing red		2,092	$3,599
Chrome printing red B	DH		
Chrome printing red B	I		
Chrome printing red Y	DH		
Chrome violet CBD	DH	220	
Chromochlorine G	DH	220	
Chromocitronine		3,308	
Chromocitronine 3R	DH		
Chromocitronine V	DH		
Chromogene red BD	IG	50	
Chromopurpurine JJ	DH	55	
Chromorhodine 6GN extra	DH	1,871	
Chromovesuvine RA	DH	331	
Chromoxane brilliant violet		6,791	
Chromoxane brilliant violet BD	IG		
Chromoxane brilliant violet SB	IG		
Chromoxane pure blue BLD	IG	1,650	
Chromoxane violet B	IG	350	
Diamond green BW	IG	300	
Diamond red 3B	IG	1,550	
Eriochromal brown		6,174	
Eriochromal brown AEB	G		
Eriochromal brown G	G		
Eriochrome blue S	G	8,818	
Eriochrome blue black G	G	3,306	
Eriochrome brilliant violet B supra	G	14,883	
Eriochrome flavine 2GL supra	G	165	
Eriochrome geranol R conc	G	2,204	
Eriochrome red G	G	12,127	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED MORDANT AND CHROME DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Eriochrome violet		12,125	
Eriochrome violet B	G		
Eriochrome violet 3B	G		
Gallazol fast brown		275	
Gallazol fast brown B2R	G		
Gallazol fast brown R	G		
Gallophenine P	IG	250	
Isochrome green 3BF	IG	50	
Metachrome blue-black 2BX	IG	2,500	
Metachrome brilliant blue		1,900	$1,287
Metachrome brilliant blue BL	IG		
Metachrome brilliant blue 2RL	IG		
Metachrome brilliant blue 8RL	IG		
Metachrome brown 6G	IG	5,900	
Metachrome olive 2G	IG	2,550	
Metachrome red G	IG	2,400	
Metachrome violet RR	IG	1,900	
Modern black		7,605	
Modern black CVI	DH		
Modern black N	DH		
Modern blue CVI	DH	220	
Modern gray PS	DH	1,984	
Modern violet O	DH	441	
Monochrome black blue G	IG	425	
Naphthochrome violet R	I	6,612	
Novochrome brown 3RD	DH	55	
Omega chrome brown		5,941	
Omega chrome brown G conc	S		
Omega chrome brown PB conc	S		
Omega chrome fast blue B conc	S	4,500	
Omega chrome violet B conc	S	1,500	
Polytrop blue 3G	DH	110	
Radio chrome blue B	IG	3,000	
Supranol Bordeaux B	IG	50	
Supranol brilliant red B	IG	150	
Supranol orange RR	IG	400	
Supranol red		650	
Supranol red BB	IG		
Supranol red RX	IG		
Supranol scarlet GX	IG	100	
Ultra corinth B	S	500	
Ultra cyanol B conc	S	500	

UNIDENTIFIED DIRECT DYES

Benzo bronze E	IG	200	
Benzo chrome black blue B	IG	900	
Benzo chrome brown		2,250	
Benzo chrome brown B	IG		
Benzo chrome brown 5G	IG		
Benzo dark brown extra	IG	250	
Benzo fast black L	IG	9,300	
Benzo fast blue		7,250	$8,034
Benzo fast blue G	IG		
Benzo fast blue 2GL	IG		
Benzo fast blue 4GL	IG		
Benzo fast blue 8GL	IG		
Benzo fast Bordeaux 6BL	IG	3,200	
Benzo fast brown		42,832	37,610
Benzo fast brown 3GL	IG		
Benzo fast brown RL	IG		
Direct fast brown RL	By		
Benzo fast eosine BL	IG	250	
Benzo fasy gray BL	IG	9,750	
Benzo fast heliotrope		3,600	
Benzo fast heliotrope 4BL	IG		
Benzo fast heliotrope 5RH	IG		
Benzo fast light scarlet 4BL	IG	3,000	
Benzo fast orange		7,100	
Benzo fast orange 2RL	IG		
Cotton fast orange 2RL	By		
Benzo fast red		550	
Benzo fast red 6BL	IG		
Benzo fast red GL	IG		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Benzo fast scarlet 8BSN	IG	200	
Benzo fast yellow		18,013	
Benzo fast yellow RL	IG		
Cotton fast yellow RL	By		
Benzo pure yellow FF	IG	75	
Benzo red 12B		1,539	
Benzo red 12B	IG		
Benzo red 12B	By		
Benzo rhoduline red		4,518	$2,636
Benzo rhoduline red B	IG		
Benzo rhoduline red 3B	IG		
Benzo rhoduline red 3B	By		
Direct fast red 3B	By		
Benzo rubine SC	IG	100	
Benzoform blue BBL	IG	25	
Benzoform orange G	IG	100	
Benzoform scarlet B	IG	350	
Brilliant benzo fast violet		661	
Direct fast violet 4BL	By		
Brilliant benzo fast yellow GL	IG	3,117	
Briliant benzo green B		10,178	
Brilliant benzo green B	IG		
Direct brilliant green B	By		
Brilliant benzo violet		1,198	
Brilliant benzo violet BBII	IG		
Brilliant benzo violet 2R	IG		
Brilliant congo blue 5R	IG	1,000	
Brilliant congo violet R	IG	2,300	
Brilliant fast blue 3BX	IG	300	
Brilliant pure yellow		14,492	
Brilliant pure yellow 6G extra	By		
Brilliant pure yellow 6G extra P	IG		
Brilliant sky-blue		16,280	19,259
Brilliant sky-blue G	IG		
Brilliant sky-blue R	IG		
Brilliant sky-blue RRM	IG		
Chicago red III	G	6,614	
Chloramine brown 2R conc	S	2,500	
Chloramine fast brown R conc	S	500	
Chloramine fast orange		6,200	
Chloramine fast orange R conc	S		
Chloramine fast orange 2R conc	S		
Chloramine light gray B conc	S	500	
Chloramine light violet R conc	S	1,000	
Chloramine violet FFB	IG	850	
Chlorantine brown Y	I	551	
Chlorantine fast blue 8GL	I	1,784	
Chlorantine fast Bordeaux 2BL	I	8,264	
Chlorantine fast brown		20,937	20,590
Chlorantine fast brown BRL	I		
Chlorantine fast brown 5GL	I		
Chlorantine fast brown 2RL	I		
Chlorantine fast brown 3RL	I		
Chlorantine fast brown 4RL	I		
Chlorantine fast green B	I	26,449	
Chlorantine fast orange 2RL	I	1,544	
Chlorantine fast red 5GL	I	551	
Chlorantine fast rubine RL	I	992	
Chlorantine fast violet		29,865	22,539
Chlorantine fast violet 5BL	I		
Chlorantine fast violet RL	I		
Chlorantine fast violet 2RL	I		
Chlorantine fast yellow RL	I	551	
Chlorazol drab		3,011	
Chlorazol drab RII	BDC		
Chlorazol drab RHS	BDC		
Chlorazol fast brown RKS	BDC	5,001	
Chlorazol fast orange		5,560	
Chlorazol fast orange AG	BDC		
Chlorazol fast orange AGS	BDC		
Chlorazol yellow 6GS	BDC	50	
Cotonerol A extra	IG	4,000	
Cotton black		2,400	
Cotton black AC	IG		
Cotton black A4G	IG		
Cupranil brown 3G	I	220	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Developing black		575	
Developing black ED	IG		
Developing black OT	IG		
Developing blue B	IG	2,000	
Diamine azo Bordeaux BL	C	359	
Diamine azo brown 3G	C	1,211	
Diamine azo green		9,990	
Diamine azo green 3G	IG		
Direct azo green 3G	C		
Diamine brilliant rubine S	IG	50	
Diamine brilliant scarlet S	IG	2,680	
Diamine bronze-brown PE	IG	480	
Diamine catechine		12,765	$7,621
Diamine catechine B	IG		
Diamine catechine G	IG		
Diamine catechine 3G	IG		
Diamine fast Bordeaux 6BS	C	991	
Diamine fast brown		7,550	7,194
Diamine fast brown GB	IG		
Diamine fast brown GBB	IG		
Diamine fast brown GF	IG		
Diamine fast brown R, R conc	IG		
Diamine fast orange		21,837	13,933
Diamine fast orange EG	IG		
Diamine fast orange ER, ER conc	IG		
Sunfast orange EGL	Q		
Diamine gray G	IG	100	
Diaminogen GG	C	4,981	
Dianil yellow 5G	IG	900	
Diazanil pink B	IG	900	
Diazanil scarlet 3BA conc	IG	700	
Diazo brilliant blue 2BL extra	IG	1,500	
Diazo brilliant green 3G	IG	10,550	
Diazo brilliant orange 5G extra	IG	2,663	
Diazo brilliant scarlet		13,630	16,227
Diazo brilliant scarlet B extra	IG		
Diazo brilliant scarlet 6B extra	IG		
Diazo brilliant scarlet 2BL extra conc	IG		
Diazo brilliant scarlet 3BA extra	IG		
Diazo brilliant scarlet ROA extra	IG		
Diazo brilliant scarlet G extra	IG		
Diazo brilliant scarlet S4B	IG		
Diazo brown		12,218	15,017
Diazo brown BW	I		
Diazo brown G	IG		
Diazo brown 3G	IG		
Diazo brown 6G	IG		
Diazo brown 2GW	I		
Diazo brown 3R	IG		
Diazo brown 3RB	IG		
Diazo fast blue		5,621	
Diazo fast blue 6GW	I		
Diazo fast blue 4RW	I		
Diazo fast Bordeaux BL	IG	1,500	
Diazo fast green		410	
Diazo fast green GFL	IG		
Diazo fast green GL	I		
Diazo fast red 7BL	IG	2,000	
Diazo fast violet		5,900	
Diazo fast violet BL	IG		
Diazo fast violet 3RL	IG		
Diazo fast yellow		566	
Diazo fast yellow 3GL	IG		
Diazo fast yellow 3RL	I		
Diazo green 3G	IG	1,050	
Diazo indigo blue 4GL extra	IG	3,700	
Diazo rubine B	IG	2,300	
Diazo pure blue		22,480	16,790
Diazo sky blue B	IG		
Diazo sky blue 3G	IG		
Diazo sky blue 3GL	IG		
Developed pure blue B	By		
Developed sky blue 3GL	By		
Diazo yellow R	IG	50	
Diazol brilliant orange NJN	CN	1,102	
Diazol light red N8B	CN	158	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED DIRECT DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Diazophenyl black V	G	1,433	
Diphenyl brown BBNC	G	6,615	
Diphenyl catechine R supra	G	4,122	
Diphenyl fast Bordeaux BC	G	1,324	
Diphenyl fast bronze B	G	2,755	
Diphenyl fast brown GNC	G	11,024	
Diphenyl pure yellow 5G conc	G	2,204	
Direct cutch brown		4,187	
Direct cutch brown BS	I		
Direct cutch brown GR	I		
Direct fast red 2B	Q	672	
Direct gray R paste	G	1,477	
Direct pink EG supra	G	331	
Direct pure green B pdr	Q	110	
Direct safranine RW	I	440	
Fast cotton blue FFG	IG	1,075	
Fast cotton gray GL	IG	2,300	
Fast cotton rubine 5B	IG	225	
Fastusol brown T	IG	25	
Fastusol green		1,725	
Fastusol green BB	IG		
Fastusol green BL	IG		
Fastusol red violet BBL	IG	25	
Fastusol violet BL	IG	1,450	
Formal fast black G conc	G	3,198	
Half-wool blue G	IG	500	
Naphthogene blue B	A	220	
New claret RX	IG	150	
Oxamine black		750	
Minaxo black BBNX	IG		
Oxamine brilliant red		100	
Minaxo brilliant red B	IG		
Oxamine light brown		50	
Minaxo light brown G	IG		
Oxamine light pink		1,700	
Minaxo light pink BBX	IG		
Oxamine red		400	
Minaxo red X	IG		
Paranil brown		775	
Paranil brown BBX	IG		
Paranil brown O	IG		
Parasulfon brown V	S	500	
Pluto black G extra	IG	925	
Pluto brown 2G	IG	1,700	
Rosanthrene		1,212	$1,830
Rosanthrene B	I		
Rosanthrene R	I		
Rosanthrene RN	I		
Rosanthrene Bordeaux B	I	2,424	
Rosanthrene brilliant orange 4R	I	660	
Rosanthrene brilliant red BR	I	772	
Rosanthrene fast Bordeaux 2BL	I	2,535	
Rosanthrene fast red 7BL	I	1,872	
Rosanthrene orange R	I	4,408	
Sky blue N	IG	400	
Toluylene fast brown RR	IG	100	
Toluylene fast orange LX	IG	1,550	
Triazol fast orange 2RL	GrE	560	
Trisulfon bronze BG conc	S	1,500	
Universal blue-black C	IG	100	
Zambesi black		3,948	
Developed black D	A		
Zambesi black F	IG		
Zambesi brown 4R	IG	900	
Zambesi pure blue 4BG	IG	300	

UNIDENTIFIED DYES FOR RAYON AND OTHER SYNTHETIC TEXTILES

Art silk black R	IG	1,500	
Artificial silk blue		330	
Artificial silk blue G	I		
Artificial silk blue R	I		
Artisil direct blue SAP conc	S	220	
Artisil direct orange 2RP conc	S	220	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED DYES FOR RAYON AND OTHER SYNTHETIC TEXTILES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Artisil direct violet BP conc	S	220	
Artisil direct yellow 3GP conc	S	220	
Cellit blue R	IG	600	
Cellit fast red		250	
Cellit fast red B	IG		
Cellit fast red 2B	IG		
Cellit fast violet 4R	IG	125	
Cellit fast yellow R	IG	200	
Celliazol ST pdr	IG	850	
Celliton blue extra			
Celliton blue extra paste	IG	1,740	
Celliton blue extra pdr	IG	150	
Celliton fast black		552	
Celliton fast black B paste	IG		
Celliton fast black G paste	IG		
Celliton fast blue			$4,584
Celliton fast blue B paste	IG	4,000	
Celliton fast blue 2B paste	IG		
Celliton fast blue B pdr	IG	125	
Celliton fast blue-green B paste	IG	2,600	
Celliton fast navy blue		302	
Celliton fast navy blue B paste	IG		
Celliton fast navy blue GT paste	IG		
Celliton fast pink			13,890
Celliton fast pink B paste	IG	3,800	
Celliton fast pink F3B paste	IG		
Celliton fast pink B pdr	IG	1,575	
Celliton fast pink F3B pdr	IG		
Celliton fast red violet			
Celliton fast red violet R paste	IG	1,600	
Celliton fast red violet R pdr	IG	600	
Celliton fast violet			
Celliton fast violet B paste	IG	1,000	
Celliton fast violet B pdr	IG	50	
Celliton fast yellow			2,415
Celliton fast yellow G paste	IG	3,050	
Celliton fast yellow R paste	IG		
Celliton fast yellow RR paste	IG		
Celliton fast yellow G pdr	IG	1,300	
Celliton fast yellow RR pdr	IG		
Celliton orange			
Celliton orange R paste	IG	1,350	
Celliton orange GR pdr	IG	250	
Celliton printing yellow			
Celliton printing yellow 3R paste	IG	175	
Celliton printing yellow 3R pdr	IG	25	
Celliton red			
Celliton red R paste	IG	3,350	
Celliton red R pdr	IG	1,025	
Celliton yellow 3G pdr	IG	50	
Cibacete black BN green shade pdr	I	1,102	
Cibacete blue		275	
Cibacete blue B paste	I		
Cibacete blue 2R paste	I		
Cibacete diazo black J pdr	I	110	
Cibacete navy blue BN green shade pdr	I	991	
Cibacete orange		660	
Cibacete orange 2R pdr	I		
Cibacete orange 3R pdr	I		
Cibacete red			
Cibacete red 3B pdr	I	551	
Cibacete red GR paste	I	2,644	
Cibacete saphire blue G pdr	I	3,635	
Cibacete scarlet G pdr	I	220	
Cibacete turquoise blue paste	I	881	
Cibacete violet		550	
Cibacete violet B pdr	I		
Cibacete violet 2R pdr	I		
Cibacete yellow		8,265	5,368
Cibacete yellow 3G paste	I		
Cibacete yellow 3G pdr	I		
Cibacete yellow GN pdr	I		
Cibacete yellow R pdr	I		

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED DYES FOR RAYON AND OTHER SYNTHETIC TEXTILES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Dispersol yellow			
Dispersol yellow 3G paste	BDC	970	
Dispersol yellow CY	BDC	60	
Duranol black paste	BDC	720	
Duranol blue			$15,497
Duranol blue CB paste	BDC	60	
Duranol blue 2B paste	BDC	495	
Duranol blue G paste	BDC	9,545	
Duranol brilliant violet B	BDC	60	
Duranol brown		180	
Duranol brown G paste	BDC		
Duranol brown R paste	BDC		
Duranol orange G paste	BDC	480	
Duranol red		6,785	8,269
Duranol red B	BDC		
Duranol red 2B	BDC		
Duranol red G	BDC		
Duranol violet 2R paste	BDC	180	
Icyl blue		1,160	
Icyl blue G	BDC		
Icyl blue GS	BDC		
Icyl brown GS	BDC	780	
Icyl orange		320	
Icyl orange GS	BDC		
Icyl orange RS	BDC		
Icyl red G	BDC	60	
Icyl violet BS	BDC	360	
Ionamine			1,846
Ionamine AS	BDC	1,650	
Ionamine BS	BDC		
Ionamine LS paste	BDC	120	
Ionamine blue BS	BDC	240	
Ionamine red		540	
Ionamine red GAS	BDC		
Ionamine red KAS	BDC		
Setacyl brilliant pink G	G	386	
Setacyl direct blue		19,166	16,031
Setacyl direct blue G pdr	G		
Setacyl direct blue G new	G		
Setacyl direct blue 2GS pdr	G		
Setacyl direct blue 2GS supra I	G		
Setacyl direct blue R pdr	G		
Setacyl direct blue RS conc	G		
Setacyl direct orange 2R pdr	G	9,920	
Setacyl direct pink 3B conc	G	4,963	
Setacyl direct red		5,086	3,012
Setacyl direct red BN pdr	G		
Setacyl direct red GBN supra	G		
Setacyl direct red GN pdr	G		
Setacyl direct red GN supra	G		
Setacyl direct scarlet		1,950	
Setacyl direct scarlet G conc	G		
Setacyl direct scarlet G pdr	G		
Setacyl direct violet		5,535	4,529
Setacyl direct violet B conc	G		
Setacyl direct violet R conc	G		
Setacyl direct violet R pdr	G		
Setacyl direct violet R supra	G		
Setacyl direct yellow		3,626	
Setacyl direct yellow GR supra	G		
Setacyl direct yellow R pdr	G		
SRA black III paste	BC	50	
Viscolan black B conc	S	21,252	

UNIDENTIFIED RAPID FAST DYES

Rapid fast blue B paste	IG	6,100	
Rapid fast Bordeaux B paste	IG	100	
Rapid fast orange RH paste	IG	16,000	
Rapid fast red		37,520	$20,300
Rapid fast red B paste	IG		
Rapid fast red BB paste	IG		
Rapid fast red RH paste	IG		
Rapid fast scarlet LH paste	IG	100	
Rapid fast yellow 2GH pdr	IG	250	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED BASIC DYES

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Acridine brown ON conc	Q	110	
Acridine flavine RD	DH	991	
Acridine red brown O	IG	1,377	
Astra phloxine FF extra	IG	2,000	
Brilliant acridine orange		4,222	
Brilliant acridine orange R	DH		
Brilliant acridine orange 3R	DH		
Brilliant acridine orange 5R	DH		
Brilliant rhoduline blue R	IG	2,560	
Euchrysine G	B	200	
Japan black MBG	IG	1,500	
Leather brown		3,525	
Leather brown ET	IG		
Leather brown 5RTX	IG		
Methylene blue 3G	IG	50	
Methylene gray B new	IG	150	
Rhodamine (single strength)		59,010	
Rhodamine 6GDN extra	IG		
Rhodamine 6GII extra	S		
Rhoduline blue 5B	IG	100	
Rhoduline heliotrope B	IG	25	
Rhoduline sky-blue 3G	IG	1,070	
Special blue G	IG	100	
Tannastrol GO	S	500	
Thio violet 5R	DH	22	
Toluidine green	IG	4	

UNIDENTIFIED SULFUR DYES

Eclipse brown BK	G	22	
Immedial brown W conc	IG	2,600	
Immedial direct blue RL high conc	DH	1,400	
Immedial yellow olive 5G	IG	175	
Indocarbon		54,639	$27,157
Indocarbon CL conc	IG		
Indocarbon CL fine for printing	IG		
Indocarbon CLG conc	IG		
Indocarbon SN	IG		
Sulfur black CL	C		
Katigen chrome blue 5G	IG	4,000	
Katigen indigo CLGG extra	IG	3,500	
Kurgan (Kryogene) violet 3RX	I	500	
Pyrogene brown G	I	3,527	
Pyrogene cutch 2R extra	I	1,984	
Pyrogene green		22,043	
Pyrogene green GK	I		
Pyrogene green GGK	I		
Pyrogene pure blue		25,787	
Pyrogene pure blue 3GL	I		
Pyrogene pure blue 2RL	I		
Sulfide new blue BL	IG	10,000	
Sulfide violet V	IG	450	
Sulfur brown CL4R	IG	600	
Thional brilliant blue 6BS conc	S	1,500	
Thional red brown 5R	S	2,500	
Thionol black		1,500	
Thionol black XXN conc	BDC		
Thionol black XXS	BDC		
Thionol brown OS	BDC	4,479	
Thionol navy blue XXS	BDC	500	

UNIDENTIFIED COLOR-LAKE AND SPIRIT-SOLUBLE DYES

Alizarin light blue 3G (oil soluble)	S	1,400	
Baykanol blue	IG	950	
Baykanol Bordeaux	IG	450	
Baykanol rubine	IG	150	
Baykanol yellow	IG	450	
Brillianton orange R pdr	IG	200	
Cero blue TA pdr	IG	50	
Fat blue Z	IG	25	
Frobeno red G	G	11	

TABLE 38.—*Imports of dyes, calendar year 1929*—Continued

UNIDENTIFIED COLOR-LAKE AND SPIRIT-SOLUBLE DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Frobeno yellow G	G	11	
Gasoline blue No. 2	S	50	
Grasol blue		2,952	
Grasol blue G	G		
Grasol blue R	G		
Grasol orange 2R	G	15	
Grasol red B	G	11	
Grasol yellow		81	
Grasol yellow 2G	G		
Grasol yellow GR	G		
Grasol yellow 2R	G		
Hansa green GS	IG	2,850	
Hansa orange GG pdr	IG	100	
Hansa red B pdr	IG	50	
Hansa yellow A			
Hansa yellow A supra transparent paste	IG	17,500	
Hansa yellow A supra transparent pdr	IG	1,250	
Hansa yellow		3,029	
Hansa yellow 5G pdr	IG		
Hansa yellow 3R pdr	IG		
Lake yellow 5G pdr	M		
Hansa yellow 10G			
Hansa yellow 10G special quality	IG	300	
Hansa yellow 10G pdr	IG	1,050	
Helio Bordeaux			$8,561
Helio Bordeaux BL paste	IG	13,000	
Helio Bordeaux BL	IG	75	
Helio Bordeaux BL pdr	IG	6,880	
Helio fast pink		66,500	
Helio fast pink BL paste	IG		
Helio fast pink RL paste	IG		
Helio fast rubine		32,495	45,455
Helio fast rubine 3BL	IG		
Helio fast rubine 4BL	IG		
Helio fast rubine 6BL	IG		
Helio fast rubine RL	IG		
Helio fast violet AL	IG	800	
Helio fast yellow RL paste	IG	5	
Helio red RMT extra pdr	IG	1,000	
Oil lake black LSO	IG	900	
Paper fast Bordeaux B	IG	3,900	
Permanent Bordeaux FFR paste	IG	2,000	
Permanent red FRL paste	IG	25	
Pigment brown R special quality	IG	50	
Pigment deep black R	IG	425	
Pigment green B			
Pigment green B paste	IG	7,510	
Pigment green B pdr	IG	500	
Pigment green special quality	IG	50	
Pigment lake red LC special quality	IG	50	
Rotor black 2B	BDC	60	
Spirit fast red 5B	IG	50	
Stone fast yellow			6,591
Stone fast yellow G pdr	IG	7,300	
Stone fast yellow GA pdr	IG		
Stone fast yellow GG extra paste	IG	25	
Stone rubine			876
Stone rubine BK special quality	IG	50	
Stone rubine BN pdr	IG	950	
Stone rubine G pdr	IG		
Sudan black		7,050	9,477
Sudan black B	IG		
Sudan black G	IG		
Sudan black RT	IG		
Sudan brown RR	IG	150	
Sudan red		650	
Sudan red 7B	IG		
Sudan red GG	IG		
Tero black		1,675	
Tero black FB	IG		
Tero black FT	IG		
Tero brown		75	
Tero brown FG	IG		
Tero brown FR	IG		
Tero carmine FB	IG	200	
Tero yellow FR	IG	500	

TABLE 38.—*Imports of dyes, calendar year 1928*—Continued

UNIDENTIFIED COLOR-LAKE AND SPIRIT-SOLUBLE DYES—Continued

Name of dye	Manufacturer	Imports	
		Quantity	Invoice value
		Pounds	
Zapon fast blue G	IG	100	
Zapon fast orange G	IG	2,050	
Zapon fast red CB	IG	400	
Zapon fast scarlet		50	
Zapon fast scarlet CG	IG		
Zapon fast scarlet CR	IG		
Zapon fast yellow GR	IG	1,650	

UNIDENTIFIED UNCLASSIFIED DYES

Bronze blue G paste, R paste	IG	20	
Copying blue BB base	IG	225	
All other dyes		5,591	$5,542

Index to table of dye imports

Index to table of dye imports—Continued

Name of dye	Colour Index No.	Page
Alizanthrene navy blue		103
Alizanthrene yellow 6R		103
Alizarin astrol blue B	1075	95
Alizarin astrol violet B		99
Alizarin black S paste	1019	94
Alizarin blue S	1067	95
Alizarin blue-black B	1085	95
Alizarin blue-green BB		106
Alizarin blue-green BBS		106
Alizarin Bordeaux BD	1045	95
Alizarin Bordeaux BP	1045	95
Alizarin brown HD	1035	95
Alizarin brown R	1035	95
Alizarin brown SW	1035	95
Alizarin carmoisine		106
Alizarin claret red RL	1032	94
Alizarin cyanine G	1051	95
Alizarin cyanine GG	1051	95
Alizarin cyanine 2R	1050	95
Alizarin cyanine green 3G	1078	95
Alizarin cyanine green 5G		99
Alizarin cyanol gray G		99
Alizarin cyclamine R	1064	95
Alizarin direct blue A2G		99
Alizarin direct blue AR		99
Alizarin direct blue BC	1087	95
Alizarin direct blue BGAOO	1077	95
Alizarin direct blue R	1076	95
Alizarin direct blue RBX	1076	95
Alizarin direct blue RXO	1076	95
Alizarin direct red 3G	1091	95
Alizarin direct violet ER	1073	95
Alizarin emeraldol G	1056	95
Alizarin fast gray 2BL		106
Alizarin fast light brown GL		106
Alizarin fast rubine R	1091	95
Alizarin fast violet R		99
Alizarin geranol B	1092	95
Alizarin green S	1071	95
Alizarin irisol (oil soluble)		113
Alizarin irisol B	1073	95
Alizarin irisol R	1073	95
Alizarin light blue B	1054	95
Alizarin light blue ESE	1053	95
Alizarin light blue 3G	1075	95
Alizarin light blue 3G (oil soluble)		113
Alizarin light blue SE	1053	95
Alizarin light gray BS	1085	95
Alizarin light green GS	1078	95
Alizarin light red R	1091	95
Alizarin light violet RS	1073	95
Alizarin night blue AG conc		99
Alizarin orange A	1033	94
Alizarin orange AO	1033	94
Alizarin paste bluish	1027	94
Alizarin red IP	1027	94
Alizarin red S	1034	95
Alizarin red SW	1034	95
Alizarin red SWB	1034	95
Alizarin red SX extra	1040	95
Alizarin red SZ	1034	95
Alizarin red VI	1027	94
Alizarin red WR	1040	95
Alizarin red XGP	1039	95
Alizarin rubinol 5G	1091	95
Alizarin rubinol R	1091	95
Alizarin sapphire blue G	1053	95
Alizarin sky-blue G		99
Alizarin sky-blue NA		99
Alizarin supra blue A		99
Alizarin supra sky-blue R		99
Alizarin uranol BB	1058	95
Alizarin viridine FF	1084	95
Alizarin yellow GD	195	89
Alkali blue 2B	704	91
Alkali blue No. 4	704	91
Alkali blue 3R	704	91
Alkali fast green 3G	735	92
Alkali fast green 10G		99
Alkali violet A extra	700	91
Alkali violet 10B		99
Alphanol brown B		99
Amido naphthol brown 3G		99
Anthra green B	1102	96
Anthra red RT	1142	97
Anthra scarlet GG	1228	98
Anthra yellow GC	1095	96
Anthra yellow GCN	1095	96
Anthra yellow 8G		102
Anthracene blue SWG		106
Anthracene blue SWGG	1069	95
Anthracene blue SWR	1063	95
Anthracene brown RD	1035	95
Anthracene brown SW	1035	95
Anthracene chromate brown EB		106
Anthracene chrome blue G		106
Anthraquinone blue SR	1089	95
Anthraquinone blue green BXO	1082	95
Anthraquinone green GXNO	1081	95
Art silk black R		110
Artificial silk blue G		110
Artificial silk blue R		110
Artisil direct blue SAP		110
Artisil direct orange 2RP		110
Artisil direct violet BP		111
Artisil direct yellow 3GP		111
Astra phloxine FF extra		113
Auracine G	786	93
Auramine G	656	90
Auramine O	655	90
Aurine	724	92
Azo acid black B		99
Azo acid blue B	59	88
Azo acid blue BF		99
Azo alizarin carmoisine		106
Azo carmine BX	829	93
Azo carmine GX	828	93
Azol printing Bordeaux B		106
Azol printing red R		106
Azol printing violet 2R		106
B		
Basic blue 6G	658	90
Basic yellow T	815	93
Basic yellow TCN	815	93
Baykanol blue		113
Baykanol Bordeaux		113
Baykanol rubine		113
Baykanol yellow		113
Benzoazurine 3G	503	90
Benzo bronze E		107
Benzo chrome black-blue B		107
Benzo chrome brown B		107
Benzo chrome brown G	596	90
Benzo chrome brown 5G		107
Benzo chrome brown R	597	90
Benzo dark brown extra		107
Benzo fast black L		107
Benzo fast blue G		107
Benzo fast blue 2GL		107
Benzo fast blue 4GL		107
Benzo fast blue 8GL		107
Benzo fast Bordeaux 6BL		107
Benzo fast brown 3GL		107
Benzo fast brown RL		107
Benzo fast eosine BL		107
Benzo fast gray BL		107
Benzo fast heliotrope BL	319	89
Benzo fast heliotrope 4BL		107
Benzo fast heliotrope 2RL	319	89
Benzo fast heliotrope 5RH		107
Benzo fast light scarlet 4BL		107
Benzo fast orange P	326	89
Benzo fast orange 2 RL		107
Benzo fast orange S	326	89
Benzo fast orange WS	326	89
Benzo fast red 6BL		107
Benzo fast red GL		107
Benzo fast rubine BL	278	89
Benzo fast scarlet 4BS	327	89
Benzo fast scarlet 5BS	326	89

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

Index to table of dye imports—Continued

PART IV

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

Part IV

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

Introduction

Beginning in 1921, the Tariff Commission has, each year, compiled and published in its Census of Dyes and Other Synthetic Organic Chemicals an annual survey of synthetic organic chemicals not of coal-tar origin. Each survey gives the total production and sales of the noncoal-tar synthetic organic chemical industry as well as production and sales data on as many specific items as is possible without disclosing individual operations. It also reviews notable achievements occurring during the year and contains statistics on imports and production of certain chemicals of the industry.

As the Bureau of the Census collects data on the more important noncoal-tar organic compounds, the commission does not gather statistics on such products except where the importance of the chemical or conditions in the industry warrant a departure from this practice. This 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; for example, alkaloids, constituents of essential oils, sugars, and acids such as tartaric and stearic; (2) cyanides, cyanamides, or carbides of metals or of inorganic radicals; (3) products obtainable from other sources.

Increasing Importance of the Industry

The production of synthetic organic chemicals other than those of coal-tar origin has developed into an industry of such economic importance that the scope of this year's census has been enlarged to present data regarding the growth of the industry since 1921, in addition to pointing out the general advances made in 1929. This industry, which prior to the World War was one of minor importance, has steadily grown, until to-day it is one of major importance. Its growth is due to the rapid expansion of several industries, such as the lacquer industry and the rayon industry, where aliphatic or noncoal-tar chemicals are used, as well as to their consumption in the manufacture of medicinals, perfumes, flavors, rubber accelerators, photographic developers, explosives, and as flotation agents.

Since 1921, production of synthetic organic chemicals of other than coal-tar origin has increased from 21,545,186 pounds to 633,192,215 pounds; sales have advanced from 16,761,096 pounds to 405,185,980 pounds; value of sales, from $7,226,068 to $65,117,651; and the sales value of production, from $9,285,975 to $101,943,947.

Table 39 shows in detail the steady growth of the industry since 1921, when the Tariff Commission compiled data on chemicals of this group for the first time.

TABLE 39.—*Noncoal-tar synthetic organic chemicals: Production and sales, 1921–1929*[1]

Year	Production				Sales					Quantity ratio, sales to production
	Quantity	Increase over previous year	Value	Increase over previous year	Quantity	Increase over previous year	Value	Increase over previous year	Unit value	
	Pounds	*Per cent*		*Per cent*	*Pounds*	*Per cent*		*Per cent*		*Per cent*
1921	21, 545, 186	-------	$9, 285, 975	-------	16, 761, 096	-------	$7, 226, 068	-------	$0. 431	77. 85
1922	79, 262, 155	276. 60	15, 682, 027	68. 88	60, 494, 494	260. 92	11, 964, 074	65. 57	. 198	76. 38
1923	90, 597, 712	14. 39	18, 572, 531	18. 43	67, 727, 067	11. 96	13, 875, 521	15. 98	. 205	74. 76
1924	115, 817, 865	27. 84	27, 796, 288	49. 66	85, 933, 461	26. 88	20, 604, 717	48. 50	. 240	74. 20
1925	156, 878, 013	35. 45	32, 316, 871	16. 26	114, 626, 209	33. 39	23, 632, 779	14. 70	. 206	73. 07
1926	214, 842, 513	36. 95	37, 812, 282	17. 09	168, 712, 158	47. 18	29, 719, 270	25. 75	. 176	78. 53
1927	280, 992, 825	30. 79	51, 140, 694	35. 25	201, 548, 089	19. 46	36, 600, 628	23. 15	. 182	71. 73
1928	384, 564, 836	36. 86	68, 837, 106	34. 60	257, 077, 856	27. 55	45, 928, 945	25. 49	. 179	66. 85
1929	633, 192, 215	64. 65	101, 943, 947	48. 09	405, 185, 980	57. 61	65, 117, 651	41. 78	. 161	63. 99

[1] Vanillin, previously listed in the noncoal-tar group, is included in 1929 under the coal-tar products.

In 1929, the ratio (in pounds) of sales to production was 64 per cent. Except in 1926, this ratio has, each year, been less than for the preceding year, indicating that the proportion of chemicals consumed in the plants where they are produced is continually increasing or, in other words, that manufacturers are more and more each year producing materials which they need for the manufacture of other products.

In 1929 the average value of products sold was 16.1 cents per pound, as compared with 17.9 cents in 1928 and 18.2 cents in 1927. The decrease in unit value during 1929 is due almost entirely to greatly increased sales of cheaper products, such as carbon tetrachloride, formaldehyde, and methanol, at slightly lower average prices in 1929 than in 1928. The combined sales of 9 of these cheaper products increased approximately 51,000,000 pounds in 1929, whereas combined sales of 54 of the more expensive products dropped off approximately a thousand pounds.

Of the 240 products reported to the commission in 1929, 61 showed steady gains and 21 showed continuous losses since 1927. Fifteen products, such as acetone, synthetic caffeine, ethyl mercury chloride, furacrylate sodium, isopropyl bromide, isopropyl ether, ethylisopropyl barbituric acid, isopropyl ethyl malonate, oxalacetic ether, and synthetic resins are listed in this year's census for the first time. The total production of these 15 products amounted to 43,705,088 pounds, of which 32,780,782 pounds, or 75 per cent, sold for $4,870,077, or for 14.9 cents per pound. These new products represent 6.90 per cent of the total 1929 production, 8.09 per cent of the total 1929 sales, 7.48 per cent of the total 1929 value of sales, and 6.39 per cent of the total 1929 sales value of production. Though included in the 1929 census for the first time, acetone made by fermentation, caffeine from theobromide, and citrate of lime by fermentation, were produced in the United States prior to 1929.

This year's census includes, in Table 41, a list of synthetic organic chemicals imported through the port of New York during 1929, and dutiable under paragraph 5, act of 1922.

Chemicals Showing Marked Increases In 1929

Important synthetic organic chemicals showing marked increases in 1929 are: Acetaldehyde, acetic acid, citric acid, ethyl and methyl chlorides, ethylpropionate, formic acid, isopropyl alcohol, methanol, tetraethyl lead, and triethanolamine. Other chemicals showing increases in 1929 are normal and secondary amyl alcohol, butyl aldehyde, butylamine condensation products, carbon tetrachloride, chloracetic acid, citral, citronellol, diethylene glycol, diethylene glycol monoethyl ether, ethyl bromide, ethyl iodide, and ethyl oxalate, ethylene dibromide, ethylene glycol monoethyl ether acetate, furfural, hydroxylamine, methyl acetate, pyruvic acid, sebacic acid, and research chemicals.

ACETIC ACID

Prior to 1928, when the Niacet Chemicals Corporation of Niagara Falls, N. Y., produced synthetic acetic acid from acetylene obtained by treating calcium carbide with water, most of our domestic supply was derived from calcium acetate and by importation of the acid. It is now also produced by the oxidation of ethyl alcohol obtained in the fermentation of molasses, and directly from pyroligneous liquors either by using a solvent for extraction of the acid or by employing a substance which forms a minimum boiling mixture with alcohol and water. Excepting its manufacture from calcium acetate, more acetic acid is now produced from acetylene than by all other methods combined; and the output in 1929, which was several times that of 1928, represented a substantial percentage of our total production. Its commercial production from acetylene, though but a recent achievement, will probably continue to represent an increasing proportion of our total output and may constitute the major portion of our future increases in production. Of the acetic acid imported in 1929, practically 100 per cent was synthetic acid made in Canada from acetylene.

About 50 per cent of the total consumption of acetic acid is used in the manufacture of solvents for pyroxylin lacquers, from 15 to 20 per cent is consumed in the manufacture of cellulose acetate rayon, and an equal amount is used in the dyeing and finishing of textiles. Large quantities are also consumed in the manufacture of dyes, white lead, drugs, pharmaceuticals, colors and pigments, and in the leather industry.

Of interest to the acetic acid industry is the announcement [1] that a domestic manufacturer will erect a $500,000 plant at Peoria, Ill., for the production of acetic acid at a cost well below the current market price, by the Langwell process—the fermentation of cellulose in the form of straw, cornstalks, corncobs, peanut shells, and the hulls of rice, oats, and cottonseed. It is reported that this initial unit will have a production of 10 tons per day, or approximately 25 per cent of the normal company demand.

[1] Wall Street Journal, June 13, 1930.

FORMIC ACID

Formic acid, made synthetically by heating caustic soda with carbon monoxide under pressure, adding sulfuric acid to the resulting sodium formate, distilling off and subsequently purifying the formic acid obtained, resembles acetic acid in certain chemical properties, though it is more active chemically. It is the strongest of organic acids and is used principally in the dyeing of textiles and in the dyeing and tanning of furs and leather. Competing with acetic acid on a price basis, it is used in increasing quantities in the acetate rayon industry and in treating cotton fibers prior to acetylation. It has to a certain extent displaced acetic acid as a coagulant of rubber latex in the rubber plantations of the Dutch East Indies and Straits Settlements. As esters of various alcohols, it is used in perfumes and in solvents.

In 1923 domestic production of formic acid was discontinued and was not resumed until 1928. In 1929 a second producer entered the field.

Imports of formic acid, which were discontinued during the war, were resumed in 1919 and steadily increased to 3,214,642 pounds in 1927. Since then they have dropped at the rate of about 965,000 pounds per year. These decreases have been approximately compensated for by domestic production.

CITRIC ACID

The production of citric acid in the United States by the fermentation of cane sugar with certain enzymes was substantially greater in 1929 than in 1928. The increasing output of this industry, together with that of the citric-acid industry, which was developed in California during the World War and in which cull lemons of the California citrus industry are used, has made the United States independent of the Italian monopoly on both citric acid and the raw material, citrate of lime.

The Italian monopoly at present controls the European markets for citric acid and citrate of lime and has an interest in La Citric Belge, formed in Belgium in April, 1929, with a capitalization of 20,000,000 francs "for the purpose of manufacturing, for all purposes and for the trade, calcium citrate, citric acid, and all the compounds and derivative products."[2] La Citric Belge plans the erection of a plant at Tirlemont, Belgium, having a capacity of 1,000 tons of citric acid per year and has absorbed Les Produits Organiques de Tirlemont, which manufactures calcium citrate and citric acid by biological methods and has limited its production to 300 tons per year.

METHANOL

Synthetic methanol, competing with the natural product obtained by distillation of hardwood, is produced by high pressure synthesis from carbon monoxide by the Commercial Solvents Corporation, the Carbide & Carbon Chemicals Corporation, and the Du Pont Ammonia Corporation. It is consumed chiefly in making formaldehyde, which is used as a raw material for indigo, synthetic phenolic resins, rubber accelerators, and other products.

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[2] Annex au Moniteur Belge, May 4, 1929.

Though its commercial synthesis is but two years old, it represents a substantial proportion of our total domestic output. Statistics of production can not be published; however, the production is estimated to have been over 4,000,000 gallons in 1929 [3] and to be 10,000,000 gallons in 1930.[4] The present (June, 1930) quotations on synthetic methanol are the lowest in the history of the industry.

Not only has production of the natural product decreased from 5,982,579 gallons in 1928 to 5,299,546 gallons in 1929, but imports of synthetic methanol for the last two years have been very small, as compared with production, amounting to 379,291 gallons in 1928, valued at $0.341 per gallon, and to 538,427 gallons in 1929, valued at $0.399 per gallon. Most of the methanol imported is later exported with benefit of drawback either as indigo paste or as formaldehyde.

ETHYL ALCOHOL

The first commercial production of synthetic ethyl alcohol in the United States was reported in 1929, when 48,000 proof gallons were made during a 1-month commercial test conducted at the Charleston, W. Va., plant of the Carbide & Carbon Chemicals Corporation, under a temporary permit granted in May by the Commissioner of Prohibition. This alcohol, made from ethylene obtained from natural gas, was pronounced identical with alcohol obtained by fermentation and was denatured and used in the regular chemical processes of the company. Synthetic alcohol may also be made from ethylene obtained from blast-furnace gas and from acetylene obtained by the reaction of water on calcium carbide.

It is reported that the synthetic alcohol plant of the Carbide & Carbon Chemicals Corporation, at Charleston, W. Va., has a producing capacity of from seven to eight million gallons per year, was in operation early in 1930, and will operate under a production quota fixed by the Bureau of Prohibition based on orders the company will be able to show.

PROPYL, ISOPROPYL, BUTYL, AND AMYL ALCOHOLS

The production of isopropyl alcohol in 1929 was several times that of 1928. It is made on a commercial scale by high-pressure synthesis from propylene, which is obtained by the cracking of either natural gas or petroleum, or as a by-product in the manufacture of ethyl alcohol by fermentation.

In June, 1930, the Du Pont Ammonia Corporation announced that its large plant for the production of higher alcohols by high-pressure synthesis from hydrogen and carbon monoxide obtained as a by-product in the synthesis of ammonia was nearing completion. The mixture of alcohols produced by this process is separated by fractionation; the first fraction containing butyl and amyl alcohols, the second containing propyl alcohol, and the third containing higher alcohols than 5-carbon alcohol.

Isopropyl alcohol, being a tax-free substitute for denatured ethyl alcohol, is used in the manufacture of toilet preparations because it is nonpotable, has no odor, and its properties are similar to those of

[3] Chemical and Metallurgical Engineering, January, 1930, p. 60.
[4] Chemical Markets, April, 1930, p. 432.

ethyl alcohol. It may be used as a denaturant in certain industries where methanol or pyridine might not be used for obvious reasons and by manufacturers of barbers' supplies, perfumes, and toilet preparations, in place of acetone as a denaturant of ethyl alcohol, though either is prescribed by the Bureau of Prohibition in formulas 39, 39A, and 40. It is also used, as is normal propyl alcohol, as a solvent.

The Commercial Solvents Corporation produced [5] approximately 67,500,000 pounds of butanol in 1929 by the controlled fermentation of corn, of which 45,000,000 pounds were consumed in the manufacture of butyl acetate.

The production of amyl alcohols in 1929 was greatly in excess of that in 1928. Large quantities are made by the Sharples Solvents Corporation by chlorinating pentanes contained in natural gas and subsequently hydrolyzing these monochlor derivatives with a caustic solution in the presence of a catalyst.

ACETALDEHYDE

Acetaldehyde was first produced in the United States from acetylene obtained by treating calcium carbide with water in 1926 when the Niacet Chemicals Corporation—in which the Canadian Electro Products Co. of Shawinigan Falls, Canada, and two American firms have joint interests—began operations at Niagara Falls, N. Y. The following year another company erected a plant at Charleston, W. Va., for the production of acetaldehyde from acetylene. So rapidly has production from this source increased that in 1929 practically all the acetaldehyde produced in the United States was synthesized from acetylene.

Acetaldehyde is used chiefly as an intermediate in the manufacture of glacial acetic acid. Large quantities are consumed in the manufacture of rubber accelerators, and smaller quantities in the manufacture of synthetic resins and in the organic syntheses of fruit essences and ingredients of perfumes.

ETHYL AND METHYL CHLORIDES

Ethyl and methyl chlorides have both shown steady increase in production since 1927. Of the two, ethyl chloride is produced in much greater quantity and the annual increase in its production has, since 1927, been approximately twice that of methyl chloride. This is due to the fact that ethyl chloride is used chiefly in the manufacture of tetraethyl lead, in growing demand for antiknock gasoline. It is also used as a refrigerant and as a local anesthetic. The use of methyl chloride is confined chiefly to that of a refrigerant, though small amounts are used in the manufacture of dyes. The increasing use of tetraethyl lead in the preparation of ethyl gasoline, as well as the growing demand for automatic refrigerators, augurs well for the future of these two chemicals.

TETRAETHYL LEAD

The production of tetraethyl lead is continuing to increase, and the rate of increase during the past year is even greater than during the year previous, when its production was twice that of the year before.

[5] Wall Street Journal, June 13, 1930.

Its growing use in the production of ethyl gasoline is due to the fact that it greatly reduces the knock in internal-combustion engines, through its ability to effect a slow-burning explosion of sustained pressure rather than one in which the initial pressure reaches a maximum and then instantaneously decreases appreciably. Because of this characteristic of ethyl gasoline, internal-compression engines of high-compression ratio can be operated with a higher degree of efficiency than when a fuel is used which has not been "leaded." This increased efficiency, however, is not so noticeable in the older type of engines which had a low-compression ratio.

TRIETHANOLAMINE

Triethanolamine has made continuous gains in output since 1927, although the gain registered during the past year was less than during the previous year. Ethanolamines as a class possess high penetrative powers. That the addition of a small amount of triethanolamine to various oily materials, such as creosote, markedly reduces the time of its penetration of various kinds of woods, suggests a possible use of triethanolamine in the preservation of wood. Ethanolamines have other properties that give them commercial value. Their great hygroscopicity and their ability to combine with fatty acids to form soaps having excellent detergent properties make them valuable constituents of shaving soaps and facial creams.

Products Reported in 1929 for the First Time

Of the products reported in 1929 for the first time, the more important are: Synthetic acetone from propylene, ethyl mercury chloride, isopropyl ether, and synthetic resins of the vinyl and urea-formaldehyde type. Among those of lesser importance are isopropyl bromide, isopropyl ethyl malonate, and oxalacetic ether.

ACETONE

One of the outstanding achievements of the synthetic noncoal-tar industry in 1929 was the commercial production of acetone from propylene obtained from natural gas. Acetone produced by this method and by the controlled fermentation of corn, 1 bushel of corn yielding from 10 to 11 pounds of mixed solvents in the proportion of 60 per cent butanol, 30 per cent acetone, and 10 per cent alcohol, accounted for practically all of our 1929 production. Prior to the World War, acetone was obtained only in the destructive distillation of hardwood, 1 cord of wood yielding about 180 pounds of acetate of lime, from which approximately 97 pounds of glacial acetic acid or 36 pounds of acetone could be obtained.

Had the lacquer industry not demanded increased production of butanol, it is probable that no attempt would have been made to produce acetone by the fermentation of corn, since disposal of butanol produced simultaneously might have presented a serious problem, as it does now in Italy. But fortunately, the lacquer industry serves as an outlet for most of the butanol, with the result that the United States now has two sources of synthetic acetone. In 1929, two companies were producing synthetic acetone in the United States; one by the fermentation of corn, and one by synthesizing it from natural

gas. Late in the year, a third concern began producing acetone commercially by the fermentation of corn.

Acetone is used primarily as a solvent in the manufacture of cellulose, acetate rayon, pyroxylin plastics, photographic films, airplane dopes, patent leather, and artificial leather. It enters into the manufacture of laminated glass, chloroform and iodoform; and is also used as a solvent for fats, rubber, and other gums, paints, and varnishes, as well as for acetylene. When dissolved in acetone, acetylene may be safely transported under pressure and used without danger of explosion.

ISOPROPYL ETHER

Though formerly regarded as a fine chemical, isopropyl ether, which is a solvent for animal, vegetable, and mineral oils, certain waxes, and practically all natural and synthetic resins, is now being produced on a commercial scale in the United States.

The properties of isopropyl ether are similar to those of ethyl ether with the added advantage of lower vapor pressure, higher flash point, higher boiling point, lower solubility in water, and a somewhat higher solvent power. Its unique solvent properties and ease of recovery indicate, in addition to its use as a common solvent, its possible use in the extraction of acetic acid from pyroligneous liquors by methods similar to those employed in the Brewster process; or, when used in conjunction with ketones, alcohols, or other ethers, in the dewaxing of oils or the deoiling of waxes.

SYNTHETIC RESINS

Vinyl, urea, and thiourea resins are the important synthetic resins of noncoal-tar origin. They differ from phenolic resins in chemical composition as well as in physical properties. Vinyl resins, which are polymers of vinyl chloride, vinyl acetate, or mixtures of both, are water white and transparent to ultra violet light. The basic raw material for these vinyl compounds is acetylene, or ethylene contained in natural gas. Thiourea resins, which are condensation products of thiourea or its derivatives and an aldehyde, are translucent and do not darken on exposure to light as do phenolic resins.

Vinyl resins can well be used in the lacquer industry since they not only possess greater flexibility and adhesion than does nitrocellulose, but they permit the production of surface-coating materials in which the film-forming constituents may be as high as from 50 to 60 per cent as compared to but 25 per cent in nitrocellulose lacquers.

Thiourea resins are used chiefly in the plastics industry. As they can be molded in extremely thin sections, contain no phenol to impart taste or smell, and are less brittle than products molded from phenolic resins, they are used to advantage in molding dishes and similar articles.

Vinyl resins were produced in the United States prior to 1929; but the domestic production of thiourea resins began in August, 1929.

ORGANIC METALLIC COMPOUNDS

Ethyl mercury chloride is one of several organic metallic compounds developed since the war for controlling fungus parasitic diseases that have caused losses amounting to hundreds of millions

of dollars annually. Other similar compounds are ethanol mercury chloride, hydroxymercuricresol, hydroxymercurichlorphenol, hydroxymercurinitrophenol sulfate, mercuriated orthonitrophenol, mercuriated acetaldehyde, copper beta-naphthol, and copper arsenic beta-naphthol.

Containing a metal (usually mercury or copper) in combination with an organic radical, these compounds, as a class, seem more satisfactory than certain chemicals such as formaldehyde, mercuric chloride, or copper sulfate, recommended by plant pathologists for years, in that the metallic radical is effective against smut spores and in that the organic radical alters its toxicity so as to reduce or obviate seed damage.

Although 1929 is the first year in which ethyl mercury chloride was produced on a commercial scale in the United States, the use of organic metallic compounds to combat plant fungus diseases is of several years standing, having originated in Germany during the war. They are applied either in liquid form or as dust and though the former method is cheaper, the latter is easier and does not entail the several disadvantages attendant upon the liquid application. The first of these fungicidal compounds to be used in this country was hydroxymercurichlorphenol, marketed under the trade name of "Uspulun."

Chemicals for Industrial Fumigation

Certain synthetic organic chemicals, namely, ethylene oxide, ethylene dichloride, and carbon tetrachloride, are now being used in the commercial production of two new industrial fumigants to exterminate insects, vermin, and rodents, which have brought untold economic losses and have caused much human suffering. One, known as Carboxide, is a mixture of carbon dioxide and ethylene oxide in the proportion of 9 to 1 by weight. The carbon dioxide markedly accelerates the respiration of insects and the ethylene oxide is mortally toxic except to human beings. The carbon dioxide also decreases the absorption of the fumigant by the material being treated, which is important in the fumigation of grains and foodstuffs. The other is known as ethylene dichloride—carbon tetrachloride mixture.

Both were evolved by scientists in the research laboratories of the manufacturer and of the United States Department of Agriculture working in cooperation. Both are claimed to completely eradicate all forms of insect life—eggs, larvæ, pupæ, and adults. Neither is dangerously toxic to man and both can be used safely for the fumigation of grains, foodstuffs, textiles, and dwellings. They are said to be noninflammable and nonexplosive in all proportions with air, easy to handle, stable under all conditions, and to have no injurious action on the materials fumigated.

Caffeine

The principal source of caffeine now produced in the United States is theobromine, which is extracted from cocoa cake and used in the manufacture of synthetic caffeine. Natural caffeine is obtained both from tea waste and as a by-product in the decaffeinization of coffee. In the United States caffeine has been made from tea waste since 1895, and theobromine has been extracted from cocoa cake since

1911. In 1929 the production of caffeine synthesized from theobromine was far in excess of the production of natural caffeine, which, based on imports of tea waste, was approximately 90,000 pounds plus that obtained in decaffeinizing coffee. Production of caffeine from all sources in 1927 was 399,002 pounds. The quantity of tea waste required to produce a pound of natural caffeine is approximately fifty-five times as much as the quantity of theobromine required to produce a pound of synthetic caffeine.

Caffeine is an alkaloid used chiefly in the preparation of certain soft drinks. It has also been used to a certain extent in medical practice, but recently theobromine, occurring in cocoa, and theophylline, occurring in tea, are displacing it in a marked degree. These related alkaloids are, like caffeine, also produced synthetically.

TABLE 40.—*Certain synthetic organic chemicals of noncoal-tar origin: Imports and production, 1927–1929*

	1927			1928			1929		
	Imports [1]		Production [2]	Imports [1]		Production [2]	Imports [1]		Production [2]
	Quantity	Value		Quantity	Value		Quantity	Value	
	Pounds		*Pounds*	*Pounds*		*Pounds*	*Pounds*		*Pounds*
Acetaldehyde	50	$20		4,472	$803	[3]	10,770	$1,622	[3]
Paracetaldehyde	21,258	4,017		19,587	3,216	[3]	40,853	7,319	[3]
Formaldehyde, solution	1,347	89	29,920,072	4,188	194	38,717,732			51,786,422
Hexamethylenetetramine	3,417	1,715	1,315,213	5,898	1,643	1,661,645	5,562	1,857	2,368,020
Acetic or pyroligneous acid, containing by weight—									
Not more than 65 per cent acetic acid	6,766,512	350,421		12,163,499	644,816	[3]	21,410,253	1,289,002	[3]
More than 65 per cent acetic acid	3,784,504	454,382		6,058,077	728,739	[3]	7,824,521	727,847	[3]
Formic acid	3,214,642	230,565		2,250,090	174,246	[3]	1,386,608	108,797	[3]
Gallic acid			515,876			432,571			458,389
Lactic acid, containing by weight 55 per cent or more of lactic acid	202,352	63,650		282,598	88,438	[3]	322,110	89,115	[3]
Oxalic acid	1,843,732	98,657		[4] 890,203	[4] 46,447	[3]	1,346,053	71,193	[3]
Pyrogallic acid						142,335	12	33	134,994
Butyl alcohol	31,751	5,569	[5] 48,922,561	[6] 39,903	[6] 7,957	[5] 49,860,798	5,045	1,127	[7] 67,500,000
Methanol	[8] 1,714,442	718,412		[9] 379,291	129,339	[3]	[8] 538,427	214,667	[3]
Carbon tetrachloride			16,550,026			19,764,908	20	7	34,719,234
Chloroform	11	42		51	72	[3]	30	35	2,767,301
Diethylbarbituric acid							30,874	[10] 248,986	[3]
Glycerophosphoric acid, and salts and compounds	50,279	56,205		28,550	43,726	[3]	25,779	46,532	[3]
Ethers and esters, containing not more than 10 per cent alcohol—									
Ethyl ether USP	22	12	5,855,462			5,933,297	2,262	320	6,147,393
Butyl acetate			26,304,243	5,347,902	701,827	30,029,505	7,824,234	981,953	38,780,656
Amyl acetate	300	150	2,421,301	539	211	4,290,117	300	82	5,832,145
Ethyl acetate	3,748	391	49,203,156			58,578,026	74	73	73,895,640
Other, n. s. p. f.	[11] 5,789,042	846,334		678,911	113,935		85,314	33,673	
Tetrachloroethane	72,977	3,735		46,862	2,544	[3]	99,708	4,387	[3]
Trichloroethylene	2,567	184		154,358	9,382	[3]	223,653	11,183	
Thymol	18,420	40,269		17,636	29,928		22,541	36,935	
Urea	814,309	51,880		1,788,927	101,900		4,588,583	228,401	
Vanillin [13]	[12] 3,178	20,961	301,251	18,759	129,917	281,694			

[1] Foreign Commerce and Navigation of the United States.
[2] Census of Dyes and Other Synthetic Organic Chemicals.
[3] Not publishable.
[4] T. D. 40604.
[5] Wall Street Journal, Apr. 8, 1929.
[6] T. D. 37577.
[7] Production of Commercial Solvents Corporation, Wall Street Journal, June 13, 1930.
[8] Gallons.
[9] Gallons, T. D. 41892.
[10] Based on the American selling price.
[11] Includes butyl acetate, imports of which in the last 9 months of 1927 were 4,958,560 pounds, valued at $679,490.
[12] Data from invoices indicate a total of 3,795 pounds.
[13] Vanillin, listed prior to 1929 in the noncoal-tar group, is included in 1929 in the coal-tar products. For imports in 1929, see p. 62; for production, see p. 74.

TABLE 41.—*Synthetic organic chemicals: Imports through the port of New York 1929, dutiable under paragraph 5, act of 1922* [1]

Item	Quantity	Value	Item	Quantity	Value
	Pounds			*Pounds*	
Acetamide	227	$222	Ethyl chloride	836	$791
Aldehyde C–8 to C–14, inclusive	28	793	Geranoil	3,513	3,827
Aldehyde C–14	25	181	Hexachloroethane	4,990	746
Allylbromide	2,207	2,069	Hydroxy-citronellal	100	309
Allylisopropylbarbituric acid	1,102	5,817	a-Ionone	110	527
Allylisopropylacetylaminoformamide	331	1,163	Iron ammonium oxalate	90,787	16,754
Allylisosulphocyanate	19,292	21,321	Iron cacodylate		1,363
Ammonium oxalate	69,167	8,141	Iron sodium oxalate	13,218	2,187
Ammonium valerate	1,115	1,740	Isoeugenol	200	528
Amyl valerate	100	153	Isopropylbromide	2,216	1,021
Bromvalerylurea (powder)	836	4,613	Isopropylbromophenylbarbituric acid	37	880
Butyl lactate	1,213	464	Leucine o-amino-isocapronic acid	6	553
Butyl phosphate	858	303	Linalyl acetate	55	142
Butyric acid	1,102	244	Menthyl valerianate		
Calcium lactate	61,687	12,356	Menthyl atropolin	12	876
Calcium lactophosphate	2,205	580	a-Methylionone	35	119
Calcium lactosulphate	1,103	282	Methyl heptine carbonate	11	100
Capryl alcohol	55	142	Nucleinic acid	2,602	15,307
Chlorbutanol	1,983	8,168	Pentachloroethylene	2,654	182
Cinnamic alcohol	550	786	Perchloroethylene	4,629	331
Cirtonellol	1,619	3,076	Potassium binoxalate	18,259	1,772
Diallylbartiburic acid	947	13,344	Sodium cacodylate	4,265	58,028
Dichlorethylene (diolene)	82,668	11,631	Sodium nucleinate	99	729
a-Dichlorhydrine	2,252	924	Sodium oxalate	10,350	1,025
Diethylamine	1,055	1,923	Sodium salt of allyl arsenic	331	1,545
Diethylaminoethanol	7,500	17,010	Strontium lactate	1,102	433
Diethylbarbituric acid	1,763	14,104	Tetrachloroethylene	200,000	1,577
Diethylenediamine	44	317	Tetramethyldiaminoethylisopropanol	312	188
Dihydroxycitronellal	300	1,182	Thiourea	26,763	10,312
Dimethylglyoxime	198	851	Theophyllin	550	9,979
Ethyl aceto acetate	11,023	4,341	Thymol chloride	55	178
Ethyl diodo brassidate	71	389	Tribromethanol solution		1,037
Ethyl laurate	300	147	Trichlor urethane	444	2,554
Ethylate	1,267	734			

[1] Data in this table are taken from analyses of about 85 per cent of the total value of all imports through the port of New York coded under par. 5. Hence figures for individual items may or may not be complete, but serve as an indication of the quantity and kind of these imports. Imports valued at less than $100 are not included.

TABLE 42.—*Synthetic organic chemicals of noncoal-tar origin: Production and sales, 1929*

(The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on p. 188. 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 of chemical	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Total		405,185,980	$65,117,651	$0.16	633,192,215
Acetaldehyde	61, 112, 129, 130, X				
Acetamide	10				
Acetannin (tannigen)	19				
Acetic acid (100 per cent purity)	112, 148, X				
Acetone	32, X				
Acetylbromodiethylacetylcarbamide	19				
Aldehyde ammonia	129				
Aldol (acetaldol)	112				
Amyl acetate and sec amyl acetate	52, 59, 61, 64, 89, 114, 125, 148, 149, 151, X, X, X.	5,108,737	1,138,851	.22	5,832,145
Amyl alcohol and sec amyl alcohol	64, 89, 125, 148, 151, X, X, X.				

TABLE 42.—*Synthetic organic chemicals of noncoal-tar origin: Production and sales, 1929*—Continued

Name of chemical	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Amyl butyrate	27				
Amyl nitrite	96, 102				
Amyl oenanthate	61				
Amyl propionate	125				
Amytal (see ethylisoamylbarbituric acid).					
Anethol	59, 61				
Anisic aldehyde (aubepine)	61, 65, 72, X				
Aubepine (see anisic aldehyde)					
Brometone (see tribromotertiary-butyl alcohol).					
Bromo acid (see diethylbromoacetyl bromide).					
Bromocamphor	50, 96				
Bromodiethylacetylcarbamide	19				
Butyl acetate (n and sec)	52, 59, 64, 89, 151, 158, X, X, X.	30, 667, 187	$5, 341, 329	$0.17	38, 780, 656
Butyl alcohol (n and sec) (butanol)	X, X				
Butyl aldehyde	X				
Butyl aldehyde ammonia derivatives.	130				
Butyl aldehyde amines	52				
n-Butyl bromide	1				
Butylethylbarbituric acid (neonal)	1				
Butyl furoate	126				
Butyl propionate	59, 64, 89, 158				
Butylxanthic disulphide	X				
n-Butyric acid	61, 114				
Caffeine	100, 105				
d-Camphoric acid	96				
n-Caproic acid	96, 114, X				
Carbon tetrachloride	32, 50, X, X	30, 755, 158	1, 613, 654	.05	34, 719, 934
Chaulmoogric ester	19				
Chloral hydrate	102, 105				
Chloretone (see trichlorotertiary-butyl alcohol).					
Chloroacetic acid (mono)	50				
Chloroarsenobehenolate of strontium.	19				
Chloroform	26, 50, 129	2, 340, 198	459, 154	.20	2, 767, 301
Cinnamyl acetate	59				
Cinnamyl alcohol	61				
Cinnamyl butyrate	59				
Cinnamyl formate	59				
Cinnamyl ketone	61				
Cinnamyl valerate	61				
Citral	27, 59, 61, 72, 143, 149, X	5, 737	13, 040	2.27	6, 041
Citrate of lime	X				
Citric acid	X				
Citronellal	145				
Citronellol	61, 149, X, X				
Citronellyl acetate	61				
Citronellyl butyrate	59				
Crotonaldehyde	112, 130				
Cyanacetic acid sodium salt	19				
Decyl alcohol and aldehyde	61				
Diacetin (see glycerol diacetate)					
Dibromomalonyluren (dibromin)	X				
Dichloroethyl ether	32				
Diethylacetic acid	19				
Diethylbarbituric acid (veronal) (barbital).	1, 19				
Diethylbromoacetyl bromide (bromo acid).	19				
Diethyl malonate (malonic ester)	1, 19				
Diethyl sulphate	32				
Diethylene glycol	32, 73				
Diethylene glycol monobutyl ether	32				
Diethylene glycol monoethyl ether	32				
Diethylene oxide	32				
Dihydrovanillone	61				
Dihydroxy citronellic ketone	61				
Dihydroxytartaric acid	36, 121				
Dimethylglyoxime	10				
Dimethyl sulphate	X				
1:3-Dimethylxanthine sodium acetate.	19				

TABLE 42.—*Synthetic organic chemicals of noncoal-tar origin: Production and sales, 1929*—Continued

Name of chemical	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Duodecyl alcohol and aldehyde	61				
Erucic acid	19				
Ethyl acetate (85 per cent purity)	52, 61, 62, 64, 125, 148, 151, 157, X, X, X.	55, 155, 247	$6, 388, 361	$0. 12	73, 895, 640
Ethyl acetoacetate	148				
Ethyl bromide	19, 50				
Ethyl butyrate	27, 59, 61, 64, 114, X				
Ethyl n-caproate	114				
Ethyl carbonate	148				
Ethyl chloride	50, 52, 64, 65, 68, 96, 129				
Ethyl chlorocarbonate	148				
Ethyl ether, tech	11, X				
Ethyl ether, USP	11, 96, 102, 139, 148, X	5, 307, 575	1, 680, 852	0. 32	6, 147, 393
Ethyl formate	59, 61, 64, 96, 114, X	2, 815	1, 732	. 62	3, 437
Ethyl furoate	126				
Ethyl glycolic acid ester of menthol	19				
Ethylhydroxy butyrate	X				
Ethyl iodide	96, 102				
Ethylisoamylbarbituric acid (amytal)	93				
Ethylisopropylbarbituric acid	X				
Ethyl isovalerate	59, 61, X				
Ethyl lactate	61, 148, X				
Ethyl laurate	61				
Ethyl malonate (mono)	1, 61, 143				
Ethyl mercury chloride	52				
Ethyl nitrite	11, 64, 96, 102				
Ethyl oenanthate	59, 61, 114, X				
Ethyl oleate	61				
Ethyl oxalate	61, 148				
Ethyl pelargonate	27, 61, 143				
Ethyl propionate	61, 125, X				
Ethyl n-valerate	61, 64, 114				192
Ethylene	148				
Ethylene chlorohydrin	32				
Ethylene dibromide	30, 50				
Ethylene dichloride	32, 50				
Ethylene glycol	32				
Ethylene glycol derivatives	73				
Ethylene glycol diethyl ether	32				
Ethylene glycol monobutyl ether	32				
Ethylene glycol monoethyl ether	32				
Ethylene glycol monoethyl ether acetate	32, 148				
Ethylene glycol monomethyl ether	32, 73				
Ethylene oxide	32				
Formaldehyde (40 per cent purity)	48, 80, 129, X				51, 786, 422
Formic acid (90 per cent purity)	153, X				
Furac II (zinc dithiofuroate)	126				
Furac III (lead dithiofuroate)	126				
Furacrylate sodium	126				
Furfural	126				
Furfuryl alcohol (furan carbinol)	126				
Furoic acid	126				
Gallic acid, USP and tech	56, 96, X				458, 389
Geranyl acetate	59, 61, 143				
Geranyl butyrate	59, 61				
Geranyl formate	59, 61				
Geranyl propionate	61				
Glycerol diacetate (diacetin)	65				
Glycol diacetate	148				
Glycerophosphoric acid and salts of	80, 105				
Guanidine	19				
Heliotropin	65, 72				
Heptaldehyde	X				
Heptadecyl aldehyde	61				
Hexachloroethane	50				
Hexadecyl aldehyde	61				
Hexamethylenetetramine	80, 129, X				2, 368, 020
Hexamethylenetetramineanhydromethylene citrate	19				
Hydrofuramide	126				
Hydroxylamine	10				
Iodobehenate of calcium	19				
Iodobehenate of iron, basic	19				
Iodobehenic acid	19				

TABLE 42.—*Synthetic organic chemicals of noncoal-tar origin: Production and sales, 1929*—Continued

Name of chemical	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Iodoform	96, 102, 109				
Ionone	72, 100, 143, 149, X	37,227	$145,656	$3.91	40,416
Isoamyl butyrate	27, 59, 64, 114, X	9,096	9,881	1.09	16,177
Isoamyl formate	59, 114				
Isoamyl isovalerate	59, 114, X				
Isoamyl propionate	59				
Isobutyl acetate	59, 114				
Isobutyl aldehyde	61				
Isobutyl butyrate	59, 61				
Isobutyl formate	61				
Isobutyl propionate	61				
Isoeugenol	59, 61, 72, 149				
Isomenthol (synthetic menthol)	109				
Isopropyl alcohol (isopropanol)	32, X				
Isopropyl bromide	X				
Isopropyl ether	32				
Isopropyl ethyl malonate	X				
Isovaleric acid	114				
Jasmin aldehyde	61				
Jasmone ketone	61				
Lactic acid (100 per cent purity)	14, X				
Linalyl acetate	59, 61, 72, 143				764
Linalyl butyrate	61				
Linalyl formate	59				
Linalyl propionate	61				
Menthol, synthetic (see isomenthol).					
Methaform (see trichlorobutyl alcohol).					
Methanol (methyl alcohol)	32, 51, X				
Methyl acetate	62, 148				
Methyl chloride	129				
Methyl eugenol	143				
Methyl furoate	126				
Methyl iodide	102				
Methyl isoeugenol	59				
Methylnonylacetic acid	61				
Methylene citric acid	19				
Methylene iodide	102				
Monoethanolamine	32				
Neonal (see butyl ethyl barbituric acid).					
Nonyl alcohol	61				
Nonyl aldehyde	61				
Octodecyl aldehyde	61				
Octodecyl ketone	61				
sec-Octyl acetate	61				
n-Octyl alcohol	61				
sec-Octyl alcohol (capryl alcohol)	10, 61				
Octyl aldehyde	61				
Octyl butyrate	61				
Oxalacetic ether	148				
Oxalic acid	116, 153, X				
Paracetaldehyde	112				
Paraformaldehyde	80, 129				
Phosgene	131				
Piperidine	130				
Piperonone	61				
Propionaldehyde	61, 158				
Propionic acid	158				
Propionic anhydride	158				
n-Propyl acetate	59, 61				
n-Propyl propionate	61				
Propylene chlorohydrin	32				
Protethyl	61				
Pyrogallol (pyrogallic acid)	56, 96, X				134,994
Pyruvic acid	1, X				
Research chemicals	10, 56				
Rhodinal	X				
Rhodinol	59, 61, 72, 143, 145, 149, X.				4,364
Rhodinyl acetate	59, 61, 143				
Rhodinyl butyrate	59				
Rhodinyl formate	59				
Sebacic acid	10				

TABLE 42.—*Synthetic organic chemicals of noncoal-tar origin: Production and sales, 1929*—Continued

Name of chemical	Manufacturers' identification numbers (according to list on p. 188)	Sales			Production (Quantity)
		Quantity	Value	Average price per pound	
		Pounds			*Pounds*
Succinate sodium	133				
Succinic acid	96				
Succinic peroxide	X				
Synthetic resins (noncoal-tar)	73 X, X				
Tannigen (see acetannin)					
Terpineol	59, 72, 143, X				
Terpinyl acetate	59, 72, 143, 149, X				3,857
s-Tetrachloroethane	129				
Tetradecyl aldehyde	61				
Tetraethyl lead	52				
Tetrahydrofurfuryl alcohol	126				
Tetramethylthiouramsulfide	52, X				
Tetramethylthiouramdisulfide	161, X				
Thiobismol (sodium bismuth thioglycollate).	X				
Triacetin	89				
Tribromotertiarybutyl alcohol (brometone).	X				
Trichlorobutyl alcohol (methaform)	X				
Trichloroethylene	129				
Trichlorotertiarybutyl alcohol (chloretone).	X				
Triethanolamine	32				
Triethyltrimethylenetriamine	X				
Trimethylene bromide	1				
n-Valeric acid	61				
Vanillic acid	61				
Vanillyl vanillate	61				
Vinyl acetate	32				
Vinyl chloride	32				
Vinyl resins	32				
Xanthates	74, 75, 130				
Zinc butylxanthate	X				
Zinc dimethyldithiocarbamate	X				

PART V

INTERNATIONAL DYE TRADE

Part V

INTERNATIONAL DYE TRADE

Introduction

Previous issues of the Census of Dyes, published annually since 1917, have discussed in detail trends in international dye trade during the pre-war years, through the war period (1914–1918), and through the post-war period. Many significant changes have occurred in international dye commerce during the years so far reviewed. Old alliances and trade customs have been broken down and new alignments formed, and there has been a constant shifting in the source of supply by many of the dye-importing nations. This issue of the census brings the discussion up to date.

Developments in 1929

Outstanding developments in international dye trade in 1929 were: (1) Consummation of the agreement between German, Swiss, and French dye producers; (2) formation of the American I. G.; (3) increased exports from the United States, Switzerland, Great Britain, and Italy; decreased exports from Germany, France, and Japan; and (4) increased imports into the producing countries, the United States, Great Britain, and Switzerland, and into the nonproducing country, India; decreased imports into the producing nations, Germany, France, Italy, and Japan.

World Production of Dyes

Germany, Switzerland, Great Britain, France, and the United States are the leading dye-producing nations of the world. Italy and Japan are manufacturers on a smaller scale. Other nations that make coal-tar dyes in limited quantities are Russia, Czechoslovakia, Holland, Poland, Spain, and Sweden.

The world capacity to produce dyes is estimated to be 600,000,000 pounds. (See Census of Dyes, 1923, Table 20, p. 124.) Estimates of world production in 1929 indicate that more than one-third of this capacity was idle during that year. The inability of producers to utilize fully the installed capacity has resulted in severe competition, which has eliminated many weak manufacturers and prevented certain others from making an adequate return on the invested capital. In recent years the struggle for markets has become so intense among foreign manufacturers that international organizations have been effected, and there is evidence of a movement toward the fixing of world prices by European manufacturers.

Table 43 shows the production of dyes by the chief producing countries, 1925–1929, inclusive.

TABLE 43.—*Dyes: Production by chief producing countries, 1925–1929*

Country	1925	1926	1927	1928	1929
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Germany [1]	165,000,000	165,000,000	165,000,000	165,000,000	165,300,000
United States [2]	86,343,348	87,979,000	95,200,000	96,625,000	111,421,000
Great Britain [3]	32,693,402	30,297,000	39,551,756	50,907,000	55,785,000
Switzerland [4]	18,000,000	19,200,000	22,500,000	23,857,000	24,347,000
France [5]	32,065,996	34,419,868	27,590,000	30,736,000	36,114,000
Italy [6]	13,860,000	15,428,000	13,621,000	15,211,000	
Japan [7]			16,856,000	18,221,000	

[1] 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. The figures for 1925–1929 are estimated from U. S. Department of Commerce.

[2] Annual *Census of Dyes and Other Synthetic Organic Chemicals*, U. S. Tariff Commission.

[3] Estimates for 1924–1926 were prepared by Dyestuffs Industry Development Committee from voluntary returns of British dye firms; 1927–1929 figures prepared by British Board of Trade.

[4] Calculated on basis that the home market consumes 10 per cent of the output of Swiss dyes; exports consequently equal 90 per cent of production.

[5] Official figures from French-owned plants in France compiled by the Union des Producteurs des Consommateurs pour le developpement de l'industrie des Matieres Colorantes en France; 1927 and 1928 figures from U. S. Department of Commerce; 1929 figures from Daniel J. Regan, assistant commercial attaché, U. S. Bureau of Domestic Commerce, Paris, France, July 1, 1930.

[6] Production figures for 1924 and 1925 compiled by Hon. Ernesto Belloni for International Economic Conference, Geneva, Switzerland, May, 1927, and those for 1926, 1927, and 1928 from U. S. Department of Commerce, *World Trade Notes*.

[7] Figures for 1927 and 1928 from "Chemical Trade Journal," London, Mar. 28, 1930; as reported by the Japanese Ministry for Industry and Trade.

COMPETITIVE CONDITIONS

The dye-producing nations are equipped to produce dyes far in excess of their home requirements. Consequently, there is severe competition for foreign markets, and many of the producing nations have adopted special measures to protect their industries. Among these governmental aids are concessions, special privilege, subsidies, and tariffs. The struggle for markets is most noticeable in the Far East, principally in China and India, both nonproducers and both large consumers of the cheaper dyes, such as indigo and sulfur black. The United States, Great Britain, France, and Italy are active in their endeavors to retain Far Eastern markets gained during and since the war period. Germany and Switzerland are making intensive efforts to regain their pre-war control of the dye trade of these important consuming nations.

Germany and Switzerland still dominate the international dye trade to the extent of exporting about 80 per cent by value of the dyes exported from all producing countries. This, however, is a decrease from their 85 per cent share of the world exports in 1928.

The export trade of Germany declined about 10,000,000 pounds and about $6,000,000 in value in 1929 as compared with 1928. This, however, does not present a complete picture of Germany's international activities, since the I. G. controls or has an interest in dye plants in the United States, Japan, Spain, and Russia. In addition to a substantial production, these subagencies handle products not of their own manufacture. The I. G. is constantly expanding its activities, both in Germany and in other countries, and is making a determined effort to regain its position of preeminence in international chemical trade. By centralization, coordination, and efficiency in dye production, manufacturing costs have been reduced; by agree-

ments with producers in Switzerland and France, the burden of selling costs has been reduced; and by constantly increasing the number of chemical products, many of them the result of intensive research, sales have been increased throughout the world.

Switzerland has long been an important factor in international dye trade, especially in the higher-priced products. Specialization in dyes requiring skill, experience, and trained workmanship has admirably fitted this nation for participation in this specialty field. The Swiss have a well-trained and efficient selling organization throughout the world and own or have an interest in plants in the United States, France, Germany, Great Britain, and Italy. Crudes and intermediates are imported from several neighboring nations. The manufacture of specialty types reduces the amount of raw materials and effects a saving of transportation charges, both on the imported unfinished coal-tar products and on the outgoing dyes. It is estimated that 90 per cent of the Swiss production is exported, so the vital importance of foreign markets is apparent.

In the United States domestic competition has been so severe that many of the weaker producers have been eliminated, and various mergers and consolidations have been effected. This trend will undoubtedly continue until productive capacity is not greatly in excess of domestic consumption and demands from foreign markets.

The increase in the world wide preference for fast dyes and the more expensive specialty colors is a distinct advantage to nations developing and producing this type of product, while nations restricting their output to the old type cheaper colors will have difficulty in maintaining their trade.

The increase in the average price of dyes in some nations does not mean that specific dyes are becoming more expensive, but that more of the higher-priced dyes are being produced and consumed. Dye prices, in general, have declined in international markets.

The status of the United States' activities in the dye trade is fully discussed in Parts I–III of this census, and that of other countries is further treated in Part V.

Exports From Producing Countries

Table 44 gives comparative statistics of exports of dyes from the chief producing countries during the pre-war year 1913 and in the post-war period 1925–1929.

There was a decided falling off in both quantity and value of exports from Germany in 1929 as compared with the previous year. The dyes exported from this country were only 40 per cent by quantity of exports in 1913, but in value constituted 94 per cent of the 1913 figure. This indicates the universal trend towards more expensive fast dyes and towards colors of greater concentration.

Exports from Switzerland increased slightly in quantity and more noticeably in value. The value per pound increased from 70 cents in 1928 to 74 cents in 1929. The increase is due to the greater outgo of higher-priced colors, exports of the cheaper colors (indigo) remaining at about the 1928 level. In terms of value, Switzerland has more than tripled her export trade in dyes since 1913; in quantity, the increase has been much less—from 19,000,000 to 22,000,000 pounds.

The export trade of the United States recorded a conspicuous gain in both quantity and value in 1929 over 1928. As the value per pound declined from 23 cents in 1928 to 21 cents in 1929, the rate of increase was greatest apparently in the cheaper colors, such as indigo and sulfur black.

There was a large gain in exports from Great Britain in 1929. This increase was largely in the cheaper colors, since the value per pound of exports declined from about 34 cents in 1928 to about 27 cents in 1929.

Exports of dyes from France declined appreciably in volume, but only slightly in value. This may be indicative of a trend towards specialization in the higher-priced colors.

The export trade of Italy increased decidedly in both quantity and value.

TABLE 44.—*Coal-tar dyes: Exports from chief producing countries, 1913 and 1925–1929*

Exported from—	1913		1925		1926	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
Germany	239,598,133	$51,689,400	75,879,025	$44,311,155	81,883,253	$47,134,156
United States			25,799,889	6,694,360	25,811,941	5,950,159
Great Britain	5,451,376	862,566	7,344,608	3,122,149	6,014,288	2,428,287
Switzerland	19,458,902	5,549,752	16,161,041	11,979,718	17,287,793	11,971,452
France	1,152,134	275,716	10,784,463	7,469,903	10,335,827	5,902,946
Italy	117,725	22,458	426,810	295,702	681,221	453,235
Japan			1,685,606	214,209	1,046,520	152,657

Exported from—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
Germany	107,593,519	$55,113,142	104,302,492	$54,830,872	94,695,507	$48,518,005
United States	26,770,560	5,495,322	27,824,264	6,531,619	34,130,325	7,279,086
Great Britain	7,600,208	2,970,266	11,645,404	3,924,769	[1] 17,570,112	[1] 4,780,269
Switzerland	20,291,498	14,571,841	21,471,739	15,108,761	21,912,538	16,123,693
France	11,133,671	3,055,030	8,013,280	2,356,717	6,601,234	2,182,734
Italy	620,595	334,575	796,963	464,659	1,325,846	608,844
Japan	1,080,968	136,545	2,570,892	269,602	1,788,927	170,411

[1] Accounts relating to Trade and Navigation of the United Kingdom, December, 1929.

INTERNATIONAL IMPORTS

As heretofore mentioned, the Far East is the principal battlefield of foreign trade in the cheaper dyes. Official data on imports into China in 1929 were not available at the time of preparation of this report, but export figures from the major producing countries reveal an interesting trend. Exports from Germany to China decreased from 31,390,000 pounds in 1928 to 28,910,000 pounds in 1929; those from Switzerland declined from 4,270,000 pounds in 1928 to 3,480,000 pounds in 1929. This falling off may be partially due to unsettled conditions in China. During the same period exports from the United States to China increased from 18,970,000 pounds to 24,530,000 pounds. The decrease in exports from Germany was in indigo and sulfur colors; the decline in those from Switzerland was largely in indigo; and the gain in those from the United States was in both of these cheaper colors.

The trade of India, as revealed by comparative statistics of imports, showed less change during 1929. Imports from Germany increased more than 1,000,000 pounds. Great Britain recorded a slight gain and Italy showed a decided increase. Imports from the United States were slightly less in 1929 than in 1928, while those from Switzerland, France, and Japan showed a greater rate of decrease. Other nonproducing countries in general imported more dyes, both by quantity and by value, in 1929 than in 1928.

Of the older producing countries, Germany imported a smaller quantity of dyes in 1929 than in 1928. The value of imports was about the same in both years. Switzerland imported slightly more colors, both by quantity and by value, in 1929 than in the year before. The new producing countries—the United States, Great Britain, France, Italy, and Japan—considered collectively, imported only a fraction of their consumption. The United States imports increased by about 1,000,000 pounds and by $1,000,000 during 1929. This increase was almost entirely in the high-priced colors.

TABLE 45.—*Coal-tar dyes: Imports into the chief consuming countries, 1913, 1928, and 1929*

Imported into—	1913		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
China	[1] 60,696,533	$11,673,779	64,116,911	[2] $10,985,069		
British India [3]	16,923,607	3,741,031	17,198,385	6,937,139	19,591,350	$8,337,026
Czechoslovakia			8,370,294	5,050,470		
Japan	9,755,260	2,100,255	5,949,007	4,605,831	5,778,132	4,122,246
United States	[4] 45,950,895	7,537,870	5,351,951	4,321,867	6,437,147	5,374,085
Italy	[5] 15,542,429	3,611,705	4,207,920	3,560,278	3,751,348	3,940,019
Belgium			5,911,635	1,962,246	6,394,222	2,092,008
Great Britain	41,203,008	9,207,684	4,693,696	4,866,291	5,677,056	5,329,821
Netherlands			6,479,300	3,294,501		
Dutch East Indies	[6] 2,073,434	890,366	5,723,448	1,745,590		
Germany	7,138,495	1,682,422	10,371,982	5,142,370	8,903,718	5,072,469
France	4,706,601	1,416,316	3,443,365	3,693,660	3,335,560	3,814,395
Canada [3]	2,633,516	594,414	3,111,728	1,679,633	3,250,019	1,816,461
Egypt			1,097,597	344,284	950,769	301,771
Austria	17,168,764	3,616,199				
Switzerland	2,201,292	431,197	2,252,491	1,586,641	2,373,186	1,626,677
Sweden	2,376,166	699,737	2,586,774	1,630,534		
Spain	[7] 2,303,709	1,021,368	1,038,472	1,936,832		
Poland			771,169	797,682		

[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] Exclusive of "aniline dyes" and "dyes and colors unclassified" amounting in value to $3,761,981 in 1927 and $5,876,182 in 1928.

[3] Years ending Mar. 31. Imports into British India for calendar year 1928, 20,138,441 pounds, valued at $8,966,385; calendar year 1929, 18,144,305 pounds, valued at $6,568,600.

[4] Fiscal year 1914; quantity from Special Agents Series No. 121, value from Commerce and Navigation Reports.

[5] Aniline dyes only in 1913.

[6] Quantity of synthetic indigo not shown for 1913.

[7] 1914.

INTERNATIONAL AGREEMENTS

The agreement between the dye manufacturers of Germany, France, and Switzerland, consummated in April, 1929, covered fixation of prices, establishment of export quotas, periodical readjustment of the major markets, and exchange of technical information. A detailed report on the agreement was given in the last census. This plan has not been in force for a sufficient period to appraise results accurately. Although exports of dyes by the participating nations

decreased in 1929, as compared with 1928, progress has been satisfactory. According to European press estimates, the cartel now controls 90 per cent of the Continental, 80 per cent of the European, and 70 per cent of the world production of dyes. The production of the three participating countries at the time of the conclusion of the agreement was estimated at about 165,345,000 pounds by Germany, 33,000,000 to 44,000,000 pounds by France, and 22,000,000 pounds by Switzerland.

The Department of Commerce reports that the allocated percentages of exports, under the agreement of the I. G. and the French and Swiss producers of dyes are Germany 70, France 20, and Switzerland 10. Another version gives the ratios as 75, 17, and 8. Reports from Germany and Switzerland deny that division of territory has been contemplated or that price fixing is to be engaged in. The arrangement is rather an agreement not to cut prices. The purposes of the pact are stated to be: (1) To permit France (Kuhlmann & Co.) the use of certain German processes, (2) to reduce trade in competitive dyes between participants, (3) to reduce distribution costs by consolidation of foreign sales agencies.

In the Far East it is reported that French dyes will be disposed of by the German organization, while, in Southern Europe, France will take over the sale of German products, Switzerland also having some preference. The Swiss members of the cartel are reported to have retained existing foreign sales organizations.

In October, 1929, an agreement was signed in Paris by the producers of benzol in Germany, Great Britain, Ireland, France, Belgium, Holland, Luxemburg, and the Saar. The reported object of the agreement is standardization of grades, propaganda for increasing the use of benzol, investigations on the improvement of benzol motor fuels, and a uniform system of prices. A central bureau is to be established in Paris.

According to a German statement, the production of benzol by the participating countries in 1928 was as follows:

	Long tons		Long tons
Germany	320, 000	The Saar	35, 000
Great Britain	150, 000	Belgium	30, 000
France	70, 000	Holland	25, 000

Production in 1929 is estimated to be from 12 to 15 per cent greater for Germany and about 8 per cent for the other countries.

At the December meeting of the conference in Paris it was disclaimed that there was any intention of forming an international combination. Both British and German producers of benzol already have their separate sales organizations for marketing benzol.

Negotiations are reported in course between the German benzol cartel (Bochum) and a Standard Oil-Royal Dutch association to prolong a trading contract between the two groups that expires December 31, 1930. The contract was effected January 1, 1928, committing the benzol cartel to take 225,000 metric tons of gasoline from the two import groups against deliveries of benzol to the latter of 25 per cent of the production of the German cartel.

The Dye Industry of Germany

ACTIVITIES OF THE I. G.

According to the annual report of the I. G. Farbenindustrie, the results of the activities of the I. G. during 1929 were considered satisfactory despite the manifold difficulties encountered during the year. A dividend of 12 per cent was declared on common stock; in addition, holders of common stock are to receive a bonus of 2 per cent from funds received from the United States Alien Property Custodian for property seized during the World War, and the eight firms associated with the I. G. are granted nonrecurring bonuses ranging from 0.8 to 2 per cent.

Because of agreements existing between the I. G. and other important producing groups, the dye industry of Germany was not materially affected by the world-wide economic depression. Although severe competition was encountered in certain branches of the dye industry, the results attained in 1929 were comparable with those of the previous year owing to rationalization measures enforced in manufacturing and sales. The German production of dyes by the I. G. is estimated to have been 165,345,000 pounds, valued at $83,330,100 in 1929. Germany produced 88.8 per cent of the apparent German dye consumption in 1929. The number of dyes manufactured were increased by the addition of a considerable number of new and, in practical application, valuable dyes.

Sales of chemicals, intermediates, light metals, varnishes, solvents, softening agents, technical collodion wool, Glysantine (an antifreeze similar to ethylene glycol), biological products, veterinary medicinal preparations, and perfumes increased. Increased sales of pharmaceutical products and of photographic materials necessitated an extension of the Bayer-Meister Lucius plant for increased production of pharmaceuticals, and the erection of a new plant for the manufacture of photographic paper. Foremost in scientific interest were the new narcotic Avertin, the hay-fever remedy, Helisen, and the sweet-tasting synthetic carbohydrate Sionon for sufferers of diabetes. Various Hormon preparations were also introduced to the medical world in 1929 and numerous international agreements with respect to pharmaceutical fine chemicals were concluded. Production of the more important specifics was led by Aspirin, Pyramidon, Gardon, Compral, and Panflavin. Although conditions in the artificial-silk industry were very unsatisfactory, those in the Vistra (staple rayon) improved.

The production of artificial nitrogenous fertilizers was somewhat restricted during 1929 in order to prevent the accumulation of stocks. The production of new types of fertilizers was not attempted. The reconstructed and enlarged Norsk Hydro-Elektrisk Kvaelstofaktieselskab in Norway was put into commission, and increased production at lower costs is reported. The German Nitrogen Syndicate, which controls sales both at home and abroad, and which terminated on June 30, 1930, was renewed. The new syndicate is constituted to last for a term of seven years, but may be terminated after five years. Practically the entire German nitrogen production is incorporated in the Nitrogen Syndicate, and hereafter the sale of nitrogenous products for technical purposes will be effected exclusively through the syndicate.

As regards the hydrogenation of petroleum, by means of which fuel crudes and heavy residues of the ordinary refining process may be converted almost quantitatively into gasoline or other more valuable petroleum products by the introduction of hydrogen under pressures ranging from 100 to 300 atmospheres in the presence of a catalyst, the outgrowth of the agreement reached in 1927 between the I. G. and the Standard Oil of New Jersey for joint research on the Friedrich Bergius process of catalytic hydrogenation resulted in the formation, in 1929, of the Standard I. G. Co. To this company have been transferred the rights with respect to all I. G. patents regarding hydrogenation for the whole world except Germany. The Standard Oil of New Jersey ceded to the Standard I. G. Co. all patents with respect to hydrogenation which it owned. In 1930 the Standard Oil Co. of New Jersey announced it had brought 17 major oil refiners of the United States into association in one company—the Hydro Products Co.—which will control the process in the United States and, in return, pay a fixed and running royalty to the Standard I. G. Co., which owns the process. Other oil companies, not now associate members in the Hydro Products Co., may later be allowed to use the process "when and if the process shall have been so far developed as to be capable of profitable application in plants of smaller size than those which now seem the minimum." The I. G. has reserved for itself exclusively the utilization of these processes in Germany.

The American I. G. Chemical Corporation, a manufacturing and selling subsidiary for the German I. G., was formed on April 25, 1929, with a capitalization of $30,000,000 and ended 11 months of its first fiscal year on March 31, 1930, with net earnings of $3,556,772. After allotting interest payable on the 5½ per cent debenture issued by the company and guaranteed by the parent company, there remained a net profit of $2,088,442, which has been carried forward to the new year.

A résumé of the earnings, assets, and liabilities of the I. G. for the years 1925 to 1929, inclusive, are given in tabular form below.

TABLE 46.—*Profits and losses of the I. G. Farbenindustrie, 1925–1929*

[Expressed in millions of marks]

	1925	1926	1927	1928	1929
Gross profits	168.56	186.07	224.30	257.14	256.48
General expenses	45.19	42.12	48.75	51.90	66.80
Interest				15.00	14.98
Actual profits	123.37	143.95	175.55	190.24	174.70
Depreciation	55.77	75.23	74.74	71.78	70.10
Yearly net profits	67.60	68.72	100.81	118.46	104.60
Brought forward	.44	1.80	2.40	4.43	5.46
Dividend on 3½ per cent preferred shares	.15	.15			
Dividend on common shares	64.31	66.15	95.59	95.92	95.92
Dividends in percentage	10	10	12	12	12

TABLE 46a.—*Balance sheet of the I. G. Farbenindustrie, 1925–1929*

[Expressed in millions of marks]

	Dec. 31—				
	1925	1926	1927	1928	1929
Assets:					
Plants	319.19	346.90	382.46	451.92	501.01
Outside holdings	237.11	261.13	296.14	306.26	288.63
Securities	5.43				
Stocks	208.63	226.03	245.91	342.13	357.99
Bills receivable	299.79	384.93	411.80	500.47	485.88
Cash, drafts	115.70	14.63	25.44	23.31	22.62
Bank credits		200.73	165.83	227.77	136.83
Liabilities:					
Common shares A [1]	641.60	726.89	796.63	799.30	799.35
Preferred shares B [1]	4.40	13.39	13.39	13.39	13.39
Reserves	104.03	173.15	176.25	188.29	200.00
Welfare fund	48.82	48.82	49.24	49.34	53.00
Loans	10.38	7.73	.96	250.47	249.71
Uncollected dividends	.72	.20	.37	.61	.29
Bank debts		83.41	66.77	82.10	31.06
Other liabilities	307.86	310.25	320.77	345.48	321.13

[1] Amounts paid in; preferred shares A are 100,000,000 marks par.

On the company's balance sheet the stock capital in 1929 remained unchanged at 1,100,000,000 marks.

The consumption and production of coal-tar crudes and intermediates by German distillation plants in 1913, 1927, and 1928 are shown in the following table, furnished by Trade Commissioner W. T. Daugherty, in Berlin.

TABLE 47.—*Consumption and production of coal-tar distillation plants in Germany, 1913, 1927, and 1928*

Item	1913	1927	1928	
			Quantity	Value
Consumption:	*Pounds*	*Pounds*	*Pounds*	
Half fabricates, total	214,075,478	205,686,975	251,604,384	$4,258,067
Crude benzols		55,721,265	81,464,379	1,954,249
Heavy oils		64,014,970	82,112,532	1,205,955
Light oils		14,570,201	18,626,665	225,013
Crude naphthalene, etc		31,029,745	40,209,699	395,145
Crude phenols		2,654,338	3,569,247	188,028
Other products, including—				
Crude pyridines		37,522,292	25,621,861	289,677
Gas (ammonia) water	2,292,784	947,978	767,201	33,167
Production:				
Tar pitch	1,342,996,023	1,453,552,304	1,524,141,392	10,401,184
Prepared tar, etc	237,755,087	486,914,570	537,704,145	5,777,084
Heavy coal-tar oils	885,389,406	941,478,839	952,235,083	12,804,504
Naphthalene	111,160,341	93,999,735	108,153,267	1,696,068
Crude and pure anthracene		26,565,430	27,312,789	467,683
Pyridine bases		1,602,744	1,430,785	180,154
Phenol, crystalline	16,327,268	7,586,029	8,505,347	960,183
Cresols		18,203,382	17,945,444	1,031,767
Crude phenols (for sale)		932,546	3,487,677	93,537
Crude and pure benzol	34,821,657	53,002,993	67,791,450	2,179,978
Toluol		3,485,473	4,484,156	184,926
Xylol	11,574,150	14,693,659	16,049,488	445,970
Cumaron rosins		3,624,362	5,577,638	203,538
Other products		55,337,665	61,671,480	713,933
Ammonia water under 10 per cent NH_3		24,257,214	23,567,174	20,282
Ammonium sulphate		2,343,490	4,012,372	46,768
Sal-ammoniac spirits		2,052,483	1,541,015	29,588

The 3-year agreement between the I. G. and the Soviet Republics terminated in 1929 and has not been renewed. Under the terms of this agreement the I. G. was required to maintain certain specified quantities of dyes in stock in Russia and was given a guarantee for a certain annual amount of sales. The Soviet authorities accorded the I. G. a quota of 70 per cent of the Russian imports of dyes and pharmaceuticals. The Soviet was to receive technical assistance in the development of the Russian chemical industry. The agreement has not worked out satisfactorily and serious differences have arisen concerning the interpretation of the contract.

TABLE 48.—*Coal-tar dyes: Exports from Germany, 1913 and 1920–1929*

Year	Quantity	Value	Year	Quantity	Value
	Pounds			*Pounds*	
1913	239,598,133	$51,666,168	1925	75,879,025	$44,311,155
1920	61,140,171	53,002,407	1926	81,883,253	47,134,156
1921 [1]	48,304,991	15,935,585	1927	107,593,519	55,413,142
1922	115,974,900	80,781,892	1928	104,302,492	54,830,872
1923	73,974,473	41,580,742	1929	94,695,507	48,518,005
1924	61,033,911	30,933,368			

[1] May to December.

Tables 49 and 50 show imports of coal-tar dyes into Germany in 1928 and exports from that country in the same year.

TABLE 49.—*Germany: Imports of coal-tar dyes, 1929* [1]

Class of dye and country of origin	Quantity	Value
Aniline and other coal-tar dyes not elsewhere mentioned (sulfur dyes):	*Pounds*	
Belgium	127,867	
France	654,546	
Great Britain	199,957	
Italy	160,936	
Netherlands	1,121,260	
Austria	31,526	
East Poland	22,046	
Portugal	24,471	
Rumania	45,635	
Sweden	34,392	
Switzerland	4,230,848	
Spain	83,334	
Czechoslovakia	143,519	
Hungary	43,431	
British India	55,556	
China	166,006	
Japan	325,619	
Dutch East Indies	1,984	
Brazil	42,108	
United States	909,838	
Other countries	128,749	
Total	8,553,628	$4,872,619
Alizarin (alizarin red); alizarin colors, variegated, from anthracene, total	147,708	158,165
Indigo natural and synthetic, total	201,059	40,970
Indigo carmine, color lakes, and new blue from indigo and indigo carmine, total	1,323	715
Grand total	8,903,718	5,072,469

[1] Monthly Review of the Foreign Commerce of Germany, December, 1929. Values converted at par rate of exchange.

TABLE 50.—*Germany: Exports of coal-tar dyes, 1929* [1]

Class of dye and country of destination	Quantity	Value
Aniline and other coal-tar dyes not elsewhere mentioned (sulfur dyes):	*Pounds*	
Saar District	11,023	
Belgium	2,918,229	
Bulgaria	428,354	
Denmark	438,054	
Danzig	14,771	
Estonia	77,161	
Finland	360,452	
France	801,372	
Greece	246,254	
Great Britain	2,470,254	
Italy	1,783,742	
Yugoslavia	731,486	
Latvia	177,911	
Lithuania	80,468	
Luxemburg	55,115	
Netherlands	3,223,346	
Norway	375,664	
Austria	1,602,744	
East Poland	708,338	
Portugal	521,388	
Rumania	838,409	
Russia	818,348	
Sweden	1,473,334	
Switzerland	2,074,529	
Spain	275,134	
Czechoslovakia	6,599,470	
Hungary	755,516	
Egypt	196,871	
British South Africa	38,360	
Canary Islands	661	
British India	6,640,035	
British Malay	183,864	
China	13,858,997	
Japan	1,992,518	
Dutch East Indies	1,439,604	
Persia	52,249	
Siam	247,136	
Turkey	196,650	
The rest of Asia	195,769	
Argentina	474,209	
Bolivia	80,688	
Brazil	381,396	
Canada	729,061	
Chile	186,730	
Colombia	151,677	
Ecuador	70,327	
Mexico	901,020	
Peru	173,722	
Uruguay	58,201	
Venezuela	50,485	
United States	2,110,023	
Australian Federation	141,976	
Other countries	162,920	
Total	60,576,015	$33,726,023
Alizarin (red):		
British India	3,409,414	
Dutch East Indies	503,310	
Other countries	229,940	
Total	4,142,664	871,336
Alizarin colors (variegated) from anthracene:	*Pounds*	
Belgium	170,636	
Denmark	63,713	
Finland	30,203	
France	313,715	
Greece	20,723	
Great Britain	858,471	
Italy	325,399	
Yugoslavia	18,519	
Netherlands	298,062	
Norway	26,235	
Austria	109,128	
Poland	17,857	
Portugal	22,487	
Russia	66,358	
Sweden	290,346	
Switzerland	276,457	
Spain	81,129	
Czechoslovakia	84,436	
Hungary	74,956	
British India	485,453	
China	89,066	
Japan	244,270	
Dutch East Indies	36,376	
Brazil	43,871	
Canada	76,500	
Mexico	29,321	
United States	1,600,540	
Australia	6,834	
Other countries	83,334	
Total	5,844,395	$7,870,366
Indigo, natural and synthetic:		
Belgium	805,561	
Great Britain	85,538	
Italy	132,937	
Yugoslavia	65,036	
Netherlands	867,069	
Austria	396,167	
Portugal	80,688	
Russia	132,496	
Switzerland	917,775	
Spain	60,406	
Czechoslovakia	459,218	
Hungary	293,212	
Egypt	277,339	
British India	969,363	
British Malay	133,599	
China	14,959,975	
Japan	967,599	
Dutch East Indies	1,014,777	
Persia	127,426	
Siam	204,807	
The rest of Asia	289,905	
Mexico	112,435	
United States	410,055	
Other countries	369,050	
Total	24,132,433	6,050,280
Grand total	94,695,507	48,518,005

[1] Monthly Review of the Foreign Commerce of Germany, December, 1929. Values converted at par rate of exchange.

The Dye Industry of Great Britain

IMPERIAL CHEMICAL INDUSTRIES (LTD.)

The Imperial Chemical Industries (Ltd.), the largest chemical organization in Great Britain, closed a profitable year in 1929. Its annual report states the the business showed a substantial increase compared with the previous year and that considerable advance was made in the development of new dyes. The gross profits for the year amounted to $31,643,642, from which $2,800,569 was transferred to the central obsolescence fund and $713,692 provided for income tax, leaving a net profit of $28,129,382, which is an increase of $2,761,763 over 1928. Assets totaled $529,485,731 at the end of 1929, as compared with $433,280,194 at the end of 1928. The directors have decided to transfer $2,574,476 to general reserves and to distribute $24,376,649 in dividends (as compared with $20,369,952 in the previous year). During the year an additional $52,247,221 capital was issued, bringing the total issued to $372,198,480 out of an authorized capital of $462,317,500.

Table 51 shows the various allocations and the principal items of the balance sheet for the years 1927–1929, inclusive.

TABLE 51.—*Principal items of balance sheet of Imperial Chemical Industries, 1927–1929* [1]

Item	1927	1928	1929
Net profit [2]	$21,616,482	$25,367,619	$28,129,382
To reserves	1,990,282	19,466,000	2,574,476
Preference dividend	5,574,581	5,813,278	7,288,825
Ordinary dividend	12,826,157	13,687,961	16,468,056
Deferred dividend	823,086	868,714	1,057,753
Forward	402,367	533,534	1,707,767
Issued capital	283,083,570	319,951,259	372,198,480
Reserve funds	3,406,550	53,575,970	81,392,212
Due to subsidiaries	27,235,451	36,616,427	42,533,716
Creditors	4,119,395	10,237,087	16,237,087
Investments	286,197,410	333,350,057	335,363,533
Preliminary expenses	6,136,428		
Due by subsidiaries	40,612,067	78,753,567	104,351,746
Debtors	3,670,232	13,081,979	34,196,321
Properties		1,532,305	2,605,198
Furniture fittings, etc	193,730	498,841	
Cash	3,221,209	6,063,440	28,994,544

[1] Source: Chemical Trade Journal, London, Apr. 25, 1930. Conversion to dollars at par rate of exchange.
[2] After taxation and providing for obsolescence fund.

REGULATION OF IMPORTATION OF DYESTUFFS

Great Britain permits the import of synthetic dyes only under license, under the provisions of the dyestuffs act of 1920. This act expires in January, 1931, unless new legislation is passed by Parliament. Thus far no action has been taken for its renewal. The grave situation thus confronting the British dye industry was expressed by Lord Melchett at the annual meeting of Imperial Chemical Industries (Ltd.) in April, 1930, when he said: "We think the period has been too short for us to catch up to the long start our competitors have had." Proposals have been made for a conference of dye makers, merchants, and consumers to decide upon a common line of action, but thus far no concrete results have been attained.

I. C. I.–I. G.—PATENT LITIGATION [1]

The long-continued patent action in England relating to certain selection patents governing the manufacture of azo and monoazo dyestuffs between Imperial Chemical Industries and the I. G. Farbenindustrie ended March 30, 1930, in a judgment that all three German patents involved are invalid. The period of appeal expired May 1, 1930, without any appeal being entered, so the judgment became final.

The I. G. sought to amend three of their patents of 1922 for the manufacture of azo dyestuffs by limiting them to the dyeing of cotton on the fiber. Imperial Chemical Industries (Ltd.) petitioned for the revocation of the patents on the grounds of prior publication, common general knowledge, and insufficiency of description, and alleged that by reason of these patents the German Dye Trust would be able to extend its monopoly in the manufacture of azo dyestuffs and greatly hamper the petitioning company in its business.

PRODUCTION

The British home production in 1929 represented 90 per cent by weight of the home consumption and 74 per cent by value.[2] According to the statement of Lord Melchett made in April 1930, the British consumption of dyes was then little different from what it was in 1913, when it was estimated to be 51,520,000 pounds. With revived activity in the textile industry a consumption of about 67,200,000 pounds may be reached.

However, British production of dyes in 1913 is estimated to have been only 11,200,000 pounds (of which 28 per cent was indigo, 36 per cent alizarin red, and 36 per cent other colors), as compared to 55,785,032 pounds in 1929. Production in 1929, entirely from British intermediates, exceeded consumption in 1913 when production was chiefly from imported intermediates.

The production of dyes in Great Britain in 1929 was 9.6 per cent greater than in 1928. The increase is accounted for chiefly by 3,393,000 pounds greater output of vat dyes, or 30 per cent more than in 1928. Other increases were in acetate silk and direct cotton colors. Table 52, gives production figures for 1927, 1928, and 1929, as prepared by the Dyestuffs Industry Development Committee and issued by the British Board of Trade. Although the output of a few small firms is not included, the totals represent substantially the British output.

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[1] Chemical and Metallurgical Engineering, April, 1930, p. 261.
[2] The Chemical Age, July 26, 1930, p. 72.

TABLE 52.—*United Kingdom: Production of dyes, 1927–1929*

	Blacks	Blues	Browns	Greens	Oranges	Reds	Violets	Yellows	Total
1927	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Direct cotton colors	2,172,380	1,011,853	421,657	143,393	275,661	720,807	75,130	794,726	5,615,607
Acid wool colors	1,438,631	1,316,987	104,029	294,875	500,919	1,339,846	478,960	758,992	6,233,179
Chrome and mordant colors (including alizarin)	1,468,434	760,317	530,230	107,351	661,965	3,535,926	50,189	387,817	7,502,229
Basic colors	7,570	337,828	127,940	171,888	122,537	450,828	451,671	344,544	2,014,806
Sulfur colors	5,396,527	295,967	993,086	196,020	31,902	104,837	----------	98,894	7,117,233
Vat colors (including indigo)	166,434	7,600,418	30,557	141,207	127,446	243,834	283,598	225,429	8,818,923
Dyestuffs for making color lakes	----------	----------	----------	76,187	387	988,197	----------	73,604	1,138,375
Oil, spirit, wax, and miscellaneous colors	409,937	414,641	71,495	5,262	62,805	88,657	28,636	29,971	1,111,404
Total	11,059,913	11,738,011	2,278,994	1,136,183	1,783,622	7,472,932	1,368,124	2,713,977	39,551,756
1928									
Direct cotton colors	2,376,063	1,466,201	514,996	156,100	343,248	958,646	153,329	968,579	6,937,162
Acid wool colors	1,612,762	1,632,230	179,616	371,053	645,663	1,631,186	556,433	897,427	7,526,370
Chrome and mordant colors (including alizarin)	1,722,850	715,855	756,447	85,912	800,410	5,079,797	53,837	379,629	9,594,737
Basic colors	21,412	460,320	169,310	242,529	167,511	559,957	500,964	392,690	2,514,693
Sulfur colors	4,992,737	347,874	885,448	155,423	20,899	100,673	----------	77,308	6,580,362
Vat colors (including indigo)	193,365	9,967,653	78,805	204,149	121,641	228,754	289,557	203,418	11,287,342
Dyestuffs for making color lakes	162	138	----------	117,789	281	1,257,085	----------	116,056	1,491,511
Oil, spirit, wax, and miscellaneous colors	441,149	400,666	59,765	3,130	84,968	104,467	42,370	51,922	[1] 4,974,903
Total	11,360,500	14,990,937	2,644,387	1,336,085	2,184,621	9,920,565	1,596,490	3,087,029	[1] 50,907,080
1929									
Direct cotton colors	2,467,943	1,684,257	626,592	249,782	354,992	879,095	147,311	978,753	7,388,725
Acid wool colors	1,417,243	1,366,020	173,357	440,632	725,005	1,752,169	579,531	971,373	7,425,330
Chrome and mordant colors (including alizarin)	1,782,860	618,806	923,111	82,321	627,677	5,160,149	40,639	379,171	9,614,734
Basic color	----------	489,862	194,775	330,562	103,186	478,428	526,402	427,922	2,551,137
Sulfur colors	5,008,413	504,838	1,020,186	101,285	26,625	113,102	----------	89,794	6,864,243
Vat colors (including indigo)	157,297	12,977,825	144,759	440,474	136,650	307,597	306,981	212,118	14,683,701
Dyestuffs for lake making	627	----------	673	136,652	1,851	1,566,548	----------	156,517	1,862,868
Cellulose acetate silk, oil, spirit, wax, and miscellaneous colors	472,362	740,046	69,816	24,306	148,476	184,416	68,862	98,709	[1] 5,394,294
Total	11,306,745	18,381,654	3,153,269	1,806,014	2,124,462	10,441,504	1,669,726	3,314,357	[1] 55,785,032

[1] Including quantities not separately distinguished.

Table 53 shows imports of dyes into Great Britain by countries for 1928; Table 54, exports by countries for 1928; and Table 55, imports and exports of coal-tar products and of dyeing and tanning materials for 1929.

TABLE 53.—*United Kingdom: Imports of coal-tar dyes, 1928* [1]

Class of dye and country of origin	Quantity	Value	Class of dye and country of origin	Quantity	Value
Alizarin:	*Pounds*		Other coal-tar dyes—Con.	*Pounds*	
Germany	89,264	$149,582	United States	16,352	$19,442
France	224	49	Other foreign countries	12,432	7,908
Switzerland	8,736	16,619			
Other foreign countries	224	102	Total from foreign countries	4,572,512	4,681,568
Total	94,448	166,352			
			Canada	15,120	16,872
Other coal-tar dyes:			Other British countries	4,256	1,494
Germany	3,024,000	3,030,671			
Netherlands	36,848	30,055	Total from British countries	19,376	18,366
Belgium	48,160	52,583			
France	71,232	48,835	Total imported	4,591,888	4,699,934
Switzerland	1,363,488	1,492,074			

[1] Annual Statement of the Trade of the United Kingdom with Foreign Countries and British Countries, 1928. Values converted at par rate of exchange.

TABLE 54.—*United Kingdom: Exports of coal-tar dyes, 1928* [1]

Class of dye and country of destination	Quantity	Value	Class of dye and country of destination	Quantity	Value
Alizarin:	*Pounds*		Other coal-tar dyes—Con.	*Pounds*	
British India	938,448	$185,492	Switzerland	108,752	$46,704
Other British countries	3,808	2,209	Spain	36,624	55,916
			Italy	56,672	66,710
Total to British countries	942,256	187,701	China	976,976	377,271
Total to foreign countries	169,904	102,771	Japan	195,328	78,136
			United States	68,656	54,091
Total exported	1,112,160	290,472	Brazil	26,992	22,863
			Other foreign countries	215,264	112,582
Indigo, synthetic:					
China	3,482,080	774,265	Total to foreign countries	2,428,272	1,137,919
Japan	797,328	159,207			
Other foreign countries	1,680	3,027	Irish Free State	154,560	97,242
			Union of South Africa	95,424	72,579
Total to foreign countries	4,281,088	936,499	British India—		
			Bombay	549,472	315,685
Total to British countries	468,944	173,233	Madras	39,760	23,958
			Bengal, Assam, Bihar, and Orissa	48,160	28,810
Total exported	4,750,032	1,109,732	Burma	12,544	7,422
			Australia	845,712	440,817
Other coal-tar dyes:			New Zealand	77,840	41,638
Russia	224	127	Canada	162,400	103,262
Sweden	121,408	55,463	Other British countries	102,256	63,863
Norway	39,984	16,906			
Denmark (including Faroe Islands)	7,392	4,185	Total to British countries	2,088,128	1,195,276
Netherlands	65,520	24,727			
Belgium	240,912	92,176	Total exported	4,516,400	2,333,195
France	267,568	130,062			
			Grand total	10,378,592	3,733,399

[1] Annual Statement of the Trade of the United Kingdom, 1928, Vol. III. Values converted at par rate of exchange.

TABLE 55.—*United Kingdom: Imports and exports of coal-tar products and of dyeing and tanning materials, 1929* [1]

	Quantity	Value		Quantity	Value
IMPORTS			EXPORTS		
Coal-tar products:	*Pounds*		Coal-tar products	*Pounds* 17,570,112	$4,789,716
Intermediates	208,208	$119,244	Other	10,276,896	500,797
Finished coal-tar dyestuffs—			REEXPORTS		
Alizarin	190,400	291,265			
Other	5,486,656	5,049,091	Extracts for dyeing:		
Extracts for dyeing:			Cutch	1,841,392	133,376
Cutch	5,815,712	421,225	Other	299,040	103,910
Other	4,128,992	602,721	Indigo, natural	9,968	12,088
Indigo, natural	35,616	41,059	Extracts for tanning	1,468,768	81,670
Extracts for tanning	92,239,616	4,255,516			

[1] Accounts Relating to Trade and Navigation of the United Kingdom, December, 1929. Values converted at par rate of exchange.

The Dye Industry of Switzerland

The sales agreement concluded between the three largest dye manufacturers in Basle and the leading German and French producers in April, 1929 (see Census of Dyes, etc., 1928), has hardly been in effect sufficiently long to judge results, but is reported to be working satisfactorily.

Exports of dyes from Switzerland increased in value from $15,108,761 in 1928 to $16,123,693 in 1929, or almost 7 per cent. The increase in quantity was only 2 per cent, indicating increased specialization on the part of the Swiss makers in the higher-priced dyes such as the vat dyes. Since Switzerland is on an import basis with respect to the raw materials, the reduction in bulk is of importance in regard to savings in freight.

Germany, as in previous years, took the largest share of Swiss dyes in 1929, although to a somewhat less extent than in 1928.

In 1929 the United States displaced France as the second best customer for Swiss dyes. The increase of about 50 per cent in exports of dyes to the United States is attributed to improved conditions in American silk trade. Decrease of exports to the United States during the last two months of 1929 was probably due largely to the effect of the New York Stock Exchange crisis upon business in the United States.

Great Britain's purchases of Swiss dyes in 1929 almost equaled those of France, and Italy also took increased quantities.

It is reported that Switzerland's trade with the Orient in certain lines of dyes has the disadvantage of expensive packing requirements which German and British firms are better able to meet.

TABLE 56.—*Switzerland: Imports and exports of coal-tar dyes, 1929* [1]

IMPORTS

Class of dye and country of origin or destination	Quantity	Value	Class of dye and country of origin or destination	Quantity	Value
Alizarin:	*Pounds*		Aniline and other coal-tar dyes—Continued.	*Pounds*	
Germany	66,601	$14,964	United States	35	$34
France	117	32	Other countries	183	163
Total	66,718	14,996	Total	2,248,652	1,599,385
Aniline and other coal-tar dyes:			Indigo, indigo solution:		
Germany	2,066,094	1,489,392	Germany	54,910	11,760
France	100,193	70,220	France	2,906	536
Italy	34,006	10,743	Total	57,816	12,296
Holland	1,424	1,719			
Great Britian	45,335	26,453	Grand total	2,373,186	1,626,677
Poland	1,382	661			

EXPORTS

Aniline and other coal-tar dyes:			Aniline and other coal-tar dyes—Continued		
Germany	3,796,520	$2,486,221	Norway	80,616	$71,702
Austria	272,559	182,155	Sweden	534,821	453,247
France	1,452,472	1,716,258	Finland	78,717	71,756
Italy	1,090,563	1,152,443	Latvia	74,604	65,583
Belgium	952,052	465,273	Lithuania	15,545	12,875
Netherlands	448,640	347,782	Poland	282,819	417,391
Great Britain	1,490,052	1,588,586	Czechoslovakia	1,083,510	677,246
Ireland	492	996	Hungary	167,384	116,978
Spain	204,393	459,293	Yugoslavia	273,485	156,911
Portugal	149,534	97,789	Greece	43,611	32,897
Denmark	180,790	151,456	Bulgaria	157,455	111,482

[1] Statistik des Warenverkungs der Schweiz mit dem Auslande, 1929. Values converted at average exchange rate, 1929, 1 franc=$0.192792.

TABLE 56.—*Switzerland: Imports and exports of coal-tar dyes, 1929*—Continued

EXPORTS—Continued

Class of dye and country of origin or destination	Quantity	Value
Aniline and other coal-tar dyes—Continued.	*Pounds*	
Rumania	341,314	$223,187
Russia	29,916	60,987
Turkey	27,833	20,278
Egypt	64,088	38,810
Algeria	60	133
Morocco	3,049	2,175
British Africa	2,983	2,191
Occidental Africa	33	33
Oriental Africa	2,337	681
Mesopotamia	7,817	4,610
Syria	105,312	39,841
British India	548,910	477,319
Burma	500	892
Siam	761	773
Indo-China	32,632	20,086
Dutch East Indies	123,995	106,932
China	415,300	242,571
Japan	573,608	525,269
Canada	309,420	200,815
United States	1,853,187	2,020,485
Mexico	156,443	113,217
Venezuela	1,596	1,150
Brazil	126,238	130,257
Uruguay	5,461	5,025
Argentina	175,640	108,728
Chile	40,785	30,424
Peru	21,365	16,325
Ecuador	1,526	1,350
Bolivia	1,914	1,357
Australian Federation	30,992	30,165
Oceania	11,587	6,502
Total	17,877,236	15,268,888
Indigo, indigo solution:		
Germany	6,085	5,565
Austria	212	239
Indigo, indigo solution—Continued.	*Pounds*	
France	6,340	$2,792
Italy	132	230
Belgium	25,919	3,836
Netherlands	152	481
Great Britain	4,409	1,701
Spain	8,975	5,413
Portugal	287	269
Denmark	5,071	4,531
Norway	154	145
Sweden	220	202
Finland	220	281
Poland	2,306	1,190
Czechoslovakia	390	813
Hungary	708	315
Yugoslavia	3,186	1,464
Bulgaria	14,370	6,709
Rumania	5,732	3,482
Turkey	11,777	3,812
Egypt	60,219	15,647
Mesopotamia	45,190	17,860
Syria	36,069	12,117
British India	324,122	110,157
Straits Settlements	30,677	2,916
Indo-China	6,669	1,930
Dutch East Indies	25,161	7,614
Philippines	6,504	2,475
China	3,066,914	496,086
Japan	305,205	128,226
United States	2,072	3,988
Mexico	27,337	10,873
Brazil	2,205	868
Australian Federation	306	564
Other countries	7	14
Total	4,035,302	854,805
Grand total	21,912,538	16,123,693

THE DYE INDUSTRY OF FRANCE

Official figures of the production of dyes [3] in French-owned plants in France are as follows:

Year	Pounds	Year	Pounds
1920	16,233,000	1925	32,066,000
1921	12,876,000	1926	34,420,000
1922	17,775,000	1927	27,590,000
1923	24,173,000	1928	30,736,000
1924	33,012,000	1929	36,114,000

The dye industry of France developed in a fairly satisfactory manner in 1929, with production reported as sufficient to meet domestic consumption. In 1929 French production supplied 89.8 per cent of the apparent French consumption. As regards foreign markets, France continued to export in the proportions agreed upon in inter-

[3] Figures for 1920–1926, inclusive, compiled by the Association of Dye Producers and Consumers; 1927 and 1928, from the French Chemical Industry and Trade; 1928, U. S. Bureau of Foreign and Domestic Commerce, Bulletin No. 652; 1929, from Daniel J. Regan, assistant commercial attaché, U. S. Bureau of Domestic Commerce, Paris, France, July 1, 1930, U. S. Bureau of Foreign and Domestic Commerce.

national agreements concluded in preceding years, and which have been renewed by Germany, England, and Switzerland. Germany has continued to observe scrupulously the terms of her dyestuffs agreement with France. French dyes are exported chiefly to the Latin-American countries, few being marketed in the Far East.

The Etablissement Kuhlmann practically dominates the French dye industry and manufactured approximately 68 per cent of the 1929 production. The Société des Matières Colorantes et Produits Chimiques de Saint-Denis produced approximately 24 per cent, and the other companies: Sainte-Etienne, Nancy, and Saint-Fons produced the remainder. Although the French manufacturers continually regulate their production by careful scrutiny of the market, there was a fairly large surplus of dyes in various plants at the close of 1929 which, it is intimated, may tend toward decreased production in 1930.

The output of azo, vat and indigo, sulfur, diphenyl and triphenylmethane, and alizarin dyes has been increased. Improvement has been made in quality, especially in the vat dyes. Research work has been conducted on plastic materials, enamels, and artificial porcelain.

Tables 57 and 58 show the foreign trade of France in the several groups of dyes in 1929.

TABLE 57.—*France: Imports of coal-tar dyes, 1929* [1]

Class of dye	Dry		Paste	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Nitroso	4,850	$3,450	20,944	$5,174
Nitro	8,157	7,566	4,189	1,999
Pyrazolone	104,057	105,252	5,291	2,705
Stilbenes	46,738	41,199		
Monoazos	615,965	517,362	49,163	25,598
Polyazos	800,931	642,174	8,377	5,331
Thiocarbenzyls	31,305	54,762		
Sulfurs	46,958	36,338		39
Carbazol derivatives	82,452	74,598		
Indulines, nigrosines	156,968	171,225	9,700	5,684
Azines	41,446	62,485	220	118
Pyronines	1,764	7,370	18,078	5,449
Phthaleins	78,925	183,613	5,732	1,450
Eosines	11,023	17,718		
Diphenylmethanes	367,507	394,509	3,527	1,646
Acridine and quinoline	52,029	75,734		
Hydroquinones	152,117	309,758	182,982	133,358
Indigotines		392	1,323	1,294
Insoluble vat dyes	168,431	685,059	185,627	213,248
Synthetic indigo	12,346	4,077	5,291	2,705
Alizarin	7,716	4,626	43,431	9,330
Total	2,791,685	3,399,267	543,875	415,128

[1] Statistique Mensuelle du Commerce Extérieur de la France, December, 1929. Values converted a par rate of exchange.

TABLE 58.—*France: Exports of coal-tar dyes, 1929* [1]

Class of dye	Dry		Paste	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Nitroso	44,753	$12,583	15,653	$4,978
Nitro	9,921	8,154	2,205	1,411
Pyrazolone	9,480	5,841	3,748	2,822
Stilbenes	2,425	1,137	661	196
Monoazos	441,141	162,523	86,861	36,456
Polyazos	1,302,698	592,194	236,774	92,159
Thiocarbenzyls	13,889	5,175	7,937	823
Sulfurs	405,206	89,650	2,866	1,137
Indophenols	28,439	21,364	11,905	7,409
Indulines, nigrosines	2,205	4,900	220	39
Azines, other	55,115	25,676	2,645	1,099
Pyronines	70,988	29,674	441	470
Phthaleins	6,834	12,309	1,323	1,294
Eosines	11,684	23,246		
Diphenylmethanes	1,141,321	390,785	135,362	47,197
Acridine and quinoline	26,235	24,892	3,527	666
Hydroquinones	43,210	38,690	12,787	3,567
Indigotines	335,540	93,688	362,877	35,868
Insoluble vat dyes	118,387	135,906	23,369	13,877
Synthetic indigo	426,590	94,119	1,131,180	141,590
Alizarin	30,424	6,194	32,408	10,976
Total	4,526,485	1,778,700	2,074,749	404,034

[1] Statistique Mensuelle du Commerce Extérieur de la France, December, 1929. Values converted at par rate of exchange.

THE DYE INDUSTRY OF ITALY

The coal-tar industry of Italy supplies about 90 per cent of the intermediates consumed by the domestic dye industry. Production of intermediates, amounting to 10,000,000 pounds in 1927, is reported to have decreased in 1928. Production of aniline, the principal intermediate, exceeds 2,000,000 pounds annually. Other intermediates produced in large quantity are H acid, betanaphthol, benzidine, and paranitroaniline. Less important intermediates are aniline hydrochloride, tolidine, a-naphthylamine, and gamma, naphthionic, and sulfanilic acids.

The Aziende Chimiche Nazionali Associate, the consolidation of which was the outstanding event in the Italian dye industry in 1928, has equipped a plant at Cengio for the production of phthalic anhydride, benzoylbenzoic acid, and anthraquinone.

The following table shows the production of synthetic dyes in Italy from 1921 to 1927, inclusive.

TABLE 59.—*Italy: Production of dyes and intermediates* [1] *1921–1927*

Year	Synthetic dyes		Year	Synthetic dyes	
	Sulfur colors	Others		Sulfur colors	Others
	Pounds	*Pounds*		*Pounds*	*Pounds*
1921	6,364,680	1,556,448	1925	10,824,586	4,409,200
1922	8,487,710	2,328,058	1926	10,687,901	4,717,844
1923	8,300,319	4,001,349	1927	9,402,619	4,177,717
1924	8,730,216	3,714,751			

[1] Banca Commerciale Italiana: Movimento Economico Dell' Italia, p. 279.

In 1928 Italy produced 15,200,000 pounds of dyes, an increase of 1,620,000 pounds or of 12 per cent over 1927. Production by groups in 1928 was as follows:

	Pounds		Pounds
Sulfur dyes:		Basic, for vats and special dyes	264, 600
Black	8, 818, 400	Nigrosine	286, 600
Other	1, 102, 300	Vat, naphthol and bases	110, 000
Indigo	1, 322, 800		
Direct dyes	1, 984, 100	Total	15, 211, 600
Acid and chrome dyes	1, 322, 800		

The production of indigo in 1928 was less than half of the 3,960,000 pounds estimated as the output in 1927. The capacity of the Cesano Maderno plant alone had previously been reported to be 13,000 pounds of indigo daily. Production of sulfur dyes showed an increase of 518,081 pounds, or 5½ per cent over 1927.

According to a report prepared by the managing director of the A. C. N. A., the principal Italian manufacturer, the production of dyes in Italy in 1929 was 16,314,040 pounds. The Italian dye industry is now producing the following vat dyes: Anthynol dark blue BO (corresponding to indanthrene dark blue BO); anthynol black BB (corresponding to indanthrene black BB); anthynol gray B; anthynol yellow G for wool; anthynol brown GG for wool (corresponding to the helindones).

It was reported that a new series of these dyes in orange, green, olive, black, and violet will be put on the market shortly, and that during 1929 the anthynol violets, corresponding to the indanthrene violets, would be available. The A. C. N. A. is also reported to be planning the manufacture of aminoanthraquinone derivatives.

The A. C. N. A. published its first annual report in 1929. The year 1928 closed with a net profit of about 7,000,000 lire and with the declaration of a dividend of 6 per cent. Sales in 1929 increased approximately 18 per cent over the previous year. Commercially and financially the year is reported to have been a difficult one because of the purchase of an outside plant, amortization expenses, purchase of raw materials, and other expenses. The company's floating debt, according to a recent estimate, was upward of 146,000,000 lire. The board of directors is authorized to increase the capitalization of the company by December 31, 1931, from 95,295,200 lire to 200,000,000 lire by a new stock issue (not carried through up to April 4, 1930).

IMPORTS AND EXPORTS

For the year 1929 imports of coal-tar dyes into Italy decreased 18 per cent in quantity. The decrease was due to smaller receipts of reparation dyes, which were 695,000 pounds less than in 1928. Imports from other sources showed a small net increase. Exports increased about 66 per cent in quantity and 31 per cent in value.

The import trade of Italy in coal-tar dyes is shown by countries in Table 60 and by class of dye in Table 61; the export trade is shown in Table 61.

TABLE 60.—*Italy: Imports of synthetic organic dyes by countries, 1929* [1]

Imports from—	Quantity
	Pounds
France	130,733
Germany	2,285,729
German, account of reparations	28,439
Switzerland	1,195,555
Other countries	110,891
Total	3,751,348

[1] Statistica del Commercio Speciale di Importazione di Esportazione, January–December, 1929.

TABLE 61.—*Italy: Imports and exports of synthetic organic dyes, 1929* [1]

Class of dye	Imports		Exports	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
Sulfur black	10,362	$4,839	80,468	$15,996
Other sulfur dyes	109,569	100,395	31,305	17,022
Other organic synthetic dyes:				
Dry (containing less than 50 per cent water)	3,404,564	3,695,900	1,199,743	573,830
Account of German reparations	2,866			
Paste (containing 50 per cent or more water)	198,414	138,885	14,330	1,996
Account of German reparations	25,573			
Total	3,751,348	3,940,019	1,325,846	608,844
Natural indigo	5,732	6,210	5,071	2,103

[1] Statistica del Commercio Speciale di Importazione e di Esportazione, January–December, 1929. Values converted at average exchange rate 1929, 1 lira = $0.052334.

THE DYE INDUSTRY OF JAPAN

The total production of coal-tar dyes in Japan during 1928 was 18,200,000 pounds, an increase of more than 8 per cent over 1927. Production by groups for 1927 and 1928 as reported by the Japanese Ministry for Industry and Trade [4] was as follows:

	1927	1928		1927	1928
	Pounds	*Pounds*		*Pounds*	*Pounds*
Sulfur colors	14,462,176	15,275,673	Mordant colors	185,186	[1] 185,186
Direct colors	1,124,346	1,455,036	Vat colors	70,547	92,543
Basic colors	617,288	617,288			
Acid colors	396,828	595,242	Total	16,856,371	18,221,018

[1] Or less.

Sulfur black leads in the production of sulfur colors, followed by the blues. Production of Hydron blue has been commenced. In 1928 almost half of the production of direct cotton colors was represented by Nippon or Direct deep black. Other direct colors were Diamine blue 2B, Congo red, Pyramine orange, Diamine green, Benzopurpurine, Diamine brown, and Chrysophenine. Colors produced in 1928 for the first time were Diamine scarlet B, Benzo copper blue, Chicago blue 6B, and Benzo fast black.

The principal basic dyes produced in 1928 were Methyl violet, Bismarck brown, Auramine, Malachite green, Rhodamine, Methylene blue, Victoria blue, Chrysoidine, Crystal violet, and Safranine.

[4] As reported in Chemical Trade Journal, London, March 28, 1930.

The acid colors showed a larger percentage increase in production in 1928 than any other group. Naphthol blue black represented about 30 per cent of the 1928 output of acid colors. Other acid colors produced were Orange II, Roccelin, Acid scarlet 3R, Silk scarlet, Quinoline yellow, Naphthol yellow S, Nigrosine, Metanil yellow, Eosine, and Phloxine. Production of Sulphocyanine was started during the year.

The increased output of vat colors in 1928 was largely due to the increased demand for brominated indigos. The manufacture of anthraquinonoid vat colors did not reach a commercial scale in 1928. The Miike factory, to cost about 7,000,000 yen, made progress with its plans for the production of synthetic indigo. This factory will produce its own acetic acid and other materials used in the production of indigo. The Japanese Government will subsidize it to the amount of 195,000 yen during the first calendar year. Initial production will be at the rate of 36 tons annually and will be increased to 1,000 tons in five years. Ultimate expansion to 3,000 tons is contemplated, with a view to exporting the surplus to China.

The production of crude and refined natural indigo in Japan from 1925 to 1927 is shown in the following table.

TABLE 62.—*Japan: Production of natural crude and refined indigo, 1925–1927*

Year	Crude		Refined	
	Pounds	Value	Pounds	Value
1925	2,199,080	$144,886	5,769,986	$335,512
1926	1,754,853	109,378	3,377,723	223,293
1927	1,827,825	140,048	3,577,668	287,654

Production of the two principal intermediates in Japan in 1928 were aniline oil, 5,202,800 pounds (4,409,200 pounds in 1927), and naphthol AS, 353,000 pounds (167,000 pounds in 1927).

The foreign trade of Japan in coal-tar dyes is shown in Tables 63 to 65, inclusive.

TABLE 63.—*Japan: Imports of coal-tar dyes, 1928* [1]

Class of dye and country of origin	Quantity	Value	Class of dye and country of origin	Quantity	Value
Indigo, synthetic:	*Pounds*		Direct cotton colors:	*Pounds*	
France	104,102	$46,410	France	58,599	$43,625
Germany	1,144,328	512,362	Germany	633,871	574,086
Italy	661	464	Switzerland	211,114	140,621
Switzerland	222,887	113,239	United States	605,829	212,092
North America other than United States	242,861	104,422	Other countries	16,402	13,459
Total	1,714,839	776,897	Total	1,525,815	983,883
Basic colors:			Acid colors:		
France	36,773	58,940	France	19,180	17,171
Germany	267,464	534,175	Germany	576,728	478,019
Switzerland	160,452	188,887	Switzerland	141,272	99,781
United States	57,276	42,233	United States	65,212	24,133
Other countries	2,116	1,856	Other countries	5,556	22,741
Total	524,081	826,091	Total	807,948	641,845

[1] Annual Return of the Foreign Trade of the Empire of Japan, Pt. 1, 1928. Values converted at average exchange rate for 1928; 1,000 yen = $464.096.

TABLE 63.—*Japan: Imports of coal-tar dyes, 1928*—Continued

Class of dye and country of origin	Quantity	Value	Class of dye and country of origin	Quantity	Value
Mordant colors:	*Pounds*		Vat colors—Continued.	*Pounds*	
Great Britain	39,815	$51,979	Switzerland	30,556	$28,310
France	7,408	5,105	United States	265	
Germany	403,842	401,443	Other countries		928
Switzerland	136,774	121,129			
United States	51,853	16,243	Total	373,418	529,533
Other countries		928			
			Other synthetic colors:		
Total	639,692	596,827	France	6,085	6,961
			Germany	104,234	103,958
Sulfide colors:			Italy	5,688	1,392
Germany	154,103	97,924	North America other		
United States	50,662	18,100	than United States	33,995	12,995
Other countries	6,481	4,177	Other countries	1,984	3,249
Total	211,246	120,201	Total	151,986	128,555
Vat colors:					
Great Britain	20,238	43,625	Grand total	5,949,026	4,603,832
Germany	322,359	456,670			

TABLE 64.—*Japan: Exports of coal-tar dyes, 1928* [1]

Country of destination	Quantity	Value
	Pounds	
China	2,322,652	$238,081
Kwantung Province	216,934	23,669
British India	18,122	6,033
Dutch India	5,820	464
Other countries	7,408	928
Total	2,570,936	269,175

[1] Annual Return of the Foreign Trade of the Empire of Japan, Pt. 1, 1928. Values converted at average exchange rate for 1928; 1,000 yen=$464.096.

TABLE 65.—*Japan: Imports and exports of coal-tar dyes, 1929* [1]

Class of dye	Quantity	Value
IMPORTS		
Synthetic colors:	*Pounds*	
Indigo	2,073,140	$965,798
Basic colors	459,538	643,214
Direct cotton colors	1,427,463	950,829
Acid colors	597,891	485,749
Mordant colors	399,770	374,021
Sulphide colors	400,194	249,646
Vat colors	238,705	324,718
Other colors	181,431	128,271
Total	5,778,132	4,122,246
EXPORTS		
Coal-tar dyes, total	1,788,927	170,411

[1] Monthly Return of the Foreign Trade of Japan, December, 1929. Values converted at average exchange rate, calendar year 1929, 1 yen=$0.460997.

THE DYE INDUSTRY OF SPAIN

A royal order of the Ministry of National Economy, No. 124, dated March 5, 1930, abolished the restrictions which have been in force for the last four years governing the importation of dyes and intermediates.

A translation of the text of the royal order follows:

His Majesty the King has been pleased to dispose:

1. That the royal order of March 9, 1926, by which was established a temporary system of restricted, conditional, and prohibited importations for the intermediate products and artificial organic coloring materials combined in items 793, 794, 795, and 796 of the existing customs tariff, is revoked.

2. That similarly may be considered as revoked the dispositions complementing and clarifying the same which were later dictated, remaining therefore, from the date of publication of the present in the Gaceta de Madrid, reestablished the tariff régime governing the products mentioned which was in force before the dispositions which are now revoked.

In the exposition preceding the actual text of the royal order it was pointed out that the action taken on March 9, 1926, was of a temporary character and that since further steps and studies indicated therein had not been followed by the detailed decisions envisaged, it was desirable to end for the present the restrictive system. It envisaged the possibility, however, that the tariff section of the Council of National Economy might later undertake a study leading to the adoption of permanent methods for the protection of the national dye industry.

The issuance of the royal order abolishing the restrictions on dye imports was received with considerable satisfaction by dye importers and consuming interests, and it marks a departure of the present Government away from extreme intervention in commerce and industry. To avoid any confusion resulting from this order, a commission has been appointed to make consistent interpretations of the decree. Spanish import duties on synthetic organic dyes were increased by a royal decree, effective July 22, 1930.

TABLE 66.—*Spain: Imports and exports of coal-tar dyes, 1928* [1]

Class of dye and country of origin or destination	Quantity	Value
Synthetic organic colors in powder or crystal form:		
Imported from—	*Pounds*	
Germany	473,974	$1,105,967
Belgium	8,018	18,709
Czechoslovakia	24	57
United States	7,077	16,513
France	97,443	227,554
Great Britain	27,553	64,292
Holland	6,173	14,404
Italy	14,875	34,708
Switzerland	156,824	365,933
Other countries	77	----------
Total	792,038	1,848,137
Exported to—		
Argentina	10,769	8,106
Colombia	481	362
United States	3,713	2,794
Total	14,963	11,262
Synthetic organic colors in paste or solid, containing 50 per cent or over of water:		
Imported from—		
Germany	34,680	9,137
Denmark	384	101
Synthetic organic colors in paste or solid, containing 50 per cent or over of water—Continued.		
Imported from—Con.	*Pounds*	
United States	1,697	$447
France	33,276	8,767
Great Britain	24,952	6,573
Italy	1,689	445
Sweden	1,521	401
Switzerland	21,903	5,770
Total	120,102	31,641
Synthetic aniline:		
Imported from—		
Germany	53,373	24,105
United States	441	199
France	48,241	21,787
Great Britain	55	25
Italy	1,074	485
Switzerland	23,148	10,454
Total	126,332	57,055
Total imports, all dyes	1,038,472	1,936,833
Total exports, all dyes	14,963	11,262

[1] Estadística del Comercio Exterior España. Value converted at average exchange rate, 1928, 1 peseta = $0.165942.

The Dye Industry of Poland and Russia

The annual production of coal-tar dyes in Poland amounts to approximately 1,650 short tons, valued at more than $1,681,350, and the total consumption is said to average 2,750 short tons. In 1928 small quantities of American and Italian dyes made their appearance, German and Swiss dyes having hitherto shared the Polish market almost exclusively.

The dye industry of Poland is reported to have suffered from the general economic crisis of 1929. The depression in the Polish textile and tanning industries was responsible for unusually low sales of dyes. In an attempt to dispose of a part of the surplus production, small quantities of Polish dyes were exported during the first quarter of 1930.

During 1929 the French dye works Etablissement Kuhlmann established a dye plant in Poland. It is understood that this plant will operate in close cooperation with the parent company.

The production of coal-tar dyes in Russia increased from 7,541 tons in 1926–27 to more than 10,000 tons in 1927–28. Another report estimates the 1927–28 production as 12,000 tons. The demands of the textile industry are now largely supplied by domestic dyes.

The Dye Industries of Other Countries

Through unavoidable delay in publishing last year's census, tables for several countries that would normally appear in this year's issue were given. For the latest available data the reader is referred to last year's census for statistics on China, the Netherlands, the Dutch East Indies, and Poland.

Table 67.—*Australia: Imports of coal-tar dyes, year ended June 30, 1928* [1]

Country of origin	Value
United Kingdom	$539,091
West Indies	725
France	3,835
Germany	99,841
Switzerland	12,687
United States	3,192
Other countries	1,149
Total	660,520
Reexports	17,140
Total net imports	643,380

[1] Official Statistics, Commonwealth of Australia, Oversea Trade. Values converted at par rate of exchange.

TABLE 68.—*Belgium: Imports and exports of coal-tar dyes, 1929* [1]

Class of dye and country of origin or destination	Quantity	Value
IMPORTS		
Alizarin:	*Pounds*	
Germany	2,645	$2,115
Other countries	7,937	1,614
Total	10,582	3,729
Alizarin dyes	1,102	668
Aniline dyes:		
Germany	2,626,781	1,147,578
United States	654,766	163,471
France	795,640	274,019
Netherlands	522,270	92,406
Switzerland	453,046	218,313
Other countries	202,382	69,339
Total	5,254,885	1,965,126
Indigo, synthetic:		
Germany	600,092	61,159
Other countries	482,587	46,412
Total	1,082,679	107,571
Other coal-tar dyes:		
Germany	221	83
France	18,739	3,701
Other countries	26,014	11,130
Total	44,974	14,914
Grand total	6,394,222	2,092,008
EXPORTS	*Pounds*	
Alizarin	1,102	$863
Aniline dyes:		
Germany	115,521	43,657
British India	50,265	12,855
Netherlands	83,334	53,841
Other countries	575,400	140,014
Total	824,520	250,367
Indigo, synthetic	3,087	751
Other coal-tar dyes	51,808	5,593
Grand total	880,517	257,574

[1] Bulletin Mensuel du Commerce Spécial, Decembre, 1929. Values converted at average exchange rate, 1929; 1,000 francs = $27.8248.

TABLE 69.—*Canada: Imports of coal-tar dyes, year ended March 31, 1929* [1]

Class of dye and country of origin	Quantity	Value
Aniline and coal-tar dyes, soluble in water, in bulk or package of not less than 1 pound weight, including alizarin and artificial alizarin:	*Pounds*	
United Kingdom	121,644	$80,345
United States	1,713,434	985,688
France	25,564	11,314
Germany	797,153	474,678
Switzerland	363,950	235,656
Other countries	1,405	568
Total	3,023,150	1,788,249
Aniline and coal-tar dyes, n. o. p.:		
United Kingdom	3,541	1,724
United States	11,973	4,129
Total	15,514	5,853
Indigo:		
United Kingdom	442	188
United States	607	364
Total	1,049	552
Indigo, paste and extract of:		
United States	197,189	20,307
Other countries	13,117	1,500
Total	210,306	21,807
Grand total	3,250,019	1,816,461

[1] Monthly Report of the Trade of Canada, March 31, 1929. Values converted at par rate of exchange.

TABLE 70.—*China: Exports of indigo, 1928* [1]

Country of destination	Quantity	Value
	Pounds	
Hong Kong	69,200	$3,166
Macao	9,600	448
French Indo-China	2,800	89
Singapore, Straits, etc.	99,866	2,749
British India	3,067	325
Total	184,533	6,777

[1] Foreign Trade of China, 1928. Values converted at average exchange rate, 1928, 1 Haikwan tael=$0.7058.

TABLE 71.—*Czechoslovakia: Imports and exports of coal-tar dyes, 1928* [1]

Class of dye and country of origin	Quantity	Value
IMPORTS		
Anthraquinone dyes:	*Pounds*	
Germany	190,257	$95,274
Switzerland	43,210	46,008
Great Britain	6,173	800
Hamburg	3,307	355
Netherlands	661	267
Austria	441	474
Other countries	661	148
Total	244,710	143,326
Sulfur black:		
Germany	981,047	111,509
United States	29,101	3,436
Netherlands	25,573	4,177
Switzerland	6,173	1,629
Hamburg	5,732	504
Other countries	3,748	385
Total	1,051,374	121,640
Other coal-tar dyes:		
Germany	5,142,230	3,790,371
Switzerland	1,362,222	730,671
France	242,506	122,085
Netherlands	179,454	78,210
United States	54,233	13,835
Hamburg	40,124	24,144
Great Britain	29,321	14,516
Austria	18,519	8,977
Italy	3,527	948
Poland	882	859
Hungary	661	444
Other countries	441	444
Total	7,074,120	4,785,504
Grand total	8,370,204	5,050,470
Indigo, natural:		
Germany	872,140	107,479
France	55,556	16,383
Belgium	22,046	$1,985
Switzerland	2,204	2,725
Greece	1,323	948
Total	953,269	129,520
EXPORTS		
Sulfur black:		
United States	61,288	2,577
Germany	661	119
Total	61,949	2,696
Other coal-tar dyes:		
Germany	425,929	211,433
Hungary	108,466	33,239
Bulgaria	91,711	25,714
Belgium	80,909	66,242
Austria	73,193	28,055
Netherlands	54,895	9,776
Poland	23,369	17,894
Yugoslavia	18,739	7,406
Rumania	13,668	5,451
Switzerland	12,787	8,650
Brazil	6,614	3,229
Sweden	4,409	1,837
Japan	1,543	830
Italy	1,323	1,126
Turkey	1,323	978
French Morocco	882	474
Other countries	3,086	1,866
Total	922,846	424,200
Grand total	984,795	426,896

[1] From Foreign Commerce of the Republic of Czechoslovakia, 1928, Pt. I. Values converted at average exchange rate 1928, 1,000 crowns=$29.625.

TABLE 72.—*Denmark: Imports of coal-tar dyes, 1928* [1]

Class of dye and country of origin	Quantity	Value	Class of dye and country of origin	Quantity	Value
Indigo, natural and synthetic:	*Pounds*		Aniline and alizarin colors (others):	*Pounds*	
Germany	18,739	$18,492	Germany	372,357	$287,564
Holland	220	----------	Great Britain	18,078	7,504
Belgium	220	----------	Sweden	3,307	1,608
Switzerland	3,528	4,288	Holland	36,155	15,008
Total	22,707	22,780	Belgium	27,998	11,256
Aniline and alizarin colors (blue or green):			France	441	268
Germany	134,701	113,900	Switzerland	86,420	85,760
Great Britain	3,968	1,876	United States	882	----------
Sweden	661	804	Total	545,638	408,968
Holland	1,764	804	Grand total	751,327	589,332
Belgium	5,071	2,948			
France	441	268			
Switzerland	36,376	36,984			
Total	182,982	157,584			

[1] Danmarks Vareindførsel Og-Udførsel, 1928. Values converted at par rate of exchange.

TABLE 73.—*Egypt: Imports of coal-tar dyes, 1929* [1]

Class of dye and country of origin	Quantity	Value	Class of dye and country of origin	Quantity	Value
Synthetic indigo:	*Pounds*		Natural indigo:	*Pounds*	
France	108,100	$19,555	British India	16,605	$10,697
Germany	326,861	75,352	Grand total	961,521	307,950
Switzerland	75,417	15,047			
Other countries	25,688	9,125	Reexports:		
Total	536,066	119,079	Synthetic indigo	5,604	2,096
Other dyes:			Other coal-tar dyes	5,148	4,083
United Kingdom	3,988	3,193	Total	10,752	6,179
Germany	11,894	11,804	Grand total imports	950,769	301,771
Other countries	2,921	2,190			
Total	18,803	17,187			
Other coal-tar dyes:					
Germany	196,139	100,617			
Switzerland	77,986	32,214			
Other countries	115,922	28,156			
Total	390,047	160,987			

[1] Monthly Summary of the Foreign Trade of Egypt, December, 1929. Values converted at par rate of exchange.

TABLE 74.—*India: Imports of coal-tar dyes and exports of natural indigo, year ended March 31, 1929* [1]

Class of dye and country of origin or destination	Quantity	Value
IMPORTS		
Alizarin:	*Pounds*	
United Kingdom	1,168,137	$222,857
Germany	3,660,039	722,986
Netherlands	730,644	134,948
Switzerland	17,920	2,999
Italy	37,262	7,836
United States	49,084	26,949
Other countries	22,960	4,068
Total	5,686,046	1,122,643
Aniline:		
United Kingdom	507,930	311,828
Ceylon	35,394	30,529
Germany	9,720,174	4,755,166
Netherlands	547,508	302,244
Belgium	131,489	73,375
France	121,125	125,187
Switzerland	386,754	315,688
Italy	1,020,502	549,329
Persia	3,360	1,886
Japan	15,453	7,576
United States	1,158,903	477,020
Other countries	1,743	1,854
Total	13,650,335	6,951,682
Other coal-tar dyes:		
United Kingdom	8,226	2,638
Hong Kong	1,372	1,002
Germany	166,538	192,421
Netherlands	65,776	41,494
France	2,464	1,101
Italy	5,243	4,273
China	4,169	3,970
Other countries	920	552
Total	254,708	247,451
Indigo, synthetic:		
Great Britain and possessions	224	147
Italy	29,008	15,103
Total	29,232	15,250
Grand total	19,620,321	8,337,026
REEXPORTS		
Alizarin:	*Pounds*	
Ceylon	2,821	$710
Mauritius and dependencies	448	146
Germany	112	26
Other countries	308	86
Total	3,689	968
Aniline:		
United Kingdom	16,063	13,779
Ceylon	19,723	13,840
Zanzibar and Pemba	5,255	3,764
Kenya Colony	1,698	1,214
Tanganyika	5,560	3,832
Germany	6,774	4,449
Belgium	26,024	20,422
Italy	721	748
Muskatt Territory	1,379	1,051
Other Arabian States	3,196	2,134
Iraq	2,184	1,551
Persia	55,842	37,023
United States	426	178
Other countries	2,352	1,435
Total	147,197	105,420
Other dyes:		
Ceylon	1,624	2,373
Siam	625	342
Total	2,249	2,715
Total reexports	153,135	109,103
Grand total	19,438,215	8,227,923
EXPORTS		
Natural indigo:		
Germany	1,232	343
Austria	1,008	697
Greece	33,824	30,922
Turkey (European)	1,232	1,062
Syria	5,264	4,453
Iraq	12,208	13,204
Persia	2,016	1,632
Japan	7,168	5,182
Egypt	7,728	5,642
Other countries	27,888	21,791
Total	99,568	84,928

[1] Annual Statement of the Sea-borne Trade of British India, year ended Mar. 31, 1929, vol. 1. Values converted at average exchange rate, 1 rupee=$0.3650.

TABLE 75.—*India: Imports of coal-tar dyes, calendar year 1929* [1]

Class of dye and country of origin	Quantity	Value
Alizarin:	*Pounds*	
United Kingdom	1,206,993	$211,936
Germany	3,945,903	699,895
Netherlands	408,938	67,473
Belgium	112	81
Other countries	181,006	67,782
Total	5,742,952	1,047,167
Aniline:		
United Kingdom	803,578	445,541
Germany	8,242,397	3,217,456
Netherlands	172,282	77,934
Belgium	71,464	49,528
Aniline—Continued.	*Pounds*	
France	26,209	$23,333
Switzerland	640,969	639,476
Italy	875,165	348,650
United States	1,189,058	454,743
Other countries	23,075	14,368
Total	12,044,197	5,271,029
Other coal-tar dyes	332,891	225,182
Total coal-tar dyes	18,120,040	6,543,378
Indigo, synthetic	55,552	25,222

[1] Accounts Relating to the Sea-borne Trade and Navigation of British India for the calendar year 1929. Values converted at average exchange rate, 1929, 1 rupee=$0.362020.

TABLE 76.—*India: Exports of indigo, natural, calendar year 1929* [1]

Country of destination	Quantity	Value
	Pounds	
United Kingdom	30,688	$24,238
Iraq	6,944	7,334
Persia	1,792	1,428
Egypt	9,184	7,311
Other countries	42,224	37,148
Total	90,832	77,459

[1] Accounts Relating to the Sea-borne Trade and Navigation of British India for the calendar year 1929. Values converted at average exchange rate, 1929, 1 rupee=$0.362020.

TABLE 77.—*Sweden: Imports and exports of coal-tar dyes, 1928* [1]

Class of dye and country of origin or destination	Quantity	Value
IMPORTS		
Alizarin dyes:	*Pounds*	
Denmark	1,036	$1,008
Germany	191,300	186,041
France	811	789
Great Britain	3,331	3,240
Switzerland	1,577	1,533
Total	198,055	192,611
Aniline and other coal-tar dyes:		
Norway	3,281	1,994
Denmark	8,966	5,450
Germany	1,642,720	998,478
Netherlands	83,210	50,577
Belgium	62,000	37,685
Great Britain	97,807	59,449
France	11,583	7,040
Italy	18,146	11,030
Switzerland	415,060	252,282
United States	6,984	4,245
Other countries	1,440	875
Total	2,351,197	1,429,105
IMPORTS—continued		
Indigo, synthetic: Germany	*Pounds* 37,092	$8,753
Other indigo dyes	430	65
Grand total	2,586,774	1,630,534
EXPORTS		
Alizarin dyes and other coal-tar dyes not mentioned elsewhere:		
Norway	12,387	9,813
Denmark	2,308	2,289
Finland	2,152	1,811
Germany	15	11
Total	16,862	13,924

[1] Handel Berattelse for Ar 1928 AV Kommerskollegium. Values converted at par rate of exchange.

PART VI

APPENDIX

STATISTICS OF DOMESTIC IMPORTS AND EXPORTS

DIRECTORY OF MANUFACTURERS OF DYES AND OTHER SYNTHETIC ORGANIC CHEMICALS, 1929

PART VI

STATISTICS OF IMPORTS AND EXPORTS

TABLE 78.—*Coal-tar products: Imports entered for consumption, calendar years 1927–1929*

GROUP I.—CRUDE (FREE)

	Year					
	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
Benzene, pounds	2,991,729	$63,962	7,268,258	$166,011	18,164,952	$405,029
Dead or creosote oil, gallons	95,915,221	15,436,574	88,385,074	13,928,136	79,300,575	10,119,379
Naphthalene, solidifying at less than 79° C., pounds	6,576,500	131,436	19,926,289	357,679	35,007,419	598,718
Coal tar, crude, barrels	12,951	44,836	10,257	35,434	14,473	34,214
Pitch, coal-tar, barrels	3,741	8,584	514	2,486	1,081	3,320
Toluene, pounds	154	55				
Acenaphthene, fluorene, methylanthracene, and methylnaphthalene pounds	66,559	17,658	55,205	15,645	44,360	11,351
Anthracene, purity less than 30 per cent, pounds	23,241	589	135,224	3,788	91,766	1,890
Anthracene oil, gallons	10,279	2,412	33,665	7,560	33,283	6,785
Cresylic acid, pounds	9,136,516	567,802	10,687,109	678,177	17,856,765	952,110
Pyridine, pounds	135,692	42,021	54,616	9,008	40,114	5,991
Xylene, pounds	361,200	15,649	214,260	7,219		
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	68,748	7,405	539,641	26,001	298,619	18,845
All other products found naturally in coal tar, whether produced or obtained from coal tar or other sources, n. s. p. f., pounds	37,564	4,771	340,215	15,882	160,514	12,705

GROUP II (DUTIABLE AT 40 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPT. 21, 1924)

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, etc., n. s. p. f.:				
Acetanilide, not medicinal—				*Per cent*
1927	1,001	$531	$282	53.20
1928				
1929				
Acids—				
Carbolic—				
Crystal (phenol)—				
1927	500	100	75	75.00
1928 [1]	1,653	298	117	39.42
1929	433,385	44,226	24,014	54.30
Liquid (cresylic acid or cresol)—				
1927 [2]	611,810	38,874	29,505	75.71
1928 [3]	976,180	70,513	48,269	68.45
1929	2,343,529	183,324	118,688	64.74
Coal-tar acids, n. s. p. f.—				
1927	62,155	58,673	27,820	47.42
1928	44,268	55,569	25,326	45.58
1929	11,100	10,671	5,045	47.28
Aniline oil and salts—				
1927	13,740	9,962	4,947	49.65
1928	28,740	19,083	9,645	50.54
1929				

[1] T. D. 42423. [2] T. D. 40519. [3] T. D. 42337.

TABLE 78.—*Coal-tar products: Imports entered for consumption, calendar years 1927–1929*—Continued

GROUP II (DUTIABLE AT 40 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPT. 21, 1924)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, etc.—Continued.				
Anthracene, purity of 30 per cent or more—				*Per cent*
1927				
1928	1,052	$405	$236	58.18
1929				
Anthraquinone, aminoanthraquinone, and nitroanthraquinone—				
1927	16,308	13,731	6,634	48.31
1928	28,341	20,211	10,068	49.82
1929	100	39	23	57.95
Benzaldehyde, not medicinal, and nitrobenzaldehyde—				
1927	1,587	1,027	522	50.82
1928	3,845	2,494	1,267	50.79
1929				
Benzanthrone, benzoquinone, benzidine, benzidine sulphate, and benzyl, benzal, and benzoyl chloride—				
1926	137,684	83,841	43,174	51.50
1927	321,751	199,112	102,167	51.31
1928	194,310	108,980	57,194	52.48
1929	4,567	4,051	1,940	47.89
Dihydroxy naphthalene and dianisidine—				
1927	8,855	5,652	2,881	50.97
1928	3,900	2,353	1,214	51.60
1929				
Dimethylaniline and benzylethylaniline—				
1927	2,383	2,219	1,054	47.52
1928				
1929				
Dinitrobenzene, dinitrochlorobenzene, dinitronaphthalene, dinitrophenol, nitrophenol, and dinitrotoluene—				
1927	150	182	83	45.77
1928				
1929				
Diphenylamine—				
1927				
1928	13,050	14,665	6,780	46.23
1929				
Metacresol, orthocresol, and paracresol, purity of 90 per cent or more—				
1927	174,094	35,054	26,208	74.77
1928	207,897	33,638	28,008	83.26
1929	227,974	32,098	28,797	89.72
Methylanthraquinone—				
1927				
1928				
1929	3,628	3,344	1,592	47.61
Naphthalene solidifying at 79° C. or above—				
1927	18,668	3,077	2,538	82.47
1928	27	6	4	71.50
1929				
Naphthol, alpha and beta, not medicinal—				
1927	41,746	65,739	29,218	44.45
1928	40,778	102,069	43,682	42.80
1929	34,486	78,108	33,657	43.09
Napthylamine and naphthylenediamine—				
1927	853	1,016	466	45.88
1928	1,850	2,177	1,000	45.95
1929				
Nitroaniline, para and meta, nitrobenzene, nitronaphthalene, nitrophenylenediamine, nitrosodimethylaniline, nitrotoluene, and nitrotolylenediamine—				
1927	112,012	40,027	23,852	59.59
1928	129,275	56,789	31,765	55.93
1929				
Phenylenediamine, phenylglycine, phenylhydrazine, and phenylnaphthylamine—				
1927	7,746	9,401	4,303	45.77
1928	250	294	135	45.95
1929	55	563	229	40.67

TABLE 78.—*Coal-tar products: Imports entered for consumption, calendar years 1927–1929*—Continued

GROUP II (DUTIABLE AT 40 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPT. 21, 1924)—Continued

Article and year	Pounds	Value	Duty	Actual and computed ad valorem rate
Not colors, dyes, or stains, photographic chemicals, medicinals, flavors, or explosives, etc—Continued.				
Resorcinol, not medicinal—				*Per cent*
1927	33,114	$38,046	$17,536	46.09
1928	47,882	60,352	27,493	45.55
1929	31,497	39,351	17,945	15.60
Tolidine, toluene sulfochloride, toluene solfonamide, toluidine, and tolylenediamine—				
1927	79,650	32,526	18,586	57.14
1928	83,380	35,283	19,950	56.54
1929	4,863	2,721	1,429	52.52
All distillates of coal, blast-furnace, oil-gas, and water-gas tar which on being subject to distillation below 215° C. yield a quantity of tar acids equal to or more than 75 per cent of the original distillate—				
1927	1,663	1,569	744	47.42
1928				
1929	227	23	25	109.09
All similar products, obtained, derived, or manufactured in whole or in part from the products provided for in Group I (free)—				
1927	540,237	363,914	183,382	50.39
1928				
1929				
All similar products manufactured from the products provided for in pars. 27 and 1549 [1]—				
1928	629,687	412,948	209,257	50.67
1929	1,138,898	977,255	470,625	48.16

GROUP III (DUTIABLE AT 45 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPT. 21, 1924)

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—				
1927	374	1,017	484	47.57
1928				
1929	17,518	21,817	11,044	50.62
Alizarin, synthetic—				
1927	25	48	23	48.65
1928				
1929				
Colors, dyes, stains, etc., obtained, derived, or manufactured from alizarin—				
1927	42,779	40,470	21,206	52.40
1928	3,333	3,796	1,942	51.15
1929	102	163	80	49.38
Indigo, natural—				
1927	6,843	2,957	1,810	61.20
1928	1,528	185	190	102.82
1929				
Indigo, synthetic—				
1927	590	610	316	51.77
1928				
1929				
Colors, dyes, stains, etc., derived from indigo—				
1927	5,960	6,112	3,168	51.83
1928	66	228	107	47.03
1929	550	381	210	55.10
All other colors, dyes, or stains, whether soluble or not in water, color acids, color bases, or color lakes—				
1922 [2]	2,077,712	2,941,773	965,640	32.83
1922 [3]	677,849	894,844	584,356	65.30
1923	3,059,361	4,154,091	2,706,610	65.16
1924 [4]	1,905,219	2,320,712	1,525,793	65.75
1924 [5]	1,357,133	1,865,036	934,266	50.09
1925	5,606,827	6,762,764	3,435,722	50.80
1926	5,101,759	5,613,847	2,883,354	51.36
1927	4,853,745	5,368,368	2,755,528	51.33
1928	6,089,303	6,716,566	3,448,706	51.35
1929	7,316,605	8,154,435	4,181,658	51.28

[1] Act of 1922.
[2] Act of 1916.
[3] Act of 1922.
[4] From Jan. 1 to Sept. 21, 1924.
[5] From Sept. 22 to Dec. 31, 1924.

TABLE 78.—*Coal-tar products: Imports entered for consumption, calendar years 1927–1929*—Continued

GROUP III (DUTIABLE AT 45 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPT. 21, 1924)—Continued

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.				
Color lakes—				*Per cent*
1928	155	$169	$87	51.42
1929				
Resinlike products prepared from articles provided for in par. 27 or 1549 [6]—				
1927	11,359	4,266	2,715	63.64
1928	60,547	10,984	9,181	83.59
1929	67,529	17,503	12,603	72.00
Photographic chemicals—				
1927	25,923	65,803	31,426	47.76
1928	25,313	77,539	36,664	47.29
1929	18,709	56,785	26,863	47.31
Coal-tar medicinals—				
Acetanilide, acetphenetidin (phenacetin), and acetylsalicylic acid (aspirin)—				
1927	1,279	2,455	1,336	54.40
1928	500	700	350	50.00
1929	229	201	106	52.98
Antipyrine—				
1927	52,111	47,257	24,913	52.72
1928	82,294	69,720	37,135	53.26
1929	103,277	108,075	55,863	51.69
Arsphenamine (salvarsan), neoarsphenamine and similar arsenical medicinal compounds—				
1927	127	4,904	2,216	45.18
1928	39	16,847	7,584	45.02
1929	14	5,973	2,689	45.02
Betanaphthol and benzaldehyde—				
1927	667	798	406	50.85
1928	13	132	60	45.69
1929				
Benzoic acid—				
1927	236	142	80	56.63
1928	419	256	145	56.46
1929	225	135	76	56.67
Guaiacol and derivatives—				
1929	7,666	9,451	4,790	50.68
Novocain or procaine—				
1927	6	1,652	744	45.03
1928	14	6,711	3,021	45.01
1929	25	9,781	4,403	45.02
Phenolphthalein—				
1927	630	810	545	67.28
1928	4,409	4,731	[7] 440 2,438	60.83
1929	992	1,091	560	51.36
Resorcinol—				
1927	5,202	8,245	4,074	49.42
1928	7,713	12,974	6,378	49.16
1929	24,565	35,009	17,474	49.91
Salicylic acid and its salts—				
1927	209	1,397	643	46.05
1928	196	1,343	618	46.02
1929	2,535	1,518	861	56.69
Salol—				
1928	16	100	46	46.12
1929	5	5	3	52.00
Coal-tar medicinals, n. s. p. f.—				
1927	28,642	165,528	76,493	46.21
1928	19,884	87,614	40,818	46.59
1929	74,376	224,227	106,108	47.32

[6] Bakelite prohibited. T. D. 41512.

[7] Antidumping duty.

TABLE 78.—*Coal-tar products: Imports entered for consumption, calendar years 1927–1929*—Continued

GROUP III (DUTIABLE AT 45 PER CENT AD VALOREM PLUS 7 CENTS PER POUND AFTER SEPT. 21, 1924)—Continued

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.				
Flavors and perfumes—				
Musk, artificial, benzyl acetate, benzyl benzoate, coumarin, diphenyloxide, methyl anthranilate, methyl salicylate, natural methyl salicylate, or oil of wintergreen or oil of sweet birch, phenylacetaldehyde, phenylethyl alcohol, and other synthetic odoriferous or aromatic chemicals not containing alcohol—				*Per cent*
1927	162,303	$457,644	$217,301	47.48
1928	124,388	405,759	191,299	47.15
1929	128,965	447,082	210,215	47.02
Vanillin—				
1927	3,178	20,961	9,655	46.06
1928	18,759	129,917	59,776	46.01
1929	20,703	137,579	63,360	46.05
Other flavors—				
1927	682	767	393	51.22
1928	143	196	98	50.11
1929	165	413	197	47.80
Ink powder—				
1927	30	8	6	71.25
1928				
1929				
Synthetic tanning materials—				
1927	99	336	158	47.06
1928				
1929				

TABLE 79.—*Coal-tar products: General imports, 1927–1929*

DEAD OR CREOSOTE OIL (FREE)

Imported from—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Gallons		*Gallons*		*Gallons*	
United Kingdom	38,279,105	$6,230,595	44,009,816	$6,854,025	59,383,991	$5,067,042
Netherlands	27,975,616	4,467,225	18,312,329	2,916,702	20,157,187	2,553,870
Germany	4,243,931	628,452	1,158,661	212,711	275	36
Belgium	19,034,169	3,203,425	21,977,802	3,537,583	17,944,092	2,282,456
France	1,233,933	193,801				
Mexico	553,249	85,028				
Canada	4,169,917	558,309	1,475,919	188,238	1,400,249	167,031
All other countries	425,301	69,739	1,450,547	218,877	[1] 414,781	48,944
Total	95,915,221	15,436,574	88,385,074	13,928,136	79,300,575	10,119,379

PYRIDINE (FREE)

	Pounds		*Pounds*		*Pounds*	
Germany	78,978	$23,331	49,466	$7,532	31,167	$4,158
Netherlands	3,946	1,915				
Poland and Danzig	40,552	9,173				
United Kingdom	12,216	7,602	4,340	1,172	8,947	1,853
All other countries			810	304		
Total	135,692	42,021	54,616	9,008	40,114	5,991

[1] Japan only.

TABLE 79—*Coal-tar products: General imports, 1927–1929*—Continued

ALL OTHER CRUDES

Imported from—	1927	1928	1929
Belgium	$54,657	$78,981	$49,149
France	13,707	30,023	19,747
United Kingdom	378,912	524,542	902,838
Canada	83,430	157,816	411,285
Germany	275,215	447,995	612,953
Netherlands	2,502	----------	687
Mexico	45,431	62,793	48,308
All other countries	18,590	11,462	----------
Total	872,444	1,313,612	2,044,967

COAL-TAR ACIDS

Imported from—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
Belgium	217,454	$14,364	----------	----------	----------	----------
United Kingdom	522,361	32,571	2,175,876	$162,229	1,594,973	$126,051
Netherlands	----------	----------	----------	----------	1,102	117
France	40	143	----------	----------	----------	----------
Germany	75,937	71,184	770,245	165,687	377,078	34,120
All other countries	2,866	1,487	----------	----------	----------	----------
Total	818,658	119,749	2,946,121	327,916	1,973,153	160,288

OTHER COAL-TAR INTERMEDIATES

France	40,402	$44,473	39,436	$42,903	48,235	$60,541
Germany	1,371,766	891,831	1,129,132	877,333	1,707,235	1,340,630
Netherlands	95,225	7,095	31,585	10,496	9,737	14,618
United Kingdom	192,875	33,671	194,306	26,499	144,426	23,097
Switzerland	46,323	37,360	48,752	40,627	70,030	42,181
Canada	15,185	9,213	1,484	778	5,021	1,315
All other countries	6,234	3,183	----------	----------	4,100	3,465
Total	1,768,010	1,026,826	1,444,755	998,636	1,988,790	1,485,547

ALIZARIN AND DERIVATIVES

France	81	$177	----------	----------	----------	----------
Germany	2,105	690	----------	----------	----------	----------
Switzerland	----------	----------	----------	----------	17,620	$21,980
United Kingdom	1,939	1,571	3,333	$3,796	----------	----------
Canada	40	145	----------	----------	----------	----------
Total	4,165	2,583	3,333	3,796	17,620	21,980

COLORS, DYES, STAINS, COLOR ACIDS, AND COLOR BASES, N. E. S.

Belgium	180,124	$242,419	114,977	$136,966	76,259	$95,819
France	234,998	274,154	74,284	89,991	108,312	160,012
Germany	3,238,040	3,426,848	4,055,619	4,249,849	4,665,328	5,019,070
Switzerland	1,493,466	1,859,124	1,638,662	2,004,560	2,563,470	3,000,159
United Kingdom	146,270	147,640	98,027	95,507	91,957	100,779
Italy	112,475	130,503	64,954	60,103	13,854	11,626
Netherlands	17,237	25,936	74,437	85,549	18,920	21,446
Canada	71,578	63,101	131,131	154,009	33,594	38,276
All other countries	2,647	2,070	66	72	1,428	850
Total	5,496,833	6,181,795	6,252,157	6,876,606	7,593,119	8,448,037

TABLE 79.—*Coal-tar products: General imports, 1927–1929*—Continued

COAL-TAR MEDICINALS

Imported from—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
France	25,659	$61,031	34,496	$66,351	40,558	$77,414
Germany	78,787	121,604	30,136	70,139	56,608	117,429
Italy	693	4,397	148	786	283	2,168
Netherlands	264	23,280	5,070	5,193	1,036	3,791
Switzerland	15,419	44,142	25,059	38,747	36,714	88,060
United Kingdom	7,780	19,275	17,300	24,371	16,628	30,533
All other countries	1,035	3,118	284	3,043	1,330	12,067
Total	129,637	276,847	112,693	208,628	153,157	332,462

ALL OTHER FINISHED COAL-TAR PRODUCTS

France	15,358	$14,658	5,072	$28,399	344	$2,176
Germany	26,127	66,604	88,677	147,305	101,339	169,239
Switzerland			6,776	46,054	5,349	31,774
United Kingdom	822	1,867	2,359	13,210	359	727
All other countries	32	90	1,033	5,573	706	890
Total	42,359	83,219	103,917	240,543	108,097	204,807

TABLE 80.—*Coal-tar products: Domestic exports, 1927–1929*

CRUDE COAL TAR AND COAL-TAR PITCH

Exported to—	1927		1928 [1]		1929 [2]	
	Quantity	Value	Quantity	Value	Quantity	Value
	Barrels		*Tons*		*Tons*	
Europe	585,119	$2,927,929	27,971	$449,441	1,481	$44,211
North America	86,826	315,791	10,337	156,842	8,311	159,168
South America	1,281	10,365	44	1,882	13	668
Asia	37	363				
Oceania	127	1,105	2	253		
Africa	29	413				
Total	673,419	3,255,966	38,354	608,118	9,805	204,047

[1] Coal-tar pitch and coal-tar pitch coke. [2] Coal-tar pitch.

CRUDE COAL TAR

Exported to—	1928		1929	
	Quantity	Value	Quantity	Value
	Barrels		*Barrels*	
Europe	51,882	$258,023	2,647	$23,743
North America	84,472	308,967	104,028	351,872
South America	1,729	13,230	1,818	13,122
Asia			1	20
Oceania	57	900	33	356
Africa	13	203	10	103
Total	138,153	580,623	108,537	389,216

TABLE 80.—*Coal-tar products: Domestic exports, 1927–1929*—Continued

COAL-TAR DISTILLATES—BENZOL

Exported to—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Gallons		*Gallons*		*Gallons*	
Germany	11,918,240	$3,010,816	10,824,326	$2,615,115	17,828,355	$4,459,506
France	555,544	149,997	1,380,235	333,230	1,326,496	344,332
Belgium			2,277,075	637,580	1,194,059	333,771
Netherlands	4,620,862	1,062,798			1,921,733	422,782
United Kingdom	8,396,932	2,342,299	6,559,186	1,271,412	9,251,276	2,506,768
Italy					1,030,387	214,739
Canada	18,125	7,190	14,134	4,871	34,433	13,597
Mexico	2,458	1,297	650	295	733	407
Argentina	106,860	43,311	132,090	54,792	168,915	59,642
Chile	7,433	2,764	28,830	9,808	45,433	16,119
Australia	3,100	2,234	7,827	3,557	17,212	7,543
All other countries	164,012	42,399	114,076	32,050	527,349	157,672
Total	25,793,566	6,665,105	21,338,429	4,962,710	33,346,381	8,536,878

OTHER CRUDE DISTILLATES

Exported to—	1927	1928	1929
	Value	*Value*	*Value*
France	$144	$30	
Belgium	1,552		
Canada	192,934	268,004	$394,680
Honduras	114	1,930	230
Mexico	49,422	40,572	40,010
Brazil	4,377	411	
Cuba	9,861	6,216	12,787
Japan	10,806	20	1,179
United Kingdom	68,918	65,072	90,703
Chile	37,708	26,114	6,840
Nicaragua	15,507	15,610	1,583
All other countries	[1] 46,706	34,127	[2] 77,294
Total	438,049	458,106	625,306

[1] Includes $15,802 to the Netherlands.

[2] Includes $26,944 to Australia.

INTERMEDIATE COAL-TAR PRODUCTS

Exported to—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
France	69,908	$29,902	9,232	$3,869		
Germany	78,400	9,040	48,174	4,926	17,422	$2,152
Netherlands	263,234	47,175	221,553	26,799	179,522	26,213
Switzerland			11,760	2,242	6,725	1,220
Canada	366,110	49,120	1,247,063	116,513	863,158	107,825
Mexico	39,709	3,225	103,912	12,534	107,575	13,367
Cuba	109,487	11,959	76,449	2,377	101,780	8,294
Brazil	461,521	58,874	124,581	17,301	17,423	2,893
China	4,758	832	6,666	1,450	89,788	17,948
Kwantung	94,751	15,087				
Japan	613,161	84,404	652,283	93,449	979,489	168,808
Australia	113,281	24,052	90,227	5,565	109,643	7,954
All other countries	203,419	14,806	198,538	28,852	335,985	61,324
Total	2,417,739	348,476	2,790,438	315,877	2,808,510	417,998

TABLE 80.—*Coal-tar products: Domestic exports, 1927–1929*—Continued

FINISHED COAL-TAR PRODUCTS

COLORS, DYES, AND STAINS (PACKAGES FOR HOUSEHOLD USE) [1]

Exported to—	1928		1929	
	Quantity	Value	Quantity	Value
	Pounds		*Pounds*	
United Kingdom	1,503	$1,140	920	$1,117
Canada	94,357	35,827	41,469	36,017
Mexico	25,516	18,211	19,749	15,005
Cuba	12,993	13,768	32,085	24,800
South America	29,160	25,820	33,586	32,259
Japan	37,122	54,170	1,915	1,916
Philippines	6,662	5,721	6,455	5,436
British India	858	426	23,338	7,911
Australia	5,298	4,360	3,313	1,810
New Zealand	11,382	6,646	38,342	16,216
Union of South Africa	8,403	4,849	11,803	4,647
All other countries	31,732	24,503	85,267	76,161
Total	264,986	195,441	298,242	223,295

[1] Not previously reported separately.

OTHER COLORS, DYES, AND STAINS

Exported to—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
Belgium	709,807	$166,723	1,000,592	$240,519	1,593,928	$340,276
Czechoslovakia	120,792	37,664	40,102	9,657	122,135	28,295
France	8,354	3,286	23,714	9,885	9,822	10,437
Germany	116,362	31,247	274,215	109,600	455,713	197,578
Netherlands	26,835	62,197	13,344	1,078	13,172	3,369
Soviet Russia in Europe	2,628	1,275			67,247	55,236
United Kingdom	12,605	10,672	50,012	7,699	21,668	14,854
Canada	1,978,705	850,257	2,670,079	1,022,583	1,870,498	935,995
Mexico	285,302	95,383	248,298	95,739	177,366	66,819
Cuba	54,377	42,380	77,049	59,929	42,005	24,295
South America	395,189	192,076	441,152	213,314	578,426	229,966
British India	1,612,816	536,525	1,307,898	569,219	1,467,512	628,723
China	17,798,509	1,884,288	18,970,388	2,499,400	24,514,990	3,215,200
Hong Kong	931,348	145,925	30,721	93,304	645,949	150,798
Japan	2,266,103	1,302,526	1,650,021	1,245,224	1,805,016	1,053,516
Kwantung	67,453	10,342				
Philippine Islands	135,627	24,737	229,596	46,650	201,292	28,798
Australia	6,659	5,028	2,900	2,438	893	1,075
New Zealand	11,619	8,984	3,169	2,840	1,879	1,095
Union of South Africa	12,864	8,014	4,349	2,305	4,584	2,574
All other countries	216,606	75,793	245,196	104,795	237,988	66,892
Total	26,770,560	5,495,322	27,559,278	6,336,178	33,832,083	7,055,791

MEDICINALS

	Pounds		*Pounds*		*Pounds*	
Germany	59,451	$27,899	21,000	$11,000		
United Kingdom	122,315	27,308	137,665	36,967	5,712	$4,448
Canada	70,187	17,299	353,224	41,180	65,566	17,967
Mexico	45,833	59,677	44,948	63,916	23,140	62,207
Cuba	16,363	11,683	5,053	5,189	6,269	2,293
Argentina	27,482	11,289	42,939	18,288	126	510
British India	2,110	1,664	10,424	6,654	8,436	6,969
Japan	20,223	10,374	8,220	6,997	23,758	20,130
Australia	58,170	32,219	73,359	42,478	3,425	3,131
All other countries	233,175	129,349	94,783	88,444	46,591	67,199
Total	655,309	328,761	791,615	321,113	183,023	184,854

TABLE 80.—*Coal-tar products: Domestic exports, 1927–1929*—Continued

OTHER FINISHED COAL-TAR PRODUCTS

Exported to—	1927		1928		1929	
	Quantity	Value	Quantity	Value	Quantity	Value
	Pounds		*Pounds*		*Pounds*	
Belgium	328,032	$23,413	6,184	$423		
France	372,163	27,747	31,106	3,521	6,299	$2,624
Germany	52,020	5,848	3,842	1,552	3,075	952
Italy	385,771	84,899	3,431	863	1,698	98
Poland and Danzig	95,950	23,740	2,400	228		
United Kingdom	974,931	104,466	213,924	24,399	681,468	69,959
Canada	409,420	52,922	949,698	96,722	325,124	83,662
Mexico	56,159	9,720	80,818	9,181	79,329	11,315
Cuba	578,496	19,813	118,355	13,099	51,022	11,114
Argentina	83,418	17,919	28,382	9,271	25,625	13,041
Brazil	44,216	10,062	7,097	1,691	9,894	6,216
Colombia	154,674	22,965	105,875	20,172	13,495	4,384
Peru	70,302	13,772	120,557	20,062	25,754	5,165
China	36,040	18,545	50,502	38,679	53,489	48,323
Japan	37,918	13,713	159,784	20,277	29,665	10,052
Australia	116,884	47,112	57,258	9,621	49,542	7,945
Philippine Islands	37,439	13,422	44,896	15,771	38,789	28,205
All other countries	300,282	55,136	221,933	49,376	116,054	36,140
Total	4,134,115	565,214	2,106,042	334,908	1,510,322	339,195

Directory of manufacturers of dyes and other synthetic organic chemicals, 1929

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
1	Abbott Laboratories, The	4753 East Ravenswood Avenue, Chicago, Ill. (North Chicago, Ill.)
2	Algon Color & Chemical Corporation	132 Front Street, New York, N. Y. (Elizabeth, N. J.)
3	Allied Tar & Chemical Corporation	535 Fifth Avenue, New York, N. Y. (Bayway, Elizabeth, N. J.)
4	Alston-Lucas Paint Co., The	1031 Currier Street, Chicago, Ill.
5	Althouse Chemical Co., The	540 Pear Street, Reading, Pa.
6	Alyco Manufacturing Co. (Inc.)	86 Orange Street, Bloomfield, N. J.
7	Amalgamated Dyestuff & Chemical Works (Inc.).	75 Hudson Street, New York, N. Y. (Newark, N. J.)
8	American Aniline Products (Inc.)	45 East Seventeenth Street, New York, N. Y. (Lock Haven, Pa.)
9	American Catalin Corporation	230 Park Avenue, New York, N. Y. (College Point, N. Y.)
10	American Chemical Products Co	7 Litchfield Street, Rochester, N. Y.
11	American Solvents & Chemical Corporation	122 East Forty-second Street, New York, N. Y. (Albany, N. Y.)
12	American Tar Products Co. (Inc.)	Koppers Building, Pittsburgh, Pa. (Cicero, Ill. Youngstown, Ohio; St. Louis, Mo.; Woodward Ala.; Carrollville, Wis.; Follansbee, W. Va.; Utica, N. Y.; Kearny, N. J.; St. Paul, Minn.; Hamilton, Ohio.)
13	Ansbacher-Siegle Corporation	91 Chestnut Avenue, Rosebank, Staten Island, N. Y.
14	Apex Chemical Co. (Inc.)	225 West Thirty-fourth Street, New York, N. Y. (Elizabethport, N. J.)
15	Atlantic Creosoting Co. (Inc.)	P. O. Box 902, Norfolk, Va. (Burtons Point, Portsmouth, Va.)
16	Baird & McGuire (Inc.)	Holbrook, Mass.
17	Barrett Co., The	40 Rector Street, New York, N. Y. (Plants distributed throughout the United States.)
18	Bates Chemical Co	Lansdowne, Pa.
19	Bayer Co. (Inc.), The	170 Varick Street, New York, N. Y. (Rensselaer, N. Y.)
20	Beaver Chemical Corporation	Damascus, Va.
21	Beaver Manufacturing Co	Ballardvale, Mass.
22	Benzol Products Co	237 South Street, Newark, N. J. (Piscataway, N. J.)
23	Berghausen Chemical Co., The E	915 Carr Street, Cincinnati, Ohio.
24	Berkheimer Manufacturing Co., J. E	2928 South M Street, Tacoma, Wash.
25	Brooklyn Color Works (Inc.)	129 Cherry Street, Brooklyn, N. Y
26	Brown Co	404 Commercial Street, Portland, Me. (Berlin, N. H.)
27	Bush Co. (Inc.), W. J	370 Seventh Avenue, New York, N. Y. (Linden, N. J.)
28	Cable Chemical Works	185 North Wabash Avenue, Chicago, Ill. (Cable, Wis.)
29	Calco Chemical Co. (Inc.), The	Boundbrook, N. J.
30	California Chemical Corporation	111 Sutter Street, San Francisco, Calif. (Newark, San Mateo, Chula Vista, Calif.)
31	California Ink Co. (Inc.), The	426 Battery Street, San Francisco, Calif. (West Berkeley, Calif.)

Directory of manufacturers of dyes and other synthetic organic chemicals, 1929—Con.

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
32	Carbide & Carbon Chemicals Corporation	30 East Forty-second Street, New York, N. Y. (South Charleston, W. Va.; Niagara Falls, N. Y.)
33	Carus Chemical Co	La Salle, Ill.
34	Celluloid Corporation	290 Ferry Street, Newark, N. J.
35	Certain-teed Products Corporation	100 East Forty-second Street, New York, N. Y. (East St. Louis, Ill.)
36	Chemical & Dye Corporation	Springfield, N. J.
37	Childs Pulp Colors (Inc.)	43 Summit Street, Brooklyn, N. Y.
38	Cincinnati Chemical Works (Inc.)	Evanston Station, Box 20, Cincinnati, Ohio. (Norwood and St. Bernard, Ohio.)
39	Coleman & Bell Co	4101 Main Avenue, Norwood, Ohio.
40	Commonwealth Color & Chemical Co	Nevins, Butler, and Baltic Streets, Brooklyn, N. Y.
41	Continental-Diamond Fibre Co	Newark, Del.
42	Cooks Falls Dye Works, (Inc.)	81 Fulton Street, New York, N. Y. (Cooks Falls, N. Y.)
43	Coopers Creek Chemical Co	River Road, West Conshohocken, Pa.
44	Crown Chemical Corporation	128 Front Street, New York, N. Y. (Keyport, N. J.)
45	Crown Tar Works	900 Fifteenth Street, Denver, Colo.
46	Crystal Color & Chemical Works	Cordaville, Mass.
47	DeBrook Co. (Inc.)	1105 Metropolitan Avenue, Brooklyn, N. Y.
48	Delta Chemical & Iron Co	Wells, Mich.
49	Diarsenol Co. (Inc.)	771 Ellicott Square, Buffalo, N. Y.
50	Dow Chemical Co., The	Midland, Mich.
51	Du Pont Ammonia Corporation	Du Pont Building, Wilmington, Del. (Belle, W. Va.)
52	Du Pont de Nemours & Co., E. I	Wilmington, Del. (Deep Water Point, N. J.)
53	Dye Products & Chemical Co. (Inc.)	200 Fifth Avenue, New York, N. Y. (Newark, N. J.)
54	Dyestuffs & Chemicals (Inc.)	Eleventh and Monroe Streets, St. Louis, Mo.
55	Eakins (Inc.), J. S. & W. R	55 Berry Street, Brooklyn, N. Y.
56	Eastman Kodak Co	343 State Street, Rochester, N. Y.
57	Federal Color Laboratories (Inc.)	4633 Forest Avenue, Norwood, Ohio.
58	Federal Phosphorus Co	Birmingham, Ala. (Anniston, Ala.)
59	Felton Chemical Co. (Inc.)	599 Johnson Avenue, Brooklyn, N. Y.
60	Fine Colors Co	21 McBride Avenue, Paterson, N. J.
61	Florasynth Laboratories (Inc.)	1513 Olmstead Avenue, New York, N. Y.
62	Ford Motor Co	Iron Mountain, Mich. (Kingsford, Mich.)
63	Foster-Heaton Co	833 Magnolia Avenue, Elizabeth, N. J.
64	Franco-American Chemical Works	Carlstadt, N. J.
65	Fries Bros	92 Reade Street, N. Y. (Bloomfield, N. J.)
66	Garfield Aniline Works	P. O. Box 37, Garfield, N. J. (Wallington, N. J.)
67	Gaskill Chemical Corporation, The	355 Van Buren Street, Newark, N. J.
68	Gebauer Chemical Co., The	826 Hanna Building, Cleveland, Ohio.
69	General Aniline Works (Inc.)	1150 Broadway, New York, N. Y. (Grasselli, N. J.; Rensselaer, N. Y.)
70	General Electric Co	1 River Road, Schenectady, N. Y.
71	General Plastics (Inc.)	Walek Road, North Tonawanda, N. Y.
72	Givaudan-Delawanna (Inc.)	Delawanna Avenue, Delawanna, N. J.
73	Glyco Products Co	Bush Terminal Building, No. 5, Brooklyn, N. Y.
74	Goodrich Co., The B. F	Akron, Ohio.
75	Great Western Electro-Chemical Co	9 Main Street, San Francisco, Calif. (Pittsburg, Calif.)
76	Hall Co., The C. P	504 Akron Savings & Loan Building, Akron, Ohio.
77	Hampden Paint & Chemical Co	161 Armory Street, Springfield, Mass.
78	Harmon Color Works (Inc.)	361 Harmon Street, Brooklyn, N. Y.
79	Heller & Merz Co., The	503 Hudson Street, New York, N. Y. (Newark, N. J.)
80	Heyden Chemical Corporation	50 Union Square, New York, N. Y. (Garfield and Perth Amboy, N. J.)
81	Holland Aniline Dye Co	Holland, Mich.
82	Hooker Electrochemical Co	25 Pine Street, New York, N. Y. (Niagara Falls, N. Y.)
83	Hynson, Westcott & Dunning	1030 North Charles Street, Baltimore, Md.
84	Imperial Color Works (Inc.)	Glens Falls, N. Y.
85	Inland Tar Co	38 South Dearborn Street, Chicago, Ill. (East Chicago, Ind.)
86	Johnson & Co., Charles Eneu	509 South Tenth Street, Philadelphia, Pa.
87	Kent Color Corporation	2 South Ninth Street, Brooklyn, N. Y.
88	Kentucky Color & Chemical Co	Thirty-fourth and Bank Streets, Louisville, Ky.
89	Kessler Chemical Corporation, The	575 Nassau Street, Orange, N. J.
90	Klipstein & Sons Co. (Inc.), E. C	60 Park Place, Newark, N. J. (South Charleston, W. Va.)
91	Kohnstamm & Co. (Inc.), H	87 Park Place, New York, N. Y. (Brooklyn, N. Y.)
92	LaMotte Chemical Products Co	McCormick Building, Baltimore, Md.
93	Lilly & Co., Eli	Indianapolis, Ind.
94	Lucidol Corporation	293 Larkin Street, Buffalo, N. Y.
95	Maas & Waldstein Co	438 Riverside Avenue, Newark, N. J.
96	Mallinckrodt Chemical Works	3600 North Second Street, St. Louis, Mo.
97	Marietta Dyestuffs Co	410 Peoples Bank Building, Marietta, Ohio.
98	Marx Color & Chemical Co., Max	192 Coit Street, Irvington, N. J.
99	Mathieson Alkali Works, The	250 Park Avenue, New York, N. Y. (Newark, N. J.)
100	Maywood Chemical Works	Maywood, N. J.
101	Mepham & Co., Geo. S	Twentieth Street and Lynch Avenue, East St. Louis, Ill.

Directory of manufacturers of dyes and other synthetic organic chemicals, 1929—Con.

No.	Name of company	Office address (location of plant given in parentheses if not in same city as office)
102	Merck & Co. (Inc.)	Rahway, N. J. (Rahway, N. J.; Philadelphia, Pa.)
103	Merrimac Chemical Co. (Inc.)	148 State Street, Boston, Mass. (Woburn and Everett, Mass.)
104	Metz Laboratories (Inc.), H. A	170 Varick Street, New York, N. Y. (Brooklyn, N. Y.; Newark, N. J.)
105	Monsanto Chemical Works	1724 South Second Street, St. Louis, Mo. (St. Louis, Mo.; Monsanto, Ill.)
106	National Aniline & Chemical Co. (Inc.)	40 Rector Street, New York, N. Y. (Buffalo, N. Y.)
107	Naugatuck Chemical Co., The	Naugatuck, Conn.
108	Neville Chemical Co	1004 Diamond Bank Building, Pittsburgh, Pa.
109	New York Quinine & Chemical Works (Inc.)	99 North Eleventh Street, Brooklyn, N. Y.
110	Newport Co., The	P. O. Box "M," South Milwaukee, Wis. (Carrollville, Wis.; Passaic, N. J.)
111	Newport Chemical Works (Inc.)	P. O. Box "M," South Milwaukee, Wis. (New Brunswick, N. J.)
112	Niacet Chemical Corporation	Pine Avenue and Forty-seventh Street, Niagara Falls, N. Y.
113	Noil Chemical & Color Works (Inc.)	152 West One hundred and eighth Street, New York, N. Y.
114	Northwestern Chemical Co	Wauwatosa, Wis.
115	Novocol Chemical Manufacturing Co. (Inc.)	2923 Atlantic Avenue, Brooklyn, N. Y.
116	Oldbury Electro Chemical Co	Niagara Falls, N. Y.
117	Palatine Aniline & Chemical Corporation	77 North Water Street, Poughkeepsie, N. Y.
118	Passaic Color Corporation	50 Eighth Street, Passaic, N. J.
119	Peerless Color Co	521 North Avenue, Plainfield, N. J.
120	Pennsylvania Coal Products Co	Petrolia, Pa.
121	Pharma-Chemical Corporation	233 Broadway, New York, N. Y. (Bayonne, N. J.)
122	Pittsburgh Plate Glass Co	205 Pittsburgh Avenue, Milwaukee, Wis.
123	Portland Gas & Coke Co	206 Sixth Street, Portland, Oreg.
124	Providence Chemical Laboratories (Inc.)	26 Custom House Street, Providence, R. I.
125	Publicker (Inc.)	260 South Broad Street, Philadelphia, Pa.
126	Quaker Oats Co., The	1600 Railway Exchange, Chicago, Ill. (Cedar Rapids, Iowa.)
127	Republic Creosoting Co	1615 Merchants Bank Building, Indianapolis, Ind. (Indianapolis, Ind.; St. Louis Park, Minn.; Mobile, Ala.; Norfolk, Va.; Ironton, Utah; Seattle, Wash.)
128	Reynolds Chemical Corporation	Washington Street, Utica, N. Y.
129	Roessler & Hasslacher Chemical Co., The	10 East Fortieth Street, New York, N. Y. (Perth Amboy, N. J.; Niagara Falls, N. Y.)
130	Rubber Service Laboratories Co., The	Nitro, W. Va.
131	Savell, Sayre & Co. (Inc.)	Niagara Falls, N. Y. (Lewiston, N. Y.)
132	Selden Co., The	McCartney Street, West End, Pittsburgh, Pa.
133	Seydel Chemical Co	86 Forrest Street, Nitro, W. Va.
134	Sherwin Williams Co., The	601 Canal Road, Cleveland, Ohio. (Chicago, Ill.)
135	Siemon & Elting	Irvington, N. J.
136	Simons (Inc.), Harold L	11 Forty-fourth Road, Long Island City, N. Y.
137	Sinclair & Valentine Co	11 St. Clair Place, New York, N. Y.
138	Solvay Process Co., The	Syracuse, N. Y. (Geddes, Onondaga County, N. Y.)
139	Squibb & Sons, E. R	80 Beekman Street, New York, N. Y. (Brooklyn, N. Y.; New Brunswick, N. J.)
140	Stange Co., Wm. J	2549 Madison Street, Chicago, Ill.
141	Stokes & Smith Co	Summerdale Avenue, Philadelphia, Pa.
142	Sun Chemical & Color Co	309 Sussex Street, Harrison, N. J.
143	Synfleur Scientific Laboratories (Inc.)	33 Oakley Avenue, Monticello, N. Y.
144	Tar Products Corporation	Koppers Building, Pittsburgh, Pa. (Providence, R. I.; Hartford and New Haven, Conn.)
145	Todd Co., A. M	Kalamazoo, Mich.
146	Trico Chemical Co. (Inc.)	502 Iroquois Building, Buffalo, N. Y.
147	Uhlich (Inc.), Paul	11 Cliff Street, New York, N. Y. (Brooklyn, N. Y.)
148	United States Industrial Chemical Co. (Inc.)	110 East Forty-second Street, New York, N. Y. (Baltimore Md., and Peoria, Ill.)
149	Van Ameringen-Haebler (Inc.)	315 Fourth Avenue, New York, N. Y. (Elizabeth, N. J.)
150	Van Dyk & Co. (Inc.)	4 Platt Street, New York, N. Y. (Jersey City, N. J.)
151	Van Schaack Bros. Chemical Works (Inc.)	3358 Avondale Avenue, Chicago, Ill.
152	Verona Chemical Co	26 Verona Avenue, Newark, N. J.
153	Victor Chemical Works	343 South Dearborn Street, Chicago, Ill. (Chicago Heights, Ill.)
154	Wailes Dove-Hermiston Corporation	17 Battery Place, New York, N. Y. (Westfield, N. J.)
155	Warner-Jenkinson Manufacturing Co	2526 Baldwin Street, St. Louis, Mo.
156	Western Dry Color Co	Fifty-second and Wallace Streets, Chicago, Ill.
157	Western Industries Co	110 Sutter Street, San Francisco, Calif. (Stege, Calif.)
158	White Chemical Co., The Wilbur	McMaster Street, Owego, N. Y.
159	White Tar Co. of New Jersey (Inc.)	1201 Koppers Building, Pittsburgh, Pa. (Kearny, N. J.; Cincinnati, Ohio.)
160	Wilhelm Co., The A	Third and Bern Streets, Reading, Pa.
161	Wolf-Alport Chemical Corporation	593 Irving Avenue, Brooklyn, N. Y.