UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 22

CENSUS OF DYES AND COAL-TAR CHEMICALS

1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

UNITED STATES TARIFF COMMISSION
WASHINGTON

Tariff Information Series—No. 22

CENSUS OF DYES AND COAL-TAR CHEMICALS

1919

WASHINGTON
GOVERNMENT PRINTING OFFICE
1921

UNITED STATES TARIFF COMMISSION.

Office: 1322 New York Avenue, Washington, D. C.

COMMISSIONERS.

THOMAS WALKER PAGE, *Chairman.*
DAVID J. LEWIS.
WILLIAM S. CULBERTSON.
EDWARD P. COSTIGAN.

JOHN F. BETHUNE, *Secretary.*

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
20 CENTS PER COPY

LETTER OF TRANSMITTAL.

UNITED STATES TARIFF COMMISSION,
Washington, December 6, 1920.

TO THE PRESIDENT:

The Tariff Commission transmits herewith a report showing the results of the census of production of dyes and related coal-tar chemicals for the year 1919. This census is taken in conformity with your letter of October 27, 1917, requesting the Tariff Commission to secure the information on the relation between the domestic production and the imports of dyes and other coal-tar chemicals, required by section 501 of the act of September 8, 1916.

Very respectfully,

THOMAS WALKER PAGE, *Chairman.*
DAVID J. LEWIS.
WILLIAM S. CULBERTSON.
EDWARD P. COSTIGAN.

THE PRESIDENT,
The White House, Washington.

UNITED STATES TARIFF COMMISSION.

Office: 1322 New York Avenue, Washington, D. C.

COMMISSIONERS.

THOMAS WALKER PAGE, *Chairman.*
DAVID J. LEWIS.
WILLIAM S. CULBERTSON.
EDWARD P. COSTIGAN.

JOHN F. BETHUNE, *Secretary.*

ADDITIONAL COPIES
OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.
AT
20 CENTS PER COPY

LETTER OF TRANSMITTAL.

UNITED STATES TARIFF COMMISSION,
Washington, December 6, 1920.

TO THE PRESIDENT:

The Tariff Commission transmits herewith a report showing the results of the census of production of dyes and related coal-tar chemicals for the year 1919. This census is taken in conformity with your letter of October 27, 1917, requesting the Tariff Commission to secure the information on the relation between the domestic production and the imports of dyes and other coal-tar chemicals, required by section 501 of the act of September 8, 1916.

Very respectfully,

THOMAS WALKER PAGE, *Chairman.*
DAVID J. LEWIS.
WILLIAM S. CULBERTSON.
EDWARD P. COSTIGAN.

THE PRESIDENT,
The White House, Washington.

INTRODUCTION.

This report is a survey of the domestic dye and coal-tar chemical industry in 1919, and presents the results of a special investigation made by the United States Tariff Commission. The report is divided into four parts, as follows:

PART I, *a summary of the developments in the coal-tar chemical industry, 1919*, describes the progress made in the various branches of the American industry. The relation of export trade to the industry is briefly shown.

PART II, *a census of dyes and coal-tar chemicals, 1919*, gives a detailed discussion of the significant facts in the production of crude, intermediate, and finished coal-tar products during 1919. Dyes are classified by their methods of application, and imports in 1914 are compared with production in 1917, 1918, and 1919. The number of employees, rates of pay, and cost of research in the coal-tar chemical industry are shown.

PART III, *a census of dyes imported into the United States from July 1, 1919, to June 30, 1920*, shows the quantity and value of imports of individual dyes.

PART IV, *an appendix*, gives the imports and exports of coal-tar dyes and chemicals and of natural dyes since 1917. A list of manufacturers whose production during 1919 was reported to the Tariff Commission is also shown.

In the preparation of this report the Tariff Commission has had the services of A. R. Willis, Warren N. Watson, C. R. De Long, and Grinnell Jones, of the chemical division, and others of the commission's staff.

CONTENTS.

Part I.—SUMMARY OF THE DEVELOPMENTS IN THE COAL-TAR CHEMICAL INDUSTRY DURING 1919.

INTRODUCTORY.

The Tariff Commission, in several earlier reports,[1] has described the importance of a well-developed dye industry to the industrial system of the country. These reports have also shown in detail the progress of the American industry during 1917 and 1918. The commission has also presented information relating to the cost of production of certain important intermediates and dyes. The commission[2] has analyzed the existing tariff law on dyes and related chemicals of coal-tar origin and on the raw materials from which these products are obtained and has made suggestions for such a redrafting of this law as would give effect to the intent of Congress in passing the act of September 8, 1916. The present report is, therefore, confined to a discussion of the progress which has been made in the American industry during the calendar year 1919. This report also presents the available information on the condition of the dye industries of Germany, England, Switzerland, France, and Japan.

The account of the progress of the industry, as given in the following pages, is based upon detail reports from 214 manufacturers, and, it is believed, that the canvas includes every manufacturer of dyes and other coal-tar chemicals in the United States. The investigation was carried out in conformity with a request of the President to secure information necessary to administer section 501 of the act of September 8, 1916. The production reports of individual manufacturers were collected by the Bureau of Census and transmitted to the Tariff Commission for tabulation and interpretation.

In the tariff act of September 8, 1916, the coal-tar chemicals are divided into three groups, which conform in general (although not in every detail) with commercial practice. Group I, the crudes, exempt from duty, which are contained in and separated from crude coal tar; Group II, intermediates, dutiable at 15 per cent and 2½

[1] Census of Dyes and Coal-Tar Chemicals, 1917; Report on Dyes and Related Coal-Tar Chemicals, 1918; Census of Dyes and Coal-Tar Chemicals, 1918; and Costs of Production in the Dye Industry, 1918 and 1919.

[2] Dyes and Other Coal-Tar Chemicals, Dec. 12, 1918.

cents per pound, which are produced from the crudes by chemical processes, and which, with some exceptions, are used only for the manufacture of dyes or other finished products by further chemical treatment; Group III, dyes and other finished products, now dutiable in part at 30 per cent and in part at 30 per cent and 5 cents per pound. This grouping is adhered to in the following discussion of the industry.

IMPORTANT DEVELOPMENTS IN THE DOMESTIC INDUSTRY.

The development in the production of coal-tar chemicals in this country during 1919 is shown by comparing the production of that year with the production during 1918.

TABLE 1.—*Summary of the production of coal-tar chemicals, 1918 and 1919.*

	1918			1919		
	Number of manufacturers.	Quantity.	Value.	Number of manufacturers.	Quantity.	Value.
		Pounds.			*Pounds.*	
Group I.—Crudes[1]	35	.....	$22,474,075	24	.....	$17,657,750
Group II.—Intermediates	128	357,662,251	124,382,892	116	177,362,426	63,210,079
Group III.—Finished products	.....	76,892,959	83,815,746	155	82,532,390	84,585,544
Dyes:						
Dutiable at 30 per cent plus 5 cents per pound	.....	53,825,677	58,255,391	.....	52,310,482	59,950,522
Dutiable at 30 per cent	.....	4,638,769	3,770,991	.....	11,091,712	7,648,333
Total of dyes	78	58,464,446	62,026,390	90	63,402,194	67,598,855
Color lakes, dutiable at 30 per cent plus 5 cents per pound	29	9,590,537	5,020,023	34	7,569,921	4,179,964
Photographic chemicals, dutiable at 30 per cent plus 5 cents per pound	6	316,749	823,915	10	335,509	1,059,340
Medicinals, dutiable at 30 per cent	31	3,623,352	7,792,984	31	6,777,988	7,883,071
Flavors, dutiable at 30 per cent	7	458,256	4,925,627	9	610,825	1,318,654
Synthetic phenolic resins, dutiable at 30 per cent plus 5 cents per pound	5	4,233,356	2,642,120	5	3,794,534	2,381,358
Tanning materials (synthetic)	1			1		
Perfume materials	6	116,263	584,695	6	41,419	164,302

[1] Production of coal-tar distillers does not include production of crudes at by-product coke ovens, which was reported to United States Geological Survey.

Crudes.—One of the outstanding developments during 1919 which is of significance in considering the future of the coal-tar chemical industry is the increase of 17.2 per cent in the productive capacity of by-product coke ovens in the United States. The production of coke in by-product ovens was 56.2 per cent of the total production, and thus for the first time exceeded the output of the wasteful beehive ovens. There is no question that, with the possible exception of anthracene, adequate supplies of fundamental raw materials are now available from domestic sources for the future growth

and expansion of the coal-tar chemical industry in the United States. In 1919 considerable progress was made as to supplies of anthracene, the output of this important material being about three times the production of 1918. Moreover, a larger proportion of it was refined. Although this shows encouraging progress, a much greater increase in output must be secured before there will be a sufficient supply of anthracene for alizarin and vat dyes. It may be roughly estimated that the 1919 production contained about one-fifth the amount of pure anthracene required for American needs. The difficulty in securing adequate supplies of anthracene is the most important and fundamental problem awaiting solution in the dye industry. Important work is under way which points to the solution of this problem in the near future. When a sufficient supply of anthracene is secured an adequate production of alizarin and vat dyes will soon follow.

The value of the crudes produced during 1919, as shown in Table 1, does not represent the total production in the United States, as those crudes produced at by-product coke ovens were reported to the United States Geological Survey and are not available at the present time. Complete information is therefore not at hand for an accurate analysis of the production of these raw materials in the United States during 1919.

Intermediates.—From Table 1, it is apparent that the total production of intermediates decreased from 357,662,251 pounds in 1918 to 177,362,426 pounds in 1919. This falling off was due to decreases in the output of certain intermediates which were used during 1918 in the manufacture of explosives and poison gases, or which were made during 1918 with the expectation of future military demands. The signing of the armistice left on hand large stocks of these intermediates and during 1919 they were diverted to the manufacture of dyes or other finished products. The most conspicuous example of this kind is phenol, which decreased from 106,794,277 pounds in 1918 to about 1,543,659 pounds in 1919. At the signing of the armistice about 35,000,000 pounds of phenol were on hand awaiting conversion into explosives. Other similar cases include benzene sulphonic acid, monochlorobenzene, dinitrotoluene, diphenylamine, nitronaphthalene, and dimethylaniline, all of which were used in substantial amounts in making military explosives as well as in dye making. If these intermediates are eliminated from consideration, those remaining show a gain of over 10 per cent in production in 1919 as compared with 1918. However, this gain in gross output does not measure the progress of this branch of the industry. Of much greater importance was the appearance of about 76 intermediates that were not made during 1918, and many substantial increases in the amount

produced of certain intermediates which are comparatively difficult to make, but which are needed for dyes of high quality.

Dyes.—During 1919 the total output of dyes was 63,402,194 pounds, valued at $67,598,855, an increase of about 8 per cent in quantity as compared with 1918. The production in 1919 exceeded by 38 per cent in quantity the imports during the fiscal year 1914. The increase in total output by no means measures the whole improvement in the situation. An analysis of the figures for 1919 shows many instances of substantial decrease in those dyes which are relatively easy to make and also of those needed in large amounts during 1918 for Army and Navy uniforms. Decreased output of these particular dyes has been more than offset by the increased output of dyes of better quality, many of which were made for the first time in the United States during 1919.

The domestic industry has been especially successful in the production of those colors for which there exists a large and constant demand. Sulphur black, which is consumed in the United States in larger amounts than any other color, was produced to the extent of 14,504,770 pounds by 13 manufacturers. Some of the American brands are superior in quality to the best products imported from Germany before the war. Another notable achievement was the production during 1919 of indigo in amounts exceeding our prewar import. This dye, which ranks second in consumption by the United States, ranks first in world consumption on account of its large use in China.

As has been pointed out in earlier reports of the commission, during 1915 and 1916 the new American dye industry naturally sought the line of least resistance by making the dyes which were easiest to make, and the consumers used whatever dyes they could get instead of the varieties they preferred. As a result there were many cases of enforced substitutions of both German dyes (available from stocks) and American dyes. This substitution in early years of the war materially damaged the reputation of American dyes. During the succeeding years there has been a steady and progressive improvement in the situation. Although consumers were better supplied with the particular dyes they desired in 1919 than they were in 1918, there were still needed certain types of dyes which could not be supplied from American sources in the quantity desired. Thus in 1919 there was an insufficient domestic output of vat dyes which, on account of their extreme fastness and beauty of shade, are important for cotton shirtings, ginghams, and calicos. Considerable progress has been made, however, toward supplying these much-needed colors. There is also a demand for many individual dyes of other classes which are not yet available at all or only in inadequate amounts.

This is particularly true of alizarin derivatives and of certain other specialties.

Export trade in dyes.—The domestic production of *certain* dyes has developed to a point beyond the quantity necessary for domestic consumption, and a large surplus has been available for export to foreign markets, particularly Japan and China. During the calendar year 1919 the United States exported "dyes and dyestuffs" to the value of $17,084,435, of which $10,724,071 represented aniline dyes, $1,355,936 logwood extract, and $5,004,428 other dyes. For the nine months ending September 30, 1920, the domestic exports of dyes and dyestuffs amounted to $26,032,389, of which $17,038,235 was aniline dyes, $2,321,090 was logwood extracts, and $6,673,064 was other dyes. This sum for the nine months of 1920 is more than double the exports during the same period in 1919 and also exceeds the value of total imports during the fiscal year 1914. The actual quantity exported, however, is smaller than the prewar import, and the increase in value is due to a higher value per pound. During 1919 and 1920 (nine months) Japan and China took about one-third of our total exports of dyes.

In estimating the significance of this achievement of the domestic industry in the exportation of dyes it should be remembered that domestic manufacturers during 1919 and 1920 have met little competition in foreign markets from German dyes. It should also be pointed out that any deductions as to the competitive strength of the domestic industry which are based on exports of dyes do not take into consideration the fact that the domestic industry is still deficient in the important group of vat and alizarin dyes.

The coal-tar dyes exported include sulphur dyes, chiefly blacks and browns; direct cotton dyes, chiefly blacks, greens, blues, and reds; indigo (synthetic); acid dyes, chiefly scarlets and oranges; and basic dyes, chiefly malachite green, methyl violet, and magenta. The export trade in dyes is an important factor in producing dyes at a low cost to the domestic consumer. Germany, in order to minimize her costs of production, made every effort to develop and dominate foreign markets.

Part II.—CENSUS OF DYES AND COAL-TAR CHEMICALS, 1919.

CRUDES.

Introductory.—The production of coal-tar crudes by distillers of coal tar, crude light oils, and drip and holder oils is shown in Table 2. Those firms engaged primarily in the operation of coke ovens and gas houses, and operating distilleries for the production of crudes, reported their output to the Geological Survey. Unfortunately the production of crudes by these firms has not yet been tabulated, and complete figures on the production of coal-tar crudes during 1919 are therefore not available. It should be remembered that the figures for individual commodities in Table 2 represent only a part (in some cases a small fraction) of the total quantity of crudes available to the dye industry in 1919. These figures must be considered in connection with those for crudes at by-product coke ovens and gas houses, to be published at a later date by the United States Geological Survey.

There are, however, available facts showing that there exists, so far as crude materials are concerned (anthracene excepted), an adequate supply for the future growth and development of the coal-tar chemical industry in the United States. For example, the Geological Survey has reported that the productive capacity of the by-product coke ovens during 1919 increased 17.2 per cent over that of 1918. During the war the military demand for the by-products of coal distillation, especially toluene and ammonia, caused the War Industries Board and the War Department to aid in the erection of by-product coke ovens. The completion of many of these ovens during 1919 is responsible for this increase in productive capacity.

During 1919 the output of coke decreased sharply as compared with 1918 because of strikes in the steel and coal industries. But the reduction was almost entirely accounted for by the output of the wasteful beehive ovens. The production of coke in by-product ovens in 1919 was only 3.2 per cent less than in 1918. As a result the out-

put of coke from by-product ovens exceeded for the first time that of the beehive ovens, which do not recover the valuable by-products.[1] It would appear, therefore, that there was only a slight decrease in the quantity of coal tar available during 1919. Transportation difficulties interfered with shipments of coal tar to distillers. This is reflected by decreases in output as shown in Table 3. Shortage of coal due to strikes in coal mines also caused considerable quantities of tar to be burned as fuel. These factors resulted in less tar being distilled. In general the conclusion may be drawn that there was a reduction in the output of crudes in 1919.

TABLE 2.—*Production of coal-tar crudes during 1919, 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. 94. 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. Blanks in the third and fourth columns indicate that there was actual production of the corresponding article but that the figures can not be published without revealing the output of individual firms.]

Name.	Manufacturers' identification No.	1919		
		Quantity.	Value.	Value per unit.
Total crudes [a]			$17,657,750	
Benzene.....gallons..	15, 16, 41, 53, 110, x, x.	1,826,373	560,547	$0.31
Toluene.....do....	15, 16, 53.	510,957	235,321	.46
Xylene.....do....	15, 53.			
Naphthalene, crude.....pounds..	12, 15, 16, 28, 91, 97, 115, 136, x.	12,612,203	327,201	.03
Anthracene, less than 25 per cent pure .	15, 136.			
Carbazol	x.			
Cresol	15, 30.			
Pyridine	15, 111.			
Solvent naphtha	15, 53, 136, x.	266,013	78,817	.30
Dead or creosote oil.....gallons..	12, 15, 16, 28, 30, 46, 53, 67, 83, 91, 97, 110, 115, 129, 136, 164, x, x, x.	43,434,059	4,264,594	.10
Anthracene oil	91, 136, x.			
Pitch of tar.....short tons..	15, 16, 25, 28, 30, 46, 53, 67, 83, 97, 110, 115, 129, 136, 170, x, x, x.	283,066	3,619,339	12.79
Other distillates.....gallons..	15, 16, 25, 28, 41, 46, 83, 97, 115, 136, 164, x.	6,867,001	1,461,500	.21
Refined tar.....barrels..	15, 25, 28, 30, 53, 83, 97, 115, 136, x, x, x.	1,384,047	6,540,778	4.73

[a] The instructions sent to manufacturers were as follows:
Include under "dead or creosote oil" only products which may be used for creosoting. Include under "other distillates" shingle stain oils, disinfectant oils, and flotation oils which do not contain over 5 per cent of phenol. Include under "refined tars" those tars which are used for road treatment, saturating felt, and for protective coatings.
Phenol and all distillates which, on being subjected to distillation, yield in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate, are not to be included here but are to be placed in Group II.
Cresol, for the purpose of the schedule, is defined as a distillate, containing not more than 5 per cent of phenol and at least 50 per cent of the isomeric cresols.

[1] The following table shows the fraction of the United States output of coke produced in by-product ovens, as compiled by the Geological Survey:

1890	0	1916	35.0
1900	5.3	1917	38.6
1905	10.7	1918	46.0
1910	17.1	1919	56.2
1915	33.8		

TABLE 3.—*Comparison of production of coal-tar crudes, 1918 and 1919, by firms not primarily engaged in the operation of coke-oven plants and gas houses.*

Name.	1918			1919		
	Quantity.	Value.	Value per unit.	Quantity.	Value.	Value per unit.
Total crudes		$22,474,075			$17,657,750	
Benzene, gallons	3,015,848	994,161	$0.33	1,826,373	560,547	$0.31
Toluene, gallons	1,596,353	3,044,880	1.91	510,957	235,321	.46
Naphthalene, crude, pounds	40,138,092	1,281,440	.03	12,612,203	327,201	.03
Solvent naphtha, gallons	772,489	164,068	.21	266,013	78,817	.30
Dead or creosote oil, gallons	44,712,012	4,428,046	.10	43,434,059	4,264,594	.10
Pitch of tar, short tons	356,612	3,966,341	11.12	283,066	3,619,339	12.79
Other distillates, gallons	7,034,204	1,460,363	.21	6,867,001	1,461,560	.21
Refined tar, barrels	1,398,049	6,227,748	4.45	1,384,047	6,540,778	4.73

Shortage of naphthalene.—The output of crude naphthalene by tar distillers during 1919 was 12,612,203 pounds valued at $327,201, as compared with 40,138,092 pounds valued at $1,281,440 in 1918 by the same group of manufacturers. (These figures are not total output, as previously explained.) This large reduction in output by tar distillers was due to several causes, among which was the decreased distillation of tar. At the time of the signing of the armistice there were on hand large stocks of crude naphthalene which had accumulated as a by-product in the effort to secure maximum supplies of toluene for making explosives. As a consequence, producers of crude naphthalene expected an oversupply and therefore diminished their production by leaving considerable naphthalene in the creosote oil, thereby increasing the yield of creosote oil then in great demand. When export restrictions on dyes were removed there developed an unexpectedly large export demand for dyes and intermediates made from naphthalene. This quickly exhausted the accumulated stocks and resulted in an acute shortage of naphthalene toward the end of 1919 and in the early part of 1920. Imports of crude naphthalene from England during 1919 were not as large as was anticipated, owing to English export restrictions and transportation difficulties. During the first nine months of 1920, however, imports of naphthalene amounted to nearly 11,000,000 pounds.

The anthracene situation.—Considerable progress was made during 1919 in the production of anthracene, but the problem of securing adequate supplies is still unsolved. In 1918 the actual anthracene contained in the crude anthracene produced was about a quarter of a million pounds, but very little of the crude product was refined. In 1919 the output of actual anthracene was about three times the 1918 production, and a much larger fraction of it was refined than in 1918. Notwithstanding this encouraging progress a much greater increase in output must be secured before there will be enough

anthracene available from domestic sources to supply the demand for alizarin and vat dyes which are so important to a well-developed industry. It may be roughly estimated that the 1919 production of crude anthracene contained less than one-fifth of the amount of anthracene required for domestic needs. The fundamental difficulty is not primarily an actual lack of anthracene in the tar, nor are there purely technical difficulties in its recovery, but rather the fact that its removal leaves the pitch so hard that it does not find a ready market in this country. Any method of recovering anthracene which seriously disturbs the marketing of the other larger fractions of the tar, especially the pitch, would make the anthracene so expensive that the dyes derived therefrom could not be made on a competitive basis. In England and Germany large amounts of hard pitch were used for the briquetting of coal dust and coke breeze, but this industry is little developed in the United States. England shipped considerable amounts of crude anthracene to Germany before the war.

The securing of supplies of anthracene adequate in amount and at a cost which is not prohibitive is perhaps the greatest difficulty confronting the industry. Whether the problem will be solved by the tar distillers or by the development of a synthetic process for making anthraquinone (the most important intermediate made from anthracene) from raw materials now available in adequate quantity can not be determined at the present time. Active work along both lines is well under way and important progress has been made during 1920.

Production of carbazol was reported in 1919 by one firm. It is obtained as a joint product in the separation of anthracene from coal tar. The development of a demand for carbazol would facilitate an increase in the production of anthracene from coal tar.

INTERMEDIATES.

Introductory.—The production of intermediates in the United States during 1919 is shown in Table 4 in as great detail as possible without revealing the output of individual manufacturers. During 1919 there was produced a total of 177,362,426 pounds of intermediates, valued at $63,210,079—a decrease of about 50 per cent from the output in 1918 of 357,662,251 pounds, valued at $124,382,892. Notwithstanding this large decrease in quantity the number of individual intermediates produced in 1919 was 216, as compared with 140 in 1918. The 1919 output, with the exception of many of the anthracene derivatives which are still not produced, more nearly represents domestic requirements under peace-time conditions. In addition to these intermediates, there were produced on a laboratory scale 119 intermediates or organic coal-tar chemicals for research and

experimental purposes. These totaled 2,291 pounds and were valued at $23,333, as compared with an output in 1918 of 645 pounds, valued at $7,843.

Intermediates used for military purposes.—The decrease in quantity of intermediates can be traced directly to the cessation of military requirements. There was a marked decrease in those intermediates used in making explosives and in those required for dyes for military uniforms. If the intermediates used mainly for explosives be eliminated from consideration, the remaining ones show an increase in output of about 10 per cent during 1919 as against the corresponding intermediates in 1918. The most striking example of a decrease in intermediates used for explosives is phenol.

The enormous output of phenol (106,794,277 pounds) in 1918, made almost entirely in synthetic phenol plants, left large stocks of this product on hand when the armistice was signed. Consequently, the price of phenol declined sharply—from about 45 cents per pound to 6 cents—but soon rose again to about 15 cents per pound. The surplus stock of Government phenol on hand at the signing of the armistice, about 35,000,000 pounds, represented nearly three times the normal annual consumption. The Monsanto Chemical Co., of St. Louis, Mo., was made the agent of the War Department for its sale. The synthetic phenol plants responsible for the huge output shut down promptly after the signing of the armistice, and many of them were later entirely dismantled. It is probable, however, that the present and future consumption of phenol will be in excess of the output of natural phenol obtained by separation from coal-tar distillates, and that when the surplus stocks have been consumed some of the synthetic plants will necessarily resume production.

Other intermediates used both for war purposes and for dye manufacture which showed a striking decrease in 1919 include monochlorobenzene, with a decrease of 80 per cent; nitronaphthalene, 36 per cent; dimethylaniline, 16.5 per cent; diphenylamine, and dinitrotoluene. It is probable that the production of all of these in 1919 was below the amount used during the year for dye making, and that stocks on hand November 11, 1918, and intended for military uses were diverted to the dye industry. It may therefore be assumed that the production of these intermediates during 1919 was somewhat less than actual requirements.

Intermediates required in the manufacture of dyes used for military uniforms also showed a decrease corresponding to the decreased output of such dyes. Among these may be mentioned: m-dinitrobenzene and m-nitraniline which are used in Alizarin Yellow GG and R—dyes used on wool cloths for army uniforms—and m-toluylenediamine, used for sulphur browns on cotton cloths for khaki uniforms.

Intermediates consumed in large quantity.—As a rule the intermediates for which there is the largest normal consumption and the manufacture of which had been well established by 1918, showed comparatively little change during 1919. Examples of these are nitrobenzene, aniline, paranitraniline, and betanaphthol. On the other hand, there are also many examples of a large increase in the production of intermediates difficult to make but which are required for dyes of the best quality. A good example of this kind is amidonaphthol sulphonic acid 2:8:6 (gamma acid). This was made in 1918 by a single firm, but in 1919 by five firms, with a combined output of 155,025 pounds, valued at $667,360, which is many times the 1918 output. These five firms used gamma acid to make nearly a half million pounds of Oxamine Black—an important direct black which can be developed on the fiber. Moreover, gamma acid is also required for other important direct cotton dyes of a fast type, and in the manufacture of Zambesi Black, a very important dye for union hosiery.

Toluene derivatives.—There was a notable increase in output and a marked decrease in price of those intermediates derived from toluene. Benzoic acid, U. S. P., for example, increased in output from 172,896 pounds in 1918 to 699,108 pounds in 1919, and the price dropped from $3.07 to $0.77 per pound. Orthotoluidine and paratoluidine, important intermediates, doubled in output with about a 50 per cent reduction in value. The general increase in output of toluene derivatives and the decrease in value are due to removal of war-time restrictions on toluene and the lessened demand for it.

Intermediates derived from anthracene.—During 1919 the actual anthracene content of the anthracene produced amounted to 813,318 pounds, or over three times the output in 1918. In 1919 three firms, as against only one firm in 1918, reported a production of refined anthracene of more than 80 per cent purity suitable for the manufacture of vat and alizarin dyes. The total quantity of refined anthracene produced was several times the output of the previous year. It may be roughly estimated that over 4,000,000 pounds of pure anthracene would be required to manufacture alizarin and vat dyes to the amount of the average annual import from 1912 to 1914, inclusive.

The progress among the anthracene derivatives is of especial interest. Here, unfortunately, definite figures can not be given without revealing the production of individual firms. In 1919 there were 10 intermediates produced from anthracene, as against only 5 in 1918. The output of anthraquinone, which is the most important because it serves as the raw material for the manufacture of nearly all other intermediates derived from anthracene, was about ten times as great in 1919 as in 1918. Recent information indicates that several firms

are experimenting on the production of anthraquinone synthetically from benzene and phthalic anhydride. One firm is now (December, 1920) known to be manufacturing synthetic anthraquinone in commercial quantities. The production of anthraquinone in adequate quantity either from natural anthracene or synthetically from other coal-tar materials already available will mean much to the future development of a well-rounded and permanent dye industry in the United States.

TABLE 4.—*Production of intermediates during 1919.*

[The intermediates are arranged in this table according to chemical structure. They are listed under the following five classes: Benzene compounds; toluene compounds; xylene compounds; naphthalene compounds; and anthracene compounds. Each class of compounds is further divided into 10 numbered subclasses, based on the following arbitrary order: (1) Halogen, (2) nitro, (3) amino, (4) sulphonic acid, (5) hydroxyl, (6) alcohols, (7) aldehydes, (8) carboxylic acids, (9) ketones, and (10) all others. If a compound contains two or more radicals, it is arbitrarily classed under the subclass of the highest numerical order. For example, the compound nitrophenolsulphonic acid is listed under the benzene compounds, subclass (5), hydroxyl, since the hydroxyl radical is of higher numerical order than the (2) nitro and (4) sulphonic radicals.

The numbers in the second column refer to the numbered alphabetical list of manufacturers printed on p. 94. An x signifies that the corresponding intermediates were made by a manufacturer who did not consent to the publication of his name in connection therewith. Blanks in the third and fourth columns indicate that there was actual production of the corresponding intermediates in the United States during 1919, but that the figures can not be published without revealing information in regard to the output of individual firms. The details thus concealed are, however, included in the totals. Reports have been received from all firms known to be manufacturers.]

Common name.	Manufacturers' identification numbers according to list on page 94.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
		Pounds.		
Total intermediates		177,362,426	$63,210,079	$0.36
BENZENE COMPOUNDS.				
Halogen:				
Chlorobenzene (mono)	53, 64, 76, 92, 118, 132, 151	4,116,666	623,875	.15
p-Dichlorobenzene	76, 118, 132	130,864	8,746	.07
Bromobenzene (mono)	52			
Nitro:				
Nitrobenzene (oil of myrbane)	16, 24, 27, 53, 64, 104, 112, 113, 116, 151, x, x, x, x.	42,544,017	5,899,837	.14
Nitrochlorobenzene (ortho and para)	13, 53, 109, 112, 136, x	2,520,991	739,117	.29
p-Dichloronitrobenzene	116			
Dinitrobenzene	23, 21, 53, 66, 112, 116, 156, x	2,280,282	548,302	.24
Dinitrochlorobenzene	13, 53, 64, 92, 109, 151, 166	4,428,730	907,794	.21
Amino:				
Aniline oil	16, 24, 27, 53, 64, 66, 104, 109, 112, 113, 151, x, x, x.	24,345,786	5,932,536	.24
Aniline salt (and sulphate)	21, 27, 66, 112, 113	1,446,909	359,296	.25
Aniline for red	112			
Dimethylaniline	24, 53, 112	3,559,654	1,941,152	.55
Ethylaniline (mono)	31, 53, 112	195,161	305,526	1.57
Diethylaniline	31, 74, 143	30,000	26,500	.88
Ethylbenzylaniline	31, 53, 112			
Dibenzylaniline	112			
Nitrosodimethylaniline	8, 40, 53, 64, 66, 68, 92, 112, x	592,663	364,091	.61
Acetanilide, technical	23, 31, 53, 64, 109, 112, 116, 136, x, x.	1,934,125	797,151	.41
p-Nitroacetanilide	23, 116, 136, x	669,658	484,666	.69
Ethylacetanilide	112			
Galbanilide	112			
p-Chloroaniline	x			
Dichloroaniline	116			
m-Nitraniline	53, 156, x	68,600	104,322	1.52
p-Nitraniline and sulphate	23, 53, 92, 112, 116, 136, x, x	1,310,658	1,388,627	1.06
m-Phenylenediamine	5, 8, 23, 53, 58, 64, 69, 112, 116, 156, x, x.	609,789	617,379	1.01
p-Phenylenediamine	16, 64, 112, 136, 146, 171, x, x	234,332	568,396	2.43
Acet-p-phenylenediamine	23, 112, 116, 136, x	62,567	103,750	1.66
Diphenylamine	112, x			
Phenazine	92			
Phenylglycine, sodium salt	112			

TABLE 4.—*Production of intermediates during 1919*—Continued.

Common name.	Manufacturers' identification numbers according to list on page 94.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
BENZENE COMPOUNDS—Con.				
Sulphonic acid:		*Pounds.*		
Sulphanilic acid	24, 27, 53, 66, 69, 92, 101, 112, 156, x, x.	1,023,861	$243,656	$0.24
Metanilic acid	53, 54, 64, 112, x	453,137	266,172	.59
o-Chlorometanilic acid	136			
p-Chlorometanilic acid	136			
Nitrobenzenesulphonic acid	136			
Ethylbenzylaniline sulphonic acid	31			
Ethylbenzylanilinedisulphonic acid	116			
Dinitrophenol sulphonic acid	23			
Dinitrochlorobenzene sulphonic acid	23			
Amino-azo-benzene and sulphonate.	27, 54, 69, 92, 112, x	82,755	59,847	.72
Hydroxyl:				
Phenol (U. S. P. and tech.)	15, 24, 30, 41, 101, 134	1,543,659	155,624	.10
Nitrophenol	116			
o-Nitrophenol	8, 23, 116, 156	18,373	16,497	.90
p-Nitrophenol	8, 13, 23, 53, 66, 109, 116, 151, 156	76,191	76,464	1.00
Nitro sodium phenolate	53, 57			
Dinitrophenol, and sodium salt	13, 53, 64, 112	230,771	65,050	.28
Nitroaminophenol 1:2:4	64			
Indophenol	13, 45, 92, 112, x	130,001	131,229	1.01
o-Nitroanisol	112, 116, x			
o-Anisidin	116			
o-Amidophenol	8, 112			
Diethyl m-amidophenol	53			
p-Amidophenol and sulphate	16, 19, 24, 53, 57, 64, 89, 92, 104, 145, x.	128,627	282,970	2.20
o-Amidophenol p-sulphonic acid	23, 112			
Nitroamidophenol sulphonic acid	23			
Diamidophenol	163			
Nitrosophenol	13, 40, 45, 92, 112, 116, x	155,273	82,833	.54
Nitrophenetol (ortho and para)	53			
p-Phenetidin	109			
Picric acid	23			
Ammonium picrate	23			
Picramic acid	23, 24, 53, 112, x	150,458	130,388	.87
Resorcin (tech. and U. S. P.)	66, 112, x	96,397	402,491	4.20
Alcohols:				
Benzyl alcohol	61, 65, 66, 141, 155, x, x	15,678	33,770	2.15
Aldehydes:				
Benzaldehyde	20, 24, 31, 37, 53, 61, 65, 134, 141, 155, x, x.	518,634	403,109	.78
Chlorobenzaldehyde	112			
Nitrobenzaldehyde	112			
Carboxylic acids:				
Benzoic, tech	53, 61, 65, 135, 155	21,212	46,554	2.19
Benzoic, U. S. P	20, 53, 77, 134, 135, 141, x	699,108	534,832	.77
Ammonium benzoate	51			
Sodium benzoate	20, 76, 77, 135, x, x	610,150	536,194	.88
Nitrobenzoic acid	x			
o-Amido benzoic (anthranilic)	109, 136, 150, 168, x, x	22,976	98,602	4.29
Acet. anthranilic acid	136			
Salicylic, tech	23, 24, 53, 104, 109, 134, x, x, x.	3,467,055	1,009,462	.29
Salicylic, U. S. P	20, 24, 44, 52, 53, 104, 109, x, x, x.	2,619,726	918,832	.35
Amidosalicylic acid	24, 92, 112	37,769	44,144	1.17
Cinnamic acid	61, 141, x	2,502	10,305	4.12
Ethyl p-aminobenzoate (not medicinal).	x			
o-Sulphobenzoic and ammonium salt.	81			
Chloride of o-sulphobenzoic acid	81			
Ketones:				
Tetramethyldiaminobenzophenone (Michler's ketone).	23, 53, 64	281,057	488,553	1.74
Diphenyls:				
Benzidin base	5, 23, 31, 53, 66, 112, 116, x	1,084,922	1,370,393	1.26
Benzidin sulphate	3, 23, 31, 53, 112, x, x	234,707	221,283	.96
o-Nitrobenzidin and sulphate	68, 116			
Dinitrooxydiphenylamine	116			
Dianisidin	53, 112, 116	107,441	488,114	4.54
Diphenylmethane	112			
Other benzene compounds:				
Thiocarbanilide	112, 113, 134, x, x, x	2,268,375	802,575	.35
Arsanilic acid	103			
Oxarylphenylarsenic acid	47, 103, x	6,944	117,288	16.89
Nitrophenolarsenic acid	47, 103, x	3,341	147,023	44.01

TABLE 4.—*Production of intermediates during 1919*—Continued.

Common name.	Manufacturers' identification numbers according to list on page 94.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
TOLUENE COMPOUNDS.				
		Pounds.		
Halogen:				
Chlorotoluene	112			
Benzylchloride	20, 23, 31, 61, 65, 134, 141, 155	720,953	$166,182	$0.23
Benzalchloride	61, 65, 141, x			
Benzoylchloride	61, 65			
Nitro:				
Nitrotoluene	31, 53, 54, 62, 112, 116, 147, x, x	6,211,775	1,019,522	.17
o-Nitrotoluene	53, 112, 116, x	1,360,599	312,416	.23
m-Nitrotoluene	53, 69			
p-Nitrotoluene	31, 53, 62, 112, 116, 147, x	1,263,056	704,750	.56
Dinitrotoluene	31, 53, 54, 64, 69, 112, 116, x	746,266	264,388	.35
Chloronitrotoluene	x			
Amino:				
Toluidine	31, 53, 112, 147, x, x	806,210	309,894	.38
o-Toluidine	53, 66, 112, 116, 147, x	1,002,982	503,020	.50
p-Toluidine	53, 62, 66, 112, 116, 147, x	575,841	600,267	1.04
Methylorthotoluidine	92			
o-Chlor p-toluidine	x			
o-Acetotoluidine	136			
p-Acetotoluidine	136, x			
o and p-Nitrotoluidine	147, x			
m-Nitroparatoluidine	53, 136, x, x	58,454	210,307	3.60
m-Tolylenediamine	31, 53, 54, 61, 69, 112, 116	439,544	504,063	1.15
Tolidine	53, 66, 112, 116, x	143,012	264,861	1.86
Tolidine sulphate	116			
Sulphonic acid:				
o-Chlorotoluene sodium sulphonate	109			
p-Nitrotoluene sulphonic acid	53, 112, x	32,338	29,464	.91
o-Toluidine sulphonic acid	69			
p-Toluidine sulphonic acid	1, x			
o-Chloro p-toluidine m-disulphonic acid.	x			
Toluylenediamine sulphonic acid	112			
o-Toluene sulphochloride	26, 109			
p-Toluene sulphochloride	26, 109, x	58,932	6,148	.10
o-Toluene sulphamide	26, 109, x			
p-Toluene sulphamide	26, 109			
Hydroxyl:				
Refined cresol	116			
Creosote oil (containing more than 5 per cent tar acids).	x			
Stilbenes:				
Dinitrostilbene disulphonic	112			
Diamidostilbene disulphonic acid	112, x, x	5,021	19,082	3.80
Other toluene compounds:				
Amino-azo-toluol	64, 69, x	4,836	7,871	1.63
Hydrazotoluol	112			
Dehydrothio-para-toluidine sulphonic acid.	18, 54, x, x			
XYLENE COMPOUNDS.				
Nitroxylol	27, 112, x, x	293,249	53,449	.18
Xylidine	5, 24, 27, 53, 112, 147, x, x	386,635	206,797	.53
Xylidine salts	24, x			
Dehydrothio m-xylidine base	68, x			
Cumidine	112, x			
NAPHTHALENE COMPOUNDS.				
Naphthalene, solidifying 79° C. or above (refined, flake).	15, 30, 53, 91, 97, 134, 164	17,625,235	1,160,815	.07
Halogen:				
Chloronaphthalene	39			
Nitro:				
Nitronaphthalene	15, 53, 116, x	2,771,516	368,500	.13
Dinitronaphthalene	112			
Amino:				
a-Naphthylamine	15, 53, 116, x	1,552,828	632,587	.41
Phenylalphanaphthylamine	23, 53			
b-Naphthylamine, crude	53, 124, x	99,597	167,590	1.68
Ethylbetanaphthylamine	x			

TABLE 4.—*Production of intermediates during 1919*—Continued.

Common name.	Manufacturers' identification numbers according to list on page 94.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
NAPTHALENE COMPOUNDS—Continued.				
Sulphonic acid:		*Pounds.*		
(*a*) Naphthalene disulphonic acid 2:7.	136, x			
Naphthalene trisulphonic acid 1:3:6.	136			
(*b*) Sulpho (alpha) amino compounds—				
Naphthylamine sulphone 1:2	x			
Naphthylamine sulphonic 1:4 (naphthionic acid).	3, 24, 27, 43, 53, 69, 92, 112, 116, x, x, x.	2,008,189	$1,235,742	$0.62
Naphthylamine sulphonic 1:5 (Laurent's acid).	53, 112			
Naphthylamine sulphonic 1:6	53, 112			
Naphthylamine sulphonic 1:8	53, 112			
Phenylnaphthylamine sulphonic 1:8.	53, 112			
Tolylnaphthylamine sulphonic 1:8.	112			
Naphthylamine disulphonic 1:3:6.	116			
Naphthylamine disulphonic 1:3:8.	116			
Naphthylamine disulphonic 1:4:8.	112, 116			
Naphthylamine trisulphonic 1:3:6:8.	64, 112, 116	1,418,760	887,005	.61
(*c*) Sulpho (beta) amino compounds—				
Naphthylamine sulphonic 2:1	124, 136, x	84,260	174,420	.21
Naphthylamine sulphonic 2:6 (Bronner's acid).	136, x			
Naphthylamine sulphonic 2:8	x			
Naphthylamine disulphonic 2:4:8.	116			
Naphthylamine disulphonic 2:5:7.	112			
Naphthylamine disulphonic 2:6:8.	112, 116			
Hydroxyl:				
Alpha naphthol compounds—				
a-Naphthol	66, 77, 112, x	135,025	136,833	1.01
Alpha naphthol sulphonic acids—				
Naphthol sulphonic 1:4 (Neville & Winthers).	3, 24, 27, 53, 92, 112, 116, x	344,449	629,857	1.83
Naphthol sulphonic 1:5	112			
Naphthol disulphonic 1:3:6.	116, 136			
Naphthol disulphonic 1:4:8.	116			
Naphthol trisulphonic 1:3:6:8.	112, x			
Beta naphthol compounds—				
b-Naphthol, tech	2, 24, 27, 69, 112, 124, 136, 169, x, x, x.	4,835,778	2,395,834	.49
b-Naphthol, U. S. P	24, 121, x	30,638	24,050	.79
Nitroso beta naphthol	40 136			
Beta naphthol sulphonic acids—				
Naphthol sulphonic 2:1	x			
Naphthol sulphonic 2:6 (Schaeffer's acid).	5, 54, 112, 136, x	146,111	102,975	.70
Naphthol sulphonic 2:7 (monosulphonic acid F).	136, x			
Naphthol sulphonic 2:8	x, x			
Naphthol disulphonic 2:3:6 (R acid).	3, 5, 21, 27, 53, 92, 112, 116, 136, x, x, x, x.	1,008,007	721,341	.72
Naphthol disulphonic 2:5:7.	112			
Naphthol disulphonic 2:6:8 (G acid).	3, 5, 24, 27, 92, 112, 116, 136, x, x.	732,198	602,949	.82
Naphthol disulphonic 2:3:6 and 2:6:8 (R and G salt).	136, x			
Naphthol trisulphonic 2:3:6:8.	27			
Dihydroxyl:				
Dioxynaphthalene 1:5	112			
Dihydroxy naphthalene disulphonic acid 1:8:3:6 (chromotrope acid).	5, 112, 116	164,654	380,344	2.31

TABLE 4.—*Production of intermediates during 1919*—Continued.

Common name.	Manufacturers' identification numbers according to list on page 91.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
NAPHTHALENE COMPOUNDS—Continued.				
Other naphthols:		*Pounds.*		
Amidonaphthol sulphonic acid 1:2:4.	23, 27, 53, 54, 64, 92, 112, 136, 152, x, x, x.	837,384	$808,894	$0.97
Amidonaphthol sulphonic acid 2:8:6 (gamma acid).	5, 53, 92, 112, 116	155,025	667,369	4.30
Amidonaphthol disulphonic acid 1:8:2:4 (Chicago acid).	53, 116			
Amidonaphthol disulphonic acid 1:8:3:6 (H acid).	53, 64, 105, 108, 112, 116, 152, 169, x, x, x.	3,837,534	5,081,469	1.32
Chloronaphthol disulphonic acid 1:8:3:6 (chlor H acid).	112			
Diazonaphthol sulphonic acid 1:2:4.	23, 92, 112	419,349	417,815	1.00
Nitrodiazo naphthol sulphonic acid 8:1:2:4.	23			
Carboxylic acids:				
Hydroxy naphthoic acid 2-3	x			
Other naphthalene compounds:				
Phthalic anhydride	23, 66, 109, 162, 168, x	290,677	290,637	.99
Phthalamide	150, x			
o-Cresolphthalein	81			
o-Cresolsulphophthalein	81			
Dibromcresolsulphophthalein	81			
Dibromsulphophthalein	81			
Tetrabromphenolsulphophthalein	81			
Thymolsulphophthalein	81			
ANTHRACENE COMPOUNDS.				
Anthracene, purity of 25 per cent or more.	11, 15, 91, 112, x	1,381,944	238,977	.22
Anthraquinones:				
Anthraquinone	2, 11, 53, 112	294,260	547,787	1.86
Dinitroanthraquinone	112			
Betaaminoanthraquinone	53			
Anthraquinone 2 sodium sulphonate (silver salt).	53, 112			
Anthraquinonedisulphonate 1:5	112			
Anthraquinone disulphonic acid 2:7	112			
Dihydroxy anthraquinone 1:5 anthrarufin.	112			
Nitrosulfoanthrarufin	112			
Benzanthrone	53			
Chlorobenzanthrone	53			
CARBAZOL COMPOUNDS.				
Carbazol, purity of 25 per cent or more	15, 53			
All other intermediates	23, 112, 116, x, x			

CHEMICALS FOR SALE FOR RESEARCH AND EXPERIMENTAL PURPOSES.

Total		*Pounds.* 2,291	$23,333	$10.18
BENZENE COMPOUNDS.				
Halogen:				
Iodobenzene	57, 153			
o-Dichlorobenzene	57			
Amino and related derivatives:				
Aniline redistilled	x			
p-Bromoaniline	57			
p-Chloroaniline	57–153			
o-Chloroaniline	153			
p-Bromoaniline hydrochloride	57			
Dichloroaniline 2:4	57			
Methylaniline	57			
p-Bromoacetanilide	57			
Methylacetanilide	57			
p-Nitroethylacetanilide	57			
p-Aminodimethylaniline hydrochloride	57			
Benzylamine	153			
Phenylhydrazine	57–68–x			

TABLE 4.—*Production of intermediates during 1919*—Continued.

CHEMICALS FOR SALE FOR RESEARCH AND EXPERIMENTAL PURPOSES—Con.

Common name	Manufacturers' identification numbers according to list on page 94.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
BENZENE COMPOUNDS—Con.				
Amino and related derivatives—Con.		*Pounds.*		
p-Bromophenylhydrazine	57			
Methylphenylhydrazine	57			
p-Bromophenylhydrazine hydrochloride	57			
Acetyl phenylhydrazine	57			
Carbanilide	57			
Oxanilide	57			
Diphenylcarbamine chloride	153			
Benzanilide	57			
Sulphonic acids:				
o-Dichlorobenzene sulfonate	57			
Benzene sulfonyl chloride	153			
Benzene sulpho chloride	57			
Hydroxyl:				
Sodium phenolate	x			
p-Bromophenol	153			
Dibromophenol 2:4	153			
Acetyl p-methylaminophenol	57			
p-Benzal aminophenol	57			
Acetyl p-anisidine	57			
p-Dimethylaminophenolsulphonate	57			
p-Anisidine	57			
Anisol	57, 153			
Nitroanisol	57			
Phenetol	57			
o-Dihydroxybenzene (Catechol)	57			
Hydroquinone dimethylether	57			
o-Dimethoxybenzene (Veratrole)	57			
Hydroquinonemonomethylether	57			
Resorcinolmonomethylether	57			
Resorcinoldimethyl ether	57			
Resorcinol diacetate	57			
Aldehydes:				
p-Chlorobenzaldehyde	57			
Trinitrobenzaldehyde	57			
Salicylaldehyde	57, x			
o-Methoxybenzaldehyde	57			
Carboxylic acids:				
p-Chlorobenzoic acid	57			
Iodobenzoic acid	57			
o-Nitrobenzoic acid	57, 153			
m-Nitrobenzoic acid	57			
Sodium m-nitrobenzoate	57			
p-Nitrobenzoic acid	153			
Ethyl m-nitrobenzoate	57			
Trinitrobenzoic acid	57			
Acetylanthranilic acid	57			
Benzoic anhydride	57			
Butylbenzoate	57			
Phenylbenzoate	57			
Butylsalicylate	57			
Methyl o-methoxybenzoate	57			
o-Methoxybenzoic acid	57			
Anisic acid	57			
Butyl o-methoxy benzoate	57			
Benzilic acid	57, 153			
Phenyl acetic acid	153, x			
Acetylphenylglycine	57			
Phthalic acid	57			
Hippuric acid	153			
Ketones:				
Benzophenone	57			
Ethers:				
Butylphenyl ether	57			
Butylbenzyl ether	57			
Other benzene compounds:				
p-Nitrobenzoyl chloride	57			
Phenylacetyl chloride	57			
Benzil (dibenzoyl)	57, 153			
Benzoin	57, 153			
Benzamide	57			
Dinitrobenzoylurea	57			

TABLE 4.—*Production of intermediates during 1919*—Continued.

Name.	Manufacturers' identification numbers according to list on page 94.	Total production, 1919.		Average price per pound.
		Quantity.	Value.	
BENZENE COMPOUNDS—Con.				
Other benzene compounds—Continued.				
Phthalimide	57			
Benzonitrile	57			
Benzyl cyanide	57			
Phenyl isocyanate	153			
Thiophenol	153			
Potassium hydrogen phthalol	57			
Quinone	57			
Chloranil	57			
Quinhydrone	57			
a-Benzildioxime	57			
Ethylphenyl acetate	153			
Diphenylpiperazine	57			
Diphenylpiperazine hydrochloride	57			
p-Dimethylaminoazobenzene	57			
TOLUENE COMPOUNDS.				
Halogen:				
o-Bromotoluene	153			
p-Bromotoluene	153			
o-Iodotoluene	153			
Amino:				
Acetyl p-toluidine	57			
Benzoyl o-toluidine	57			
Sulphonic acid:				
Aminotoluene sulphonic acid 4:2	57			
p-Toluenesulphonyl hydrochloride	57			
Phenyl p-toluenesulphonate	57			
p-Toluenesulphonylaniline	57			
p-Toluenesulphonyl methylaniline	57			
Hydroxyl:				
o-Cresol p-toluenesulfonate	57			
o-Cresol methyl ether	57			
Butyl o-cresol ether	57			
p-Thiocresol	57, 153			
XYLENE COMPOUNDS.				
o-Xylene	57			
m-Xylene	57			
p-Xylene	57			
o-Xylene sodium sulphonate	57			
p-Xylene sodium sulphonate	57			
Mesitylene	153			
NAPHTHALENE COMPOUNDS.				
Halogen:				
Alpha bromonaphthalene	57, x			
Benzoyl a-naphthylamine	57			
Hydroxyl:				
Nitroso b-naphthol	57, x			
QUINOLINE COMPOUNDS.				
Quinoline	57			
Quinoline ethiodide	57			
Quinaldine	57, 153			
b-Naphthaquinaldine	57			

Table No. 5 is a comparison of the production in 1918 and 1919 of those intermediates for which figures can be published.

TABLE 5.—*Production of intermediates, 1918 and 1919.*

Name.	Production, 1918.			Production, 1919.		
	Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
	Pounds.			*Pounds.*		
Total intermediates	357,662,251	$124,362,882	$0.35	177,362,426	$63,210,079	$0.36
BENZENE COMPOUNDS.						
Halogen:						
Chlorobenzene (mono)	20,530,639	3,614,866	.18	4,116,066	623,875	.152
Nitro:						
Nitrobenzene (oil of myrbane)	38,250,332	5,659,991	.15	42,544,017	5,899,837	.139
Dinitrobenzene	4,115,269	1,148,309	.28	2,280,282	548,302	.244
Amino:						
Aniline oil	24,102,129	6,572,684	.27	24,345,786	5,932,536	.244
Aniline salt and sulphate	1,765,359	591,542	.34	1,446,969	359,296	.248
Dimethylaniline	4,263,458	2,412,820	.57	3,559,654	1,941,152	.545
Diethylaniline	48,048	122,673	2.55	30,000	26,500	.883
Nitrosodimethylaniline	851,821	454,405	.53	592,663	364,091	.614
Acetanilide, tech	2,085,088	1,105,546	.53	1,934,125	797,151	.412
p-Nitroacetanilide	541,552	415,956	.77	699,658	484,666	.693
m-Nitraniline	630,802	640,318	1.02	68,600	104,322	1.521
p-Nitraniline and sulphate	1,320,064	1,722,519	1.30	1,310,658	1,388,627	1.059
m-Phenylenediamine	641,299	703,436	1.10	609,789	617,379	1.012
p-Phenylenediamine	215,148	791,191	3.68	234,332	568,396	2.426
Acet-p-phenylenediamine	177,990	382,017	2.15	62,567	103,750	1.658
Sulphonic acids:						
Sulphanilic acid	1,247,478	361,156	.29	1,023,861	243,656	.238
Metanilic acid	249,922	132,214	.53	453,137	266,172	.587
Aminoazobenzene and sulphonate	171,594	183,109	1.07	82,755	59,847	.723
Hydroxyl:						
Phenol (U. S. P. and tech)	106,794,277	37,270,284	.35	1,543,659	155,624	.101
o-Nitrophenol	143,277	215,788	1.51	18,373	16,497	.898
p-Nitrophenol	192,259	210,127	1.09	76,191	76,464	1.004
p-Amidophenol and sulphate	113,428	320,562	2.83	128,627	282,970	2.199
Picramic acid	235,652	462,158	1.96	150,458	130,388	.867
Alcohols:						
Benzyl alcohol	13,950	87,138	6.25	15,678	33,770	2.154
Aldehydes:						
Benzaldehyde	300,591	865,251	2.40	518,634	403,109	.777
Carboxylic acids:						
Benzoic, tech	109,316	155,207	1.42	21,212	46,554	2.195
Benzoic, U. S. P	172,896	530,472	3.07	699,108	534,832	.765
Sodium benzoate	255,667	658,879	2.58	610,150	536,194	.878
o-Amidobenzoic (anthranilic)	11,826	67,287	5.69	22,976	98,602	4.415
Salicylic, tech	1,395,630	799,337	.57	3,467,655	1,009,462	.291
Salicylic, U. S. P	3,270,462	2,706,171	.83	2,619,726	918,832	.351
Cinnamic	1,486	13,842	9.31	2,502	10,395	4.119
Ketones:						
Tetramethyldiaminobenzophenone	73,208	256,032	3.50	281,057	488,553	1.738
Diphenyls:						
Benzidine, base	1,565,139	1,577,466	1.01	1,084,922	1,370,393	1.263
Benzidine sulphate	936,748	427,189	.45	234,707	224,283	.956
Other benzene compounds:						
Thiocarbanilide	1,326,236	622,454	.47	2,268,375	802,575	.354
TOLUENE COMPOUNDS.						
Halogen:						
Benzylchloride	699,930	463,071	.66	720,953	166,182	.231
Nitro:						
Nitrotoluene	3,420,670	1,027,629	.30	6,211,775	1,049,522	.169
o-Nitrotoluene	1,240,499	850,343	.69	1,360,589	312,416	.230
p-Nitrotoluene	670,615	747,086	1.11	1,263,056	704,750	.558
Amino:						
Toluidine	308,667	250,125	.81	806,210	309,894	.384
o-Toluidine	638,874	612,765	.96	1,002,982	503,020	.502
p-Toluidine	205,852	380,257	1.85	575,841	600,267	1.042
m-Nitroparatoluidine	21,415	117,309	4.80	58,454	210,307	3.598
m-Toluylenediamine	612,163	862,702	1.41	439,544	501,063	1.147
XYLENE COMPOUNDS.						
Nitroxylol	639,835	338,059	.53	293,219	53,449	.184
Xylidine	534,834	291,187	.54	386,635	206,797	.535

TABLE 5.—*Production of intermediates, 1918 and 1919*—Continued.

Name.	Production, 1918.			Production, 1919.		
	Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
NAPHTHALENE COMPOUNDS.						
Naphthalene, solidifying 79° C. or above (refined, flake)	*Pounds.* 28,112,165	$2,162,618	$0.08	*Pounds.* 17,625,235	$1,160,815	$0.066
Nitro:						
Nitronaphthalene	4,340,019	1,439,052	.33	2,774,516	388,500	.133
Amino:						
a-Naphthylamine	2,671,601	1,327,740	.50	1,552,828	632,587	.407
b-Naphthylamine, crude	31,317	45,747	1.46	99,597	167,590	1.683
Sulphonic acids:						
Sulpho(alpha)amino compounds—						
Naphthylamine sulphonic 1:4 (Naphthionic)	1,462,261	959,291	.66	2,008,189	1,235,742	.615
Hydroxyl:						
Alpha naphthol compounds—						
a-Naphthol	136,723	102,032	.75	135,025	136,853	1.013
Alpha naphthol sulphonic acids—						
Naphthol sulphonic 1:4 (Neville & Winthers)	340,074	421,589	1.24	344,449	629,857	1.829
Beta naphthol compounds—						
b-Naphthol, tech	5,117,683	3,009,773	.59	4,835,778	2,365,804	.488
Beta naphthol sulphonic acids—						
Naphthol sulphonic 2:6 [a]	169,383	127,693	.76	146,111	102,975	.705
Naphthol disulphonic 2:3:6 (R acid)	712,033	572,401	.80	1,008,697	721,341	.716
Other naphthols:						
Amido naphthol sulphonic acid 1:2:4	169,999	210,478	1.84	837,384	808,894	.966
Amido naphthol disulphonic acid 1:8:3:6 (H acid)	2,883,228	4,879,351	1.69	3,837,534	5,081,469	1.324
Other naphthalene compounds:						
Phthalic anhydride	227,414	648,650	2.85	290,677	290,037	.997
ANTHRACENE COMPOUNDS.						
Anthracene, purity of 25 per cent or more	25,552	80,679	.36	1,381,944	298,977	.216

[a] 1918 figures include naphthol sulphonic 2:8.

INTERMEDIATES USED IN DYEING AND PRINTING.

In many cases the last chemical step in the manufacture of dyes can be advantageously performed on or within the fiber to be dyed rather than in a dye factory. In this way an insoluble dye can be precipitated within the fiber, and thus secure a high degree of fastness. As a consequence, textile mills and other dye consumers have been purchasers of intermediates. The German dye makers made a practice of selling intermediates for this purpose to textile mills under special trade names designed to conceal the chemical nature of the product. German firms were thus enabled in many cases to charge prices to the consumers above the market prices of the intermediates when sold under their true chemical names.

In Table 6 are given the trade names under which these products were sold by German firms before the war, with the corresponding scientific chemical names, the imports (when available) during the fiscal year 1914[1] and the American production during 1919. The

[1] Norton, Thomas H.: "Artificial Dyestuffs Used in the United States," Dept. of Commerce, Sp. Agents Series, No. 121; and Pickrell, Dr. E. R.: "Chemicals and Allied Products Used in the United States," Dept. of Commerce, Misc. Series No. 82.

identification, of course, can not be guaranteed since it has not been possible to make a critical laboratory examination of authentic samples. It is based upon a careful search of the scientific and technical literature and correspondence or consultation with a number of experts in this field. It is especially interesting to note the extent to which these needs are being met by American manufacturers of intermediates. It is hoped that the publication of this information will enable American consumers to purchase these materials under their own proper names at more reasonable prices, and will also help American intermediate makers to supply those not yet made in the United States.

TABLE 6.—*Intermediates used in dyeing and printing.*

Trade name.	Chemical name.	Imports, 1914 (Norton-Piekrell).	United States production, 1919.	Uses.
I. BENZENE DERIVATIVES.				
Developer J	Phenol	[1] 1,715,465 $109,146	[1] 1,543,659 $155,624	Developing direct dyes.
Yellow developer, Dye salt VII.				
Developer F, Dye salt VI.	Resorcin	[1] 61,624 $18,175	[1] 96,397 $402,491	Do.
Orange developer				
Para	Paranitraniline	[1] 771,682 $109,374	[1] 1,310,658 $1,388,627	For para reds and as a developer.
Azogen red	p-nitrodiazo benzene			Insoluble azo dyes.
Azophor red PN	p-nitrodiazo with stabilizer			
Benzonitriol	do			
P-nitraniline, extra paste N.	do			
Nitrazol C	do			
Nitrosamine red	Nitrosamine is the sodium compound of diazotized nitraniline.			
Parazol F. B				
Azephororange MN	Meta-nitraniline	[2] 3,527 $1,037	[1] 68,600 $104,322	Insoluble azo colors.
	Diazo compound of above.			Insoluble azo black.
Reserve salt O	m-Nitro benzene sulphonic acid.		(2)	
	Aniline		[1] 24,345,786 ($5,932,536)	Oxidation black.
Azotol C, or Prague ice black.	A symmetrical dialkylated di-p-amidoazo-benzene or amido-chrysoidine.			Insoluble azo dyes. Gives black on b-naphthol prepared goods.
Developer A. D., fast blue developer A. D.	Amidodiphenylamine	[1] 100 $29		Developing direct colors.
Diphenyl, black base	P-amidodiphenylamine			For oxidation black.
Diphenyl black oil D. O	P-amidodiphenylamine in aniline.			Do.
Developer H	M-phenylenediamine	[1] 58,978 $14,463	[1] 439,544 $804,063 [1] 609,789 $617,379	Developing direct colors.
Developer C for brown, Dye salt V.				
Oxamine dev. N. X				
"Paramine," Paramine Extra, B. A. S. F.	P-phenylenediamine	[1] 11,088 $3,414	[1] 234,332 $568,396	Oxidation brown.
Diamine B. B	A chlorinated diamine			Developing direct colors.
Nerogene D	Chloro-m-phenylenediamine.			
Developer N. B	Nitro-benzidin	o-Nitro-ben 700 Benzidin 966		Do.
Solvenol, Solution Salt B, Solvenol O, Algosol.	Sodium-salt of benzyl sulphanilic acid.	[3] 4,000		Silk printing.
Fuscamine G	M-aminophenol			Oxidation brown.
II. TOLUENE DERIVATIVES.				
Diamine developer C; H (powder), E (solution).—Diamine B.	Meta toluylene diamine or meta phenylenediamine.	[1] 133,355 $25,582	[1] 439,544 $804,063	Developing direct dyes.

[1] Pounds.

[2] Produced during 1919, but figures not publishable.

[3] Pounds, estimated.

TABLE 6.—*Intermediates used in dyeing and printing*—Continued.

Trade name.	Chemical name.	Imports, 1914 (Norton-Pickrell).	United States production, 1919.	Uses.
II. TOLUENE DERIVATIVES—continued.				
.....	Para toluidine.....	[1] 24,686 $4,764	[1] 575,841 $600,267	Insoluble azo colors.
Reserve salt W.....	p-Nitro-toluene sulphonic acid.	.....	[1] 32,338 $29,464	
Nitrotoluidine G..... Base HR, pigment fast red base HL..... Fast red G base..... Helio fast red base HL... Lithol fast scarlet RW base.	m-Nitro para toluidine.....	[1] 10,513 $4,200	[1] 58,454 $201,307	Do.
	o-Nitro p-toluidine.....	[1] 65,647 $17,814	[1] 24,125 $4,825	Do.
	p-Nitro o-toluidine.....	.....	[2]	Do.
Nitrosamine Rose B X; Azorosa N A, Nitroanisidine A; Tuscalin red base.	p-Nitro-o-anisidine.....	[3] 2,000	.....	Do.
Azophor Rose A, Naphthol Rosa.	diazo compound of above.	.....	.....	
Tuscalinorange base G...	m-Nitro-o-anisidine.....	.....	.....	Do.
Chloranisidine salt M, or chloranisidine P.	p-Chlor-m-anisidine.....	.....	.....	With B-naphthol gives scarlet red.
Azophorrose A.....	Stabilized diazo-o-anisol...	.....	.....	Insoluble azo dyes.
Blue red O.....	o-Nitro-p-phenetidine.....	.....	.....	For shading para red (bluish) shades.
.....	Benzidine.....	[1] 55,243 $16,991	[1] 1,084,922 $1,370,393	Insoluble azo colors.
.....	Toluidine.....	[1] 5,874 $3,763	[1] 806,210 $309,894	Do.
Azophor blue D.....	Tetrazo dianisol with stabilizer.	[1] 10,656 $4,217	.....	Insoluble azo colors, with copper salts to give blue.
Ortamin.....	o-Dianisidin.....	.....	[4] 107,441	Oxidation red brown.
III. XYLENE DERIVATIVES.				
.....	Xylidine.....	[1] 21,836 $2,657	[1] 386,635 $206,797	Insoluble azo colors.
.....	Cumidine.....	[1] 6,617 $1,169	[1] 16,910 $36,226	Do.
IV. NAPHTHALENE DERIVATIVES.				
Maroon developer.....	Alpha-naphthol.....	[1] 403,317 $53,600	[1] 135,075 $136,937	Developing direct dyes.
Crimson developer.....	Alpha-naphthol p-sulphonic acid.	.....	[1] 344,449 $629,857	
Developer A (Sodium salt) for red or Dye salt II.	B-naphthol.....	[1] 1,233,458 $112,007	[1] 4,825,668 $2,356,230	
Naphthol D.....	B-oxy-naphthoic acid.....	[1] 2,647 $1,029	[2]	Para red.
Naphthol AS.....	B-oxy-naphthoic anilide...	[1] 1,997 $1,218	.....	Insoluble azo dyes.
Naphthol AC.....	B-oxy-naphthoic tolnide or aniside, phenetide, xylide.	.....	.....	Do.
Shading salt, "Mono acid." "Facid."	B-naphthol sulphonic acid F (2:7).	[1] 21,253 $5,563	[1] 23,156 $51,181	For para reds.
Naphthol R.....	B-naphthol 90 per cent and B-naphthol monosulphonic acid F.	.....	.....	Para red bluish shade.
B-naphthol DC.....	Molecular mixture—B-naphthol, B-oxy-naphthoic acid, B-naphthol sulpho acid E, or dioxynaphthalin 2:3, 2:6, or 2:7.	.....	.....	Insoluble azo dyes.
Developer ES.....	2:3 dioxy-naphthalene-sulphonic acid.	.....	.....	Developing direct colors.
Developer G..... Blue developer AN.....	Amido naphthol sulphonic acid (1:2:4?).	[1] 1,153 $445	[1] 837,384 [5] $808,894	Developing direct dyes.
Developer E for brown... Gamben R.....	Nitroso B-naphthol.....	.....	[1] 24,777 $11,877	
Paradurol.....	Naphthalene trisulphonic acid.	.....	[2]	Organic stabilizer in production of para reds.

[1] Pounds.
[2] Actual production during 1919 but figures not publishable.
[3] Estimated pounds.
[4] "Dianisidin."
[5] 1:2:4.

TABLE 6.—*Intermediates used in dyeing and printing*—Continued.

Trade name.	Chemical name.	Imports, 1914 (Norton-Pickrell).	United States production, 1919.	Uses.
IV. NAPHTHALENE DERIVATIVES—contd.				
Amidonaphthol B D and 3 B.	Amido naphthol 1:6 or 1:7.	.....	.....	Insoluble azo dyes.
Naphthylamine S.....	A naphthylamine.....	[1] 112,226 / $10,620	[1] 1,552,828 / $632,587	Insoluble azo colors.
	"Sulphate".....	[1] 610 / $318		
.....	B naphthylamine.....	[1] 10,698 / $3,404	[1] 99,597 / $167,590	Do.
Developer B for Bordeaux claret dev. B. dev.	Ethyl B naphthylamine..	[1] 3,282 / $1,749	[1] 140 / $705	Developing direct dyes.
V. MISCELLANEOUS.				
Nighrophor, B. A. S. F..	Sodium, salt of p-nitro benzene, 5 sulpho, 1 amido, 8 naphthol azo, 2:5 dichlorobenzene.	.....	.....	Insoluble azo black.
Nigrogen.....	1:8 naphthylen diamine-4-sulphonic acid and acetone.	.....	.....	Insoluble azo black.
Asophor black S.....	Mixture of tetrazo-dianisol with other diazo compounds as m-nitranilin, etc.	.....	.....	Do.
Naphthylamine ether....	Amidonaphthol ether.....	.....	.....	Developing direct dyes.
Developer Z.....	Phenylmethylpyrazolone	[1] 1,397 / $377	.....	Do.
Solidogen.....	Formaldehyde condensed p and o toluidine.	.....	.....	Developing direct colors
Para brown salt G.....	The dye "Vesuvine".....	[1] 27,576 / $5,352	[1] 412,574 / $417,276	Insoluble azo brown with p-nitraniline.
Para brown salt R.....	The dye "Chrysoidine"...	[1] 105,946 / $16,852	[1] 220,542 / $246,977	
Leucotrop.....	Dimethyl-phenyl benzyl-ammonium chloride (other alkyl or acyl groups may be used).	.....	.....	Indigo discharge in printing.
Leucotrop W.....	(Ditto)-sulphonated, Ca salt.	.....	.....	
Discharge salt W.....	Dimethylphenyl benzyl-ammonium (sulphate) disulphonic acid, Ca salt.	.....	.....	Discharge printing.
Rongalite CL.....	Leucotrop W and rongalite C.	.....	.....	Do.
Hydrosulphite CL.....	Leucotrop W and hydrosulphite NF.	.....	.....	Do.
Hydralite CL.....	Leucotrop W and hydralite A.	.....	.....	Do.
Anthraquinone.....	.....	[1] 29,850 / $6,360	[1] 294,260 / $517,787	Discharge catalyzer.
Tannoxyphenol R.....	Tannin and resorcin.....	.....	[2]	Nitroso blue by condensation.
Nitrose base M 50 per cent.	Nitroso dimethyl aniline hydrochloride.	.....	[1] 592,663 / $361,091	
Ludirol.....	Nitro-anthraquinone sulphonic acid.	.....	.....	Organic oxidizing agent for preventing the reduction of vat dyes in the kier.

[1] Pounds.
[2] See Resorcin.

DYES AND OTHER FINISHED PRODUCTS.

Introductory.—The finished products of the coal-tar chemical industry are many and diverse. They include (1) dyes, (2) color lakes, (3) photographic chemicals (developers), (4) medicinals, (5) flavors, (6) perfume materials, (7) synthetic phenolic resins,

(8) synthetic tanning materials, and (9) explosives. There are many other substances belonging to all of these classes (except the synthetic resins and synthetic tanning materials) that are not derived from coal tar and that do not need to be considered for the present purpose.

A few minor uses of coal-tar products hardly deserve separate classification for the present purpose. For example, sodium benzoate and sodium salicylate are used as food preservatives as well as for strictly medicinal purposes, but these uses are so closely allied that it does not seem proper to set up a separate class of food preservatives. Many dyes and lakes are used as inks or ink powders, either pure or mixed with gum or other vehicle. A separate classification would therefore result in the overlapping of the two classes of products. Some coal-tar chemicals, usually and properly classified as intermediates, are used for accelerating the vulcanization of rubber, the most important being aniline, thiocarbanilide, phenylenediamine, and nitrosodimethylaniline. As the substances used for this purpose belong to the class of intermediates and are so classified in the tariff law, it seems inadvisable to set up another class of finished products.

The technical and generic relationship of these different classes is exceedingly close. To a large extent they use the same intermediates. Phenol enters into the manufacture of some representatives of each of the nine classes of finished products. Aniline is used for making dyes, lakes, medicinals, photographic chemicals, and explosives. Numerous other examples showing this close relationship could be cited.

In previous reports[1] the commission has pointed out the close relation of dyes to explosives and poison gases and the ease with which a dye factory can be converted into an explosive or poison-gas plant in an emergency. Since the signing of the armistice certain plants in the United States which were erected for the manufacture of explosives have been used for the manufacture of intermediates and dyes.

A close relation also exists between the dye industry and the manufacture of flavors, perfume materials, photographic chemicals, and color lakes. A well-rounded and matured dye industry would inevitably be accompanied by these smaller offshoots, which in many cases would furnish an outlet for by-products obtained in making the intermediates needed for the dye industry. The synthetic phenolic resin industry and the synthetic tanning material industry are not so closely related to the dye industry as are the other cases cited. They are dependent chiefly upon phenol and formaldehyde, and therefore furnish an outlet in times of peace for the material, phenol, which is of such vital military importance.

[1] Census of Dyes and Coal-Tar Chemicals, 1918; pp. 36 and 38.

In general, the products derived from coal tar are treated alike in the tariff act of September 8, 1916. There are, however, exceptions to this generalization which the commission has pointed out in previous reports.[1]

Table 7 shows in as great detail as is permissible, without revealing the output of single firms, the production of finished coal-tar products during 1919. Table 8 compares the production in 1918 and 1919 of products for which output could be published. The outstanding developments in the various classes of dyes and other finished coal-tar products is discussed in detail beginning on page 43.

TABLE 7.—*Production of finished coal-tar products during 1919.*

[The number in the first column identifies the dye according to the 1914 edition of the Schultz tables. The second column gives the common name of the dye. The numbers in the third column refer to the numbered alphabetical list of manufacturers printed on p. 94. An x signifies that the corresponding product was made by a manufacturer who did not consent to the publication of his identification number in connection therewith. Blanks in the fourth and fifth columns indicate that there was actual production during 1919, but that the figures can not be published without revealing information in regard to the output of individual firms. The figures thus concealed are, however, included in the totals.]

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average price per pound.
			Quantity.	Value.	
	Total finished coal-tar products		*Pounds.* 82,532,390	$84,585,544	$1.02
	NITROSO DYES.				
4	Naphthol green	5, 54, 66	34,646	38,831	1.12
	NITRO DYES.				
5	Picric acid	x	160,121	117,172	1.17
7	Naphthol yellow	66, 77, x			
8	Pigment chlorine	x			
	STILBENE DYES.				
9	Direct yellow R	5, 53, 58, 112, 116, 123, x, x	440,924	767,674	1.74
11	Chloramine orange G	5, 58			
	PYRAZOLONE DYES.				
23	Tartrazine	24, 112			
	AZO DYES.				
	Monoazos.				
28	Pigment fast yellow G	x			
31	Spirit yellow	x			
32	Butter yellow	69, 112, 121, x, x	31,156	47,964	1.54
33	Chrysoidine Y	27, 53, 64, 66, 69, 112, x	314,581	326,223	1.04
34	Chrysoidine R	27, 53, 54, 64, 69, 112	220,512	246,977	1.12
36	Sudan I	69, 112, 152, x	75,868	97,286	1.28
37	Croceine orange	51, 92, 112, 136, x	17,274	15,273	.88
38	Orange G	27, 112, 136			
39	Ponceau G	x			
40	Chromotrope 2 R	112, 116			
41	Fast acid fuchsine B	27, 40, 112, 116	26,699	45,222	1.69
42	Amido naphthol red G	64, 112			
48	Alizarine yellow GG	5, 53, 64, 92, 112, 120 152, 167, x, x.	163,170	116,906	.72
56	Para nitranilin red	x			
57	Chromotrope 2 B	23, 116			
58	Alizarine yellow R	5, 23, 24, 40, 53, 64, 75, 78, 92 116, 120, 136, 152, 167, x.	130,424	110,152	.84
59	Wool violet S	136			
61	Victoria violet	40, 112, 116	105,086	239,594	2.28
64	Lana fuchsine	116, 136, x	15,272	30,793	2.02

[1] Census of Dyes and Coal-Tar Chemicals, 1918; pp. 36 and 38.

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average price per pound.
			Quantity.	Value.	
	AZO DYES—continued.				
	Monoazos—Continued.		*Pounds.*		
65	Azo coralline	64			
66	Amido naphthol red 6 B	64			
67	Chromotrope 6 B	5, 112, 116	77,481	$154,526	$1.99
68	Spirit yellow R	112, x			
70	Brilliant orange O	x			
73	Helio fast red	x			
76	Sudan II	69, 112, x			
79	Xylidine orange 2 R	136, x			
81	Brilliant cochineal	x			
82	Ponceau 2 R	5, 24, 27, 68, 112, 136, x, x	552,680	439,515	.80
83	Ponceau 3 R	75, 112, x	21,152	128,201	5.31
88	Acid anthracene brown R	112			
89	Metachrome brown B	53			
94	Azo Eosine	116			
102	Diamond flavine G	23, x			
105	Sudan brown	x			
106	Autol red	x			
107	Sulphamine brown A	136			
109	Palatine red A	136			
111	Fast red BT	136, x			
112	Bordeaux B	5, 24, 27, 68, 92, 112, 136, x	161,862	146,810	.91
114	Chromotrope 10 B	116			
117	Erica 2 GN	58			
118	Geranine	58			
119	Diamine rose	112, 123			
120	Salmon red	x			
121	Erica B	58, 68			
132	Lake red P	136			
134	Metanil yellow	50, 53, 54, 64, 112, x	477,143	787,110	1.65
138	Methyl orange	57, 121			
139	Orange IV	x			
141	Azo yellow	112			
143	Tropaeoline	69			
144	Orange I	112, x			
145	Orange II	5, 24, 27, 53, 57, 64, 69, 112, 117, 120, 136, x, x, x	1,133,925	717,199	.63
151	Orange R	69			
152	Permanent red 4 B	x			
153	Lake red C	x			
154	Palatine chrome brown	23, 112			
155	Acid alizarine garnet R	23			
156	Palatine chrome violet	23, 112			
159	Acid alizarine black R	23			
160	Fast brown N	64			
161	Fast red A	5, 27, 53, 69, 92, 112, 116, 129, 136, x	267,582	280,974	1.05
163	Azo rubine	5, 27, 43, 64, 92, 112, 116, x	187,261	267,129	1.43
164	Fast red VR	112			
166	Fast red E	5, x			
167	Croecin scarlet 3 BX	x			
168	Amaranth	21, 27, 92, 112, 116, 136, 158, x, x, x	294,316	877,491	2.98
169	Cochineal red	5, 24, 27, 92, 112, 136, x	231,519	305,445	1.32
173	Lithol red R	112, 136, 150, x	269,169	103,926	.39
177	Mordant yellow	136			
180	Eriochrome blue black B	152			
181	Salicine black U	27, 53, 54, 64, 92, 112, 116, 136, 152	739,372	923,888	1.25
183	Eriochrome black T	23			
184	Eriochrome black A	23, 64, 92, 112	686,710	933,677	1.36
188	Sulphon acid blue R	112			
189	Sulphon acid blue B	112			
190	Benzo brown 5 R	123			
193	Stanley red	123			
194	Thiazine red R	116			
195	Rosophenine SG	x			
196	Titan red	x			
197	Thiazine red G	64, 123, x	11,886	14,266	1.20
198	Mimosa C	123			
200	Lake red D	136, 150			
201	Pigment scarlet G	150			

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average price per pound.
			Quantity.	Value.	
	AZO DYES—continued.				
	Monoazos—Continued.		*Pounds.*		
202	Palatine chrome red B	112, 136, 150, x	28,081	$79,928	$2.85
	All other monoazo dyes	23, 24, 40, 53, 57, 64, 69, 75, 92, 112, 116, 121, 136, x, x, x, x.	939,935	1,190,753	1.27
	Total monoazo dyes		8,881,819	11,560,384	1.30
	Disazo dyes.				
208	Leather brown	136			
211	Resorcin brown	112			
213	Fast brown	112			
217	Algama black 10 B	5, 27, 40, 53, 64, 75, 92, 112, 116, 120, x.	1,877,879	2,757,443	1.47
223	Sudan III	x			
224	Cloth red G	x			
227	Brilliant croceine	5, 27, 112	157,599	379,494	2.41
228	Erythrine P	27			
232	Sudan IV	69, 112, x			
233	Cloth red B	92, x			
235	Croceine 3 B	x			
236	Wool red B	112			
241	Neutral gray G	116			
244	Coomassie wool black S	136			
246	Cloth scarlet G	69			
247	Scarlet E C	54, 112			
257	Sulphocyanine	112			
261	Buffalo black 10 B	112			
264	Fast sulphon black F	x			
265	Sulphocyanine black B	112			
266	Naphthylamine black	5			
272	Brilliant black B	116			
275	Diamond black	92, 112, 167	222,938	329,989	1.48
279	Benzo fast scarlet	58			
283	Bismark brown Y	27, 53, 58, 64, 69, 74, 112, 116, x.	412,574	417,276	1.01
284	Bismark brown 2 R	27, 53, 54, 64, 69, 112	631,308	659,332	1.04
289	Palatine chrome black S	40			
303	Paper yellow	112, 116, x, x, x	48,723	61,711	1.27
304	Chrysophenine G	58, 112, 116, 165, x	86,795	219,215	2.53
307	Congo red	43, 112, 116, 120, x, x	873,734	979,285	1.12
311	Orange TA	112, x			
312	Congo Corinth G	5, 43, 112, 116, x	137,704	266,770	1.94
320	Bordeaux	x			
322	Trisulphon violet B	112-x			
327	Diamine violet N	92, 112			
329	Diamine brown V	58			
333	Oxamine black BHN	5, 53, 92, 112, 116	485,046	1,321,362	2.72
337	Benzo blue 2 B	5, 13, 27, 40, 43, 53, 58, 75, 112, 116, 120, 154, 165, x, x.	1,380,335	1,386,291	1.00
340	Benzo orange R	43 116, x, x, x	42,867	37,820	.88
341	Crumpsall direct fast red R	x, x			
342	Chrysamine G	40, 112, x, x, x, x	54,279	73,723	1.36
343	Diamine fast red F	92, 112, 116	56,864	154,789	2.72
344	Diamine brown	92, 112, 116	15,959	35,067	2.20
351	Cresotine yellow	43, 112			
352	Direct violet R	116			
355	Anthracene red	68, 116			
362	Oxydiamine orange	112			
363	Benzopurpurine 4 B	13, 53, 75, 92, 112, 116, 154, x	288,021	517,706	1.80
365	Benzopurpurine B	5, 112			
375	Congo Corinth B	x			
377	Azo blue	92			
378	Trisulphon blue R	116			
386	Benzo blue BX	112, 116, x, x	92,214	162,745	1.76
391	Benzo blue 3 B	5, 13, 27, 92, 112, 116, 154, x, x	182,946	309,066	1.69
392	Tolulene orange G	112			
405	Benzopurpurine 10 B	112, 116			
410	Benzazurine G	53, 112, 116	150,589	479,460	3.18
415	Diamine blue G	116			
419	Chicago blue RW	116			
424	Chicago blue 6 B	116			
426	Benzamine pure blue	53, 75, 112, 116, 154	192,350	378,537	1.97
	All other disazo dyes	23, 53, 69, 112, 116, x, x, x	491,321	732,951	1.49
	Total disazo dyes		9,307,768	14,401,615	1.55

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average per price pound.
			Quantity.	Value.	
	AZO DYES—continued.				
	Trisazo dyes.		*Pounds.*		
436	Columbia black FF	112			
441	Diazo blue black RS	116			
450	Benzo black blue R	x			
462	Direct deep black EW	5,40,43,53,112,116,165,x,x	7,250,007	$7,521,343	$1.04
463	Cotton black E	112,116			
464	Erie direct green ET	43,112,x	69,700	134,408	1.93
469	Chloramine black N	116			
470	Chloramine green B	116			
471	Chloramine blue 3 G	116			
474	Oxamine green B	5,53,75,112,116,x	305,854	565,873	1.85
475	Oxamine green GX	13,43,53,x,x	136,638	291,758	2.14
476	Benzamine brown 3 GO	43,112,x			
477	Congo brown G	5,112			
	All other trisazo dyes	75,112,x,x,x	131,960	198,846	1.51
	Total trisazo dyes		8,829,578	10,217,788	1.16
	Tetrakisazo dyes.				
485	Benzo brown G	13,43,x	83,306	102,536	1.23
	Other tetrakisazo dyes	116			
	All other azo dyes	13,58,92,123,x	81,472	124,493	1.53
	Total of azo dyes		27,191,371	36,116,702	1.34
	DIPHENYLMETHANE DYES.				
493	Auramine	23,53,66	127,567	392,744	3.08
	TRIPHENYLMETHANE DYES.				
495	Malachite green	40,50,53,95,112,166,x,x,x	560,301	$1,827,474	3.26
499	Brilliant green	95,x			
502	Guinea green	31,112			
503	Brilliant milling green B	112			
505	Light green	158			
506	Erioglaucine	112			
511	Para-fuchsine	112			
512	Magenta	13,33,50,53,66,69,80,86,112,125,136,x,x,x.	155,830	712,086	4.57
513	New fuchsine	112,140			
515	Methyl violet	27,49,51,66,69,74,112,117,146,171,x.	574,436	1,103,179	2.11
516	Crystal violet	23			
521	Aniline blue	69,136,x			
528	Fast acid violet 10 B	116			
530	Acid violet	51,112			
535	Methyl alkali blue	136			
536	Alkali blue	50,69,80,112,136,146,x,x.	77,796	494,133	6.35
537	Methyl blue for silk	50,80			
539	Soluble blue	50,69,112	16,315	90,613	5.55
	All other triphenylmethane dyes	23,112			
	Total triphenylmethane dyes		1,761,742	6,494,720	3.69
	DIPHENYL-NAPHTHYL-METHANE DYES.				
559	Victoria blue B	23			
560	Night blue	x			
566	Wool green S	5,23			
	XANTHONE DYES.				
573	Rhodamine B	53			
580	Fast acid violet B	95			
585	Uranine	53,69			
587	Eosine	53,66,69,117	121,303	764,179	6.30
592	Erythrosine B	69,x			
593	Phloxine P	53			
597	Rose Bengale B	69			
599	Galliene	150,169			
600	Coerulein B	169			
601	Coerulein S	150			
	Total xanthone dyes		190,148	1,235,526	6.50

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average price per pound.
			Quantity.	Value.	
	ACRIDINE DYES.		*Pounds.*		
602	Acridine yellow	112			
606	Phosphine	69, 72, 112	14,648	$56,588	$3.86
	Other acridines dyes	72			
	THIOBENZENYL DYES.				
615	Thioflavine S	123			
616	Primuline	18, 112, 123, x, x, x, x	271,338	464,870	1.71
617	Columbia yellow	18, 54, 112, 116, 123, x	54,077	143,831	2.66
	Other thiobenzenyl dyes	123			
	INDOPHENOL DYES.				
619	Indophenol	77, 112, 151	126,611	201,737	1.59
	Other indophenol dyes	92			
	OXAZINE AND THIAZINE DYES.				
622	Delphine blue B	40, 112, 152	43,827	164,184	3.75
626	Gallocyanine	5, 24, 40, 64, 112, x	365,243	1,105,346	3.03
631	Chromocyanine V	112			
649	Cotton blue	92, x			
656	Alizarine green G	61			
659	Methylene blue	24, 27, 49, 53, 66, 98, 112, 127, 159, 166, x, x.	465,992	1,410,760	3.03
660	Methylene green	92, 112, x	2,435	11,684	4.80
667	Brilliant alizarine blue	64			
	Other oxazine and thiazine dyes	x			
	Total oxazine and thiazines		904,755	2,754,677	3.04
	AZINE DYES.				
672	Azo carmine GX	53, 68			
679	Safranine	29, 66, 74, 112, 127	131,042	527,231	4.02
681	New fast gray	68, 116, x, x	28,458	48,544	1.71
683	Safranine M N	112			
697	Induline (spirit soluble)	18, 64, 112, x	436,201	231,233	.53
698	Nigrosine (spirit soluble)	24, 27, 64, 69, 112	346,167	245,508	.71
699	Induline (water soluble)	18, 53, 64, 69	130,704	87,494	.67
700	Nigrosine (water soluble)	18, 24, 64, 66, 69, 112, 152	1,660,149	987,457	.59
	SULPHUR COLORS.				
720	Sulphur black	13, 40, 53, 64, 73, 92, 112, 114, 151, 166, x, x, x.	14,504,770	4,141,124	.29
	Sulphur blue	13, 17, 40, 45, 53, 64, 74, 92, 112, 116, 151, x.	1,622,762	1,797,469	1.11
	Sulphur brown	5, 40, 53, 58, 64, 74, 92, 112, 114, 116, 144, 148, 151, x, x, x.	805,861	378,129	.47
713	Thiophor bronze	x			
	Sulphur green	40, 64, 112, 116, 144, 151, x, x	277,641	279,149	1.01
	Sulphur yellow and orange	40, 53, 112, 116	276,400	228,441	.83
	Sulphur maroon	40, 58			
	Sulphur tan	144, x, x	81,905	27,567	.34
	Sulphur colors (various shades)	112			
	Total sulphur colors		17,624,418	6,901,734	.39
	ANTHRAQUINONE DYES.				
765	Indanthrene green B	53			
766	Indanthrene violet R	53			
778	Alizarin	112			
779	Alizarin orange	112			
782	Alizarin brown	40, 150, 169	40,426	63,674	1.58
784	Alizarin SX	112			
803	Alizarin blue WX	112			
842	Indanthrene blue GCD	53			
849	Indanthrene yellow G	53			
858	Alizarin saphirol B	112			

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average per price pound.
			Quantity.	Value.	
	INDIGO AND ITS DERIVATIVES.				
			Pounds.		
874	Indigo, synthetic	52, 53, 112	8,863,824	$5,233,719	$0.59
877	Indigotine or indigo extract	5, 14, 53, 112, 116, 146, x	1,639,670	1,093,724	.64
881	Bromo-indigo	52			
	ANILINE BLACK GROUP.				
922	Pigment aniline black paste	40			
923	Ursol D B	136			
	Unclassified dyes of unknown composition.	33, x			
	Total dyes		63,402,194	67,598,855	1.07
	COLOR LAKES.				
	Alizarin lakes	x, x, x			
	Blue	10, 21, 34, 40, 48, 53, 56, 60, 70, 102, 133, 138, 150, x, x, x, x, x, x, x, x, x, x, x, x, x, x	543,201	391,210	.72
	Brown	133, x, x, x, x	74,625	9,812	.13
	Green	10, 21, 34, 48, 53, 56, 70, 96, 102, 138, x, x, x, x, x, x, x, x, x, x, x.	466,977	214,697	.46
	Maroon	10, 21, 34, 48, 53, 56, 70, 133, x, x, x, x, x, x, x, x, x, x, x.	697,699	260,769	.37
	Orange	10, 21, 34, 133, 150, x, x, x, x, x, x, x, x, x.	246,710	92,291	.37
	Para red	40, 102, 161, x, x, x	484,306	148,152	.31
	Purple lake B	150, x, x, x	6,561	4,519	.69
	Red	10, 21, 34, 48, 53, 56, 70, 96, 102, 138, 161, x, x, x, x, x, x, x, x, x, x, x, x, x, x.	2,101,527	996,765	.47
	Scarlet	10, 21, 34, 48, 53, 56, 60, 70, 96, 133, 138, 150, x, x, x, x, x, x, x, x, x, x, x, x, x, x, x.	865,536	361,904	.42
	Violet	10, 21, 34, 40, 48, 53, 56, 60, 70, 96, 133, 137, 138, x, x, x, x, x, x, x, x, x, x, x, x.	259,378	345,078	1.33
	Yellow	10, 34, 48, 53, 60, 70, 102, 138, x, x, x, x, x, x, x, x, x, x, x, x.	610,445	238,324	.39
	Eosine	10, 21, 34, 48, 53, 56, 60, 70, 96, 102, 133, 138, 150, x, x, x, x, x, x, x, x, x, x, x, x.	524,030	530,804	1.01
	Lithol red	10, 21, 40, 48, 53, 60, 70, 82, 96, 102, 133, x, x, x, x, x, x, x, x, x, x, x, x, x, x, x.	565,316	570,687	1.01
	All other color lakes	x			
	Total color lakes		7,569,921	4,179,964	.55
	PHOTOGRAPHIC CHEMICALS.				
	Hydroquinone	104, 112, 131, 169, x	272,329	552,087	2.03
	Methyl p-amidophenol sulphate (metol).	7, 57, 112, 131, 139, x, x	59,024	508,434	8.61
	All other photographic chemicals.	121, 139			
	Total photographic chemicals.		335,509	1,059,340	3.16
	MEDICINALS.				
	Acetanilide, U. S. P	24, 104, 109, 136, x, x, x	918,795	440,066	.48
	Acetphenetidine	109			
	Acetylsalicylic acid (aspirin)	44, 52, 79, 107, 109, x, x, x, x	1,777,105	4,034,400	2.27
	Ammonium salicylate	x			
	Amyl salicylate	x			

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average price per pound.
			Quantity.	Value.	
	MEDICINALS—continued.		*Pounds.*		
	Anesthesine (ethyl p-amino benzoate).	1, x			
	Arsphenamine	47, 103			
	Bacteriological stains	72			
	Benzyl benzoate	61, 155			
	Bismuth b-naphthol	104, x			
	Bismuth tribromphenol	104			
	Chloramine T	1, 24, 109	40,907	$37,881	$0.93
	Cinchophen (phenylcinchoninic acid).	1, 24			
	Copper sulphocarbolate	101			
	Refined creosote	116			
	Creosote carbonate	24, 116			
	Dibrom oxy mercury fluorescin	81			
	Dioxyquinoline sulphate	59			
	Dichloramine T	1, 24, 109			
	Disinfectant	30, 164, 170	2,103,101	91,670	.04
	Guaiacol carbonate	53			
	Guaiacol crystals, U. S. P	53, 116			
	Guaiacol liquid	53, 116			
	Halazone	1, 24, 109	459	848	1.85
	Indigo disulphonic acid	24			
	Magnesium salicylate	x			
	Methylsalicylate	36, 104, x, x	879,833	332,123	.38
	b-Naphthol benzoate	24, 61, 104, 121	36,701	156,562	4.27
	b-Naphthol salicylate	121			
	Neoarsphenamine	47, x			
	p-Nitro benzoic acid	1			
	Phenolphthalein	109, 168			
	Phenolsulphonates	1, 104, x	33,711	16,333	.48
	Phenolsulphonephthalein	81			
	Procaine	1, x, x	3,448	330,334	95.8
	Salol	104, 109, x	124,034	112,359	.91
	Sodium salicylate	44, 61, 104, 109, x, x	301,518	169,508	.56
	Sodium sulphocarbolate	101			
	Strontium salicylate	x			
	Zinc sulphocarbolate	101			
	Total medicinals		6,777,988	7,883,071	1.16
	FLAVORS.				
	Coumarin	109, x			
	Ethyl benzoate	61			
	Ethyl salicylate	61			
	Methyl salicylate (see medicinals).				
	Saccharin	24, 26, 109, 131, x, x	547,988	1,017,091	1.86
	All other flavors	61			
	Total flavors		610,825	1,318,654	2.16
	PERFUME MATERIALS.				
	Amyl salicylate	61, x			
	Benzyl acetate	65, 141, 155, x	17,019	39,137	2.30
	Benzyl benzoate	141, 155			
	Benzyl butyrate	61			
	Benzyl formate	x			
	Benzyl propionate	61, x			
	Benzyl valerate	61			
	Brom styrol	61, 141, 155			
	Cinnamic alcohol	x			
	Diethyl phthalate	61			
	Diphenyl oxide	141, x			
	Ethyl anthranilate	61			
	Isobutyl benzoate	x			
	Methyl acetophenone	61, 155, x			
	Methyl anthranilate	61, 155, x	695	8,260	11.89
	Methyl phenyl acetate	61, 155, x			
	Methyl phthalol	x			
	b-Naphthol ethyl ether (neroline).	x			
	b-Naphthol methyl ether (yara yara).	x			
	Phenyl acetaldehyde	61, 155			
	Phenyl ethyl acetate	61, x			

TABLE 7.—*Production of finished coal-tar products during 1919*—Continued.

Schultz No.	Common name.	Manufacturers' identification numbers.	Total production, 1919.		Average per price pound.
			Quantity.	Value.	
	PERFUME MATERIAL—contd.		*Pounds.*		
	Phenyl acetic acid	x			
	Phenyl ethyl alcohol	x			
	Salicylic aldehyde	x			
	Total perfumes		41,419	$164,302	$3.97
	SYNTHETIC PHENOLIC RESINS.				
	Derived from cresol	39, 126, x			
	Derived from phenol	39, 126, x			
	Derived from solvent naphtha	x			
	Derived from p-coumarone	15,53			
	Total resins		3,094,534	2,311,358	.75
	SYNTHETIC TANNING MATERIAL.				
	Liberty extract	92			

The following table shows a comparison of the published figures for 1918 and 1919:

TABLE 8.—*Comparison of production of finished coal-tar products, 1918 and 1919.*

Schultz No.	Name of dye.	Production, 1918.			Production, 1919.		
		Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
	Total finished coal-tar products	*Pounds.* 78,802,959	$83,815,746	$1.09	*Pounds.* 82,532,390	$84,585,544	$1.03
4	Naphthol green	22,465	54,013	2.40	34,646	38,831	1.121
9	Direct yellow R	307,702	804,378	2.61	440,924	767,674	1.741
	MONOAZO DYES.						
32	Butter yellow	27,660	30,979	1.12	31,156	47,964	1.54
33	Chrysoidine Y	376,495	290,363	.77	314,581	326,223	1.037
34	Chrysoidine R	137,035	166,826	1.22	220,542	248,977	1.12
36	Sudan I	29,670	37,188	1.25	75,868	97,288	1.282
37	Croceine orange	30,824	27,388	.89	17,274	15,273	.884
48	Alizarin yellow GG	2,233,208	1,525,617	.68	163,170	116,906	.717
58	Alizarin yellow R	385,910	352,940	.91	130,424	110,152	.845
82	Ponceau 2 R	1,189,054	937,502	.79	552,680	439,515	.795
112	Bordeaux B	200,115	205,355	1.02	161,862	146,810	.907
145	Orange II	916,890	619,034	.68	1,133,925	717,199	.633
161	Fast red A	242,215	249,251	1.03	267,582	280,974	1.05
163	Azo rubine	79,779	120,308	1.51	187,264	267,129	1.427
168	Amaranth	73,539	64,440	.88	294,416	877,491	2.98
173	Lithol red R	353,104	838,873	2.38	269,169	103,926	.386
181	Salicine black U	460,159	758,386	1.62	739,272	923,888	1.25
	Total monoazo dyes	8,581,763	9,228,280	1.07	8,881,810	11,560,384	1.3016
	DISAZO DYES.						
217	Algame black 10B	1,158,309	1,103,043	1.26	1,877,860	2,757,443	1.468
227	Brilliant croceine	84,643	162,875	1.92	157,509	379,494	2.409
283	Bismark brown Y	378,208	305,417	.81	412,574	417,276	1.011
284	Bismark brown 2R	295,080	286,664	.97	631,308	659,332	1.044
303	Paper yellow	1,664	5,668	3.41	48,723	61,711	1.266
304	Chrysophenine G	41,663	238,012	5.71	86,795	219,215	2.525
307	Congo red	587,153	1,178,589	2.01	873,734	979,285	1.120

TABLE 8.—*Comparison of production of finished coal-tar products, etc.*—Contd.

Schultz No.	Name of dye.	Production, 1918.			Production, 1919.		
		Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
	DISAZO DYES—continued.						
		Pounds.			*Pounds.*		
337	Benzo blue 2B	1,523,985	$2,084,036	$1.37	$1,380,335	$1,386,291	$1.004
340	Benzo orange R	50,422	78,722	1.56	42,807	37,820	.883
342	Chrysamine G	28,846	44,159	1.53	51,279	73,723	1.358
363	Benzo purpurine 4B	356,522	875,645	2.46	288,021	517,706	1.797
391	Benzo blue 3B	99,645	221,771	2.23	182,946	399,066	1.689
	Total disazo dyes	7,459,601	12,705,048	1.70	9,307,768	14,401,615	1.55
	TRISAZO DYES.						
474	Oxamine green B	295,147	649,125	2.20	305,854	565,873	1.850
475	Oxamine green GX	29,118	60,860	2.16	136,638	291,758	2.135
	Total trisazo dyes	7,518,099	8,105,563	1.08	8,829,578	10,217,788	1.157
	Total azo dyes	24,931,556	32,039,232	1.28	27,191,371	36,416,702	1.34
	DIPHENYLMETHANE DYES.						
493	Auramine	45,634	171,807	3.76	127,567	392,744	3.078
	TRIPHENYLMETHANE DYES.						
445	Malachite green	290,416	1,626,466	5.60	560,301	1,827,474	3.261
512	Magenta	71,675	553,359	7.72	155,830	712,086	4.592
515	Methyl violet	632,196	1,756,775	2.78	574,436	1,403,179	2.442
536	Alkali blue	43,184	359,897	8.33	77,796	494,133	6.352
	Total triphenylmethane dyes	1,262,704	5,791,588	4.59	1,761,742	6,494,720	3.69
	XANTHONE DYES.						
587	Eosine	161,153	1,258,549	7.81	121,303	764,179	6.30
	THIOBENZENYL DYES.						
616	Primuline	72,788	221,154	3.04	271,338	464,876	1.713
617	Columbia yellow	123,816	410,250	3.56	51,077	143,831	2.66
	OXAZINE AND THIAZINE DYES.						
626	Gallocyanine	435,460	2,231,827	5.12	365,243	1,105,346	3.026
659	Methylene blue	312,572	873,804	2.80	465,992	1,410,760	3.03
	AZINE DYES.						
679	Safranine	106,591	623,560	5.85	131,042	527,231	4.023
681	New fast gray	16,746	19,662	1.17	28,458	48,544	1.706
697	Induline (spirit soluble)	8,589	12,551	1.46	436,201	231,233	.530
698	Nigrosine (spirit soluble)	314,151	222,986	.71	346,167	245,508	.709
699	Induline (water soluble)	91,724	64,495	.70	130,704	87,494	.669
709	Nigrosine (water soluble)	1,191,343	755,846	.63	1,660,149	987,457	.595
	SULPHUR DYES.						
721	Sulphur black	12,385,130	4,427,507	.37	14,504,770	4,141,124	.286
	Sulphur blue	1,056,691	1,525,762	1.45	1,622,762	1,797,469	1.108
	Sulphur brown	5,309,044	2,558,995	.48	805,861	378,129	.47
	Sulphur green or olive	364,698	296,840	.81	277,641	279,149	.941
	Sulphur yellow and orange	521,421	567,060	1.09	276,400	228,441	.83
	Sulphur tan	337,549	219,280	.65	81,905	27,567	.337
	Total sulphur colors	23,698,826	10,812,686	.46	17,624,418	6,901,734	.392
	INDIGO AND ITS DERIVATIVES.						
874	Indigo, synthetic	3,083,888	2,724,134	.88	8,863,824	5,233,719	.591
877	Indigotine or indigo extract	1,434,703	883,668	.62	1,699,670	1,093,724	.644
	Total dyes	58,464,446	62,026,390	1.07	63,402,194	67,598,855	1.07
	COLOR LAKES.						
	Blue	753,244	416,131	.50	543,201	391,210	.72
	Green	1,042,803	278,168	.27	466,977	214,697	.46

TABLE 8.—*Comparison of production of finished coal-tar products, etc.*—Contd.

Schultz No.	Name of dye.	Production, 1918.			Production, 1919.		
		Quantity.	Value.	Price per pound.	Quantity.	Value.	Price per pound.
	COLOR LAKES—continued.						
		Pounds.			*Pounds.*		
	Maroon	632,826	$237,322	$0.38	697,699	$260,769	$0.37
	Orange	694,350	374,456	.54	246,710	92,291	.374
	Para red	165,039	141,857	.86	484,306	148,152	.306
	Red	1,828,942	844,450	.46	2,101,527	986,765	.47
	Scarlet	1,258,364	720,640	.57	865,536	361,904	.42
	Violet	245,017	233,196	.95	259,378	345,078	1.330
	Yellow	1,913,123	626,922	.33	610,445	238,321	.39
	Eosine	303,511	312,352	1.03	524,030	530,804	1.01
	Lithol red	632,663	801,765	1.27	565,316	570,687	1.01
	Total color lakes	9,590,537	5,020,023	.52	7,569,921	4,179,964	.55
	PHOTOGRAPHIC CHEMICALS.						
	Hydroquinone	305,774	659,488	2.16	272,329	552,087	2.03
	Methyl p-amidophenol sulphate (Metol)	10,975	164,427	14.98	59,024	508,434	8.61
	Total photographic chemicals	316,749	823,915	2.60	335,509	1,059,340	3.16
	MEDICINALS.						
	Acetanilide, U. S. P	939,062	615,158	.66	918,795	440,066	.479
	Acetylsalicylic acid (aspirin)	961,113	3,130,640	3.26	1,777,105	4,034,400	2.27
	b-Naphthol benzoate	13,975	96,144	6.88	36,761	156,562	4.266
	Phenolsulphonates	55,913	40,013	.72	33,711	16,233	.485
	Salol	271,945	405,072	1.49	124,034	112,359	.906
	Sodium salicylate	547,117	499,804	.86	301,548	169,568	.562
	Total medicinals	3,623,352	7,792,984	2.15	6,777,988	7,883,071	1.16
	FLAVORS.						
	Saccharin	425,600	4,489,617	10.55	547,988	1,017,091	1.856
	Total flavors	458,256	4,925,627	10.75	610,825	1,318,654	2.16
	PERFUME MATERIALS.						
	Benzyl acetate	30,193	101,284	3.35	17,049	39,137	2.296
	Total perfume materials	116,263	584,695	5.03	41,419	164,302	3.966

DYES.

In Table 9 the dyes have been arranged according to the method of application on the fiber into the following classes: (1) Direct dyes; (2) vat dyes, further subdivided into indigo and other vats; (3) acid dyes; (4) sulphur dyes; (5) mordant dyes; (6) basic dyes; (7) color lake and spirit soluble dyes; (8) unclassified dyes. The available information on dyes including imports during the 1914 fiscal year and domestic production from 1917 to 1919 inclusive has been arranged in this manner and the totals for each group are shown in Table 9.

Although the distinction between certain groups is not clear cut, particularly between acid and mordant dyes, still it is believed that this grouping more nearly reflects the progress in the industry than does that of Tables 7 and 8, which classify the dyes according to

chemical structure. This is especially true from the consumer's standpoint, as he is directly concerned with the application of the dye on the fiber. This same information is also shown graphically in figure 1, page 45.

TABLE 9.—*Comparison of imports, 1914, with the production of dyes by classes, 1917, 1918, and 1919.*

Class.	1914		1917		1918		1919	
	Imports.	Per cent of total.	United States production.	Per cent of total.	United States production.	Per cent of total.	United States production.	Per cent of total.
	Pounds.		*Pounds.*		*Pounds.*		*Pounds.*	
Direct	10,264,757	22.34	11,181,761	24.32	12,285,683	21.01	14,444,954	22.78
Vat (including indigo)	10,352,663	22.53	289,296	.63	3,281,337	5.61	9,252,982	14.59
(*a*) Indigo	8,407,359	.....	274,771	.....	3,083,888	.....	8,863,824	.....
(*b*) Other vats	1,945,304	.....	14,525	.....	197,449	.....	389,158	.....
Acid	9,286,501	20.21	9,372,121	20.38	9,799,071	16.76	12,195,968	19.24
Sulphur	7,053,879	15.35	15,588,222	33.91	23,698,826	40.53	17,624,418	27.80
Mordent	4,450,442	9.69	4,164,602	9.06	5,447,192	9.32	3,985,050	6.29
Basic	3,002,480	6.53	2,073,013	4.52	2,879,639	4.93	4,036,532	6.37
Dyes for color lakes and spirit soluble dyes	1,512,605	3.29	954,360	2.03	1,068,466	1.83	1,813,199	2.86
Unclassified	27,568	.06	2,368,541	5.15	4,232	.01	49,111	.07
Total	45,950,895	100.00	45,977,246	100.00	58,464,446	100.00	63,402,194	100.00

Direct dyes.—From a study of Table 9 and figure 1 it is seen that in 1917 the domestic production of direct dyes slightly exceeded the 1914 import. There has been a small but steady increase each succeeding year culminating in an output of over 14,000,000 pounds in 1919. This is an increase of about 40 per cent over the prewar imports and of 17.5 per cent over the 1918 output. This class of colors ranked second in quantity of output in 1919 and accounted for about 22 per cent of both the 1914 import and 1919 production. Of more importance than the increased output was the decrease in quantity of the dyes of lesser importance in this group, which was more than offset by an increased output of the better dyes and the appearance of new dyes of a faster type. Thus there was a greater variety of direct dyes from which the consumer could make his selection for dyeing cotton, half wool, and half silk goods.

Direct Deep Black EW with a total output in 1919 of 7,250,007 pounds valued at $7,521,343, an increase over 1918, accounted for over 50 per cent of the production of direct dyes. Benzo Blue 2B ranked second in this group with an output of 1,380,335 pounds valued at $1,386,291, a slight decrease from 1918.

Other important dyes in this class which showed an important gain in quantity produced in 1919 were as follows: Congo Red, increased by 50 per cent; Primuline, by 300 per cent; Benzo Blue 3B, by 100 per cent; and Chrysamine G, by 100 per cent: and Oxamine

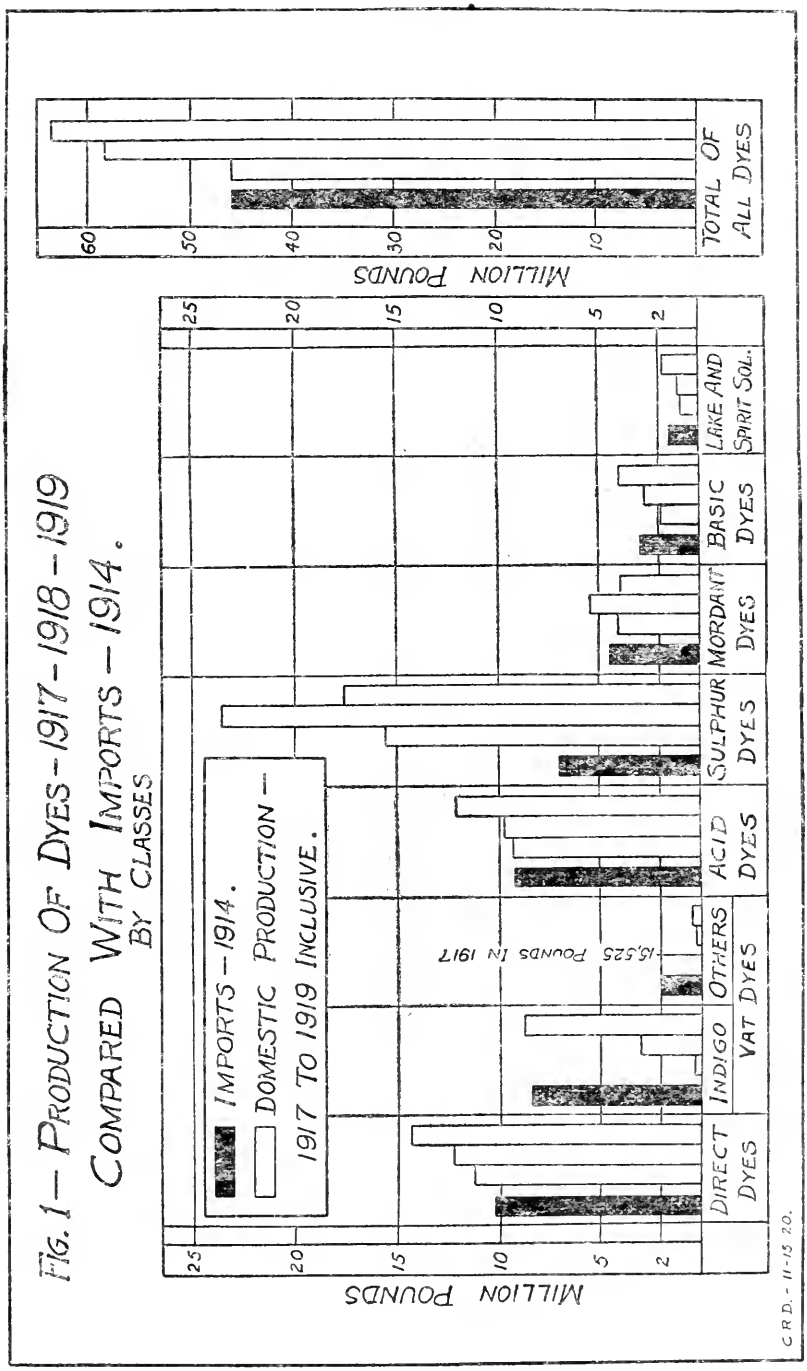
FIG. 1— PRODUCTION OF DYES—1917-1918-1919 COMPARED WITH IMPORTS—1914.
BY CLASSES
IMPORTS—1914.
DOMESTIC PRODUCTION—1917 TO 1919 INCLUSIVE.
MILLION POUNDS
25
20
15
10
5
2
15,525 POUNDS IN 1917
DIRECT DYES
INDIGO
OTHERS
VAT DYES
ACID DYES
SULPHUR DYES
MORDANT DYES
BASIC DYES
LAKE AND SPIRIT SOL.
MILLION POUNDS
60
50
40
30
20
10
TOTAL OF ALL DYES
C R D. - 11-15 20.

Black B. H. N., Oxamine Green B, Benzazurine, and Oxamine Green G, also showed large increases over the output of 1918, which could not be published.

The following direct colors made their first appearance in 1919: Those produced in considerable quantity include Chloramine Black N, Diamine Fast Red F, Chloramine Blue 3G, Cotton Black E, Chicago Blue 6B, Dianil Blue B, Chloramine Green B, Diamine Violet N, Oxydiamine Orange R, Chicago Blue R and W, and Erica B; others produced in smaller quantities than those already mentioned include: Erica 2GN, Diazo Blue Black RS, Congo Corinth, Benzo Black Blue R, Diamine Brown, Benzo Fast Scarlet, Titian Red 3B, Azo Blue, Brilliant Hessian Purple, Salmon Red, Benzo Brown 5R, Rosephenine 10B, Thio-flavine S, Benzo Blue R, and Geranine. Several other important direct dyes were produced in large quantities. These could not be identified according to Schultz but are included in the total for this class.

Indigo and other vat dyes.—It is in this class of dyes that the domestic industry has been particularly backward, and in 1919 the quantity of vat dyes, with the exception of indigo which is the most important, was still inadequate for domestic needs.

The production of indigo (20 per cent paste) during 1919 of 8,863,824 pounds, a slight increase over 1914 imports, may be regarded as the most important development of the American dye industry in 1919. The output exceeded the domestic demand and large quantities of indigo were exported. Of all the dyes produced in this country indigo ranks second only in quantity to sulphur black, but exceeds it by over $1,000,000 in value. Bromindigos, which are of great value for cotton dyeing and printing, were manufactured in considerable quantity in 1919.

The manufacture of vat dyes, not including indigo, is less developed and the output more inadequate for our domestic needs than any other class. During 1919 four vat dyes (yellow, blue, green, and violet) were placed on the market during 1919 by one firm, but the output was only a small fraction of the domestic demand. A second firm announced the production of three vat dyes in 1920. Other concerns have also worked on vat colors, several of which, including two yellows and a red, have already been offered for sale. This indicates that fundamental developments in this field are under way and an increased output of vat colors during 1920 may be expected. The manufacture of these dyes has required the highest technical skill, long research, and a large investment of capital. On account of the present small domestic production they are probably the most needed of all, although the normal quantity consumed

annually is smaller than that of other classes of dyes. They are used for dyeing and printing fast colors on cotton and, to a lesser extent, on silk.

Vat dyes, other than indigo, were imported during 1914 to the extent of nearly 2,000,000 pounds or about 4 per cent of the total for that year. The production of these dyes in 1919 was about 390,000 pounds or only one-fifth of the prewar requirements. The future development of a balanced industry will necessitate a greatly increased output of these dyes. This will be possible only when an increased output of anthracene or synthetic anthraquinone has been attained. The development of a variety of vat colors should also include the manufacture of thio-indigoids.

Acid dyes.—The prewar imports of acid dyes were equaled by the domestic output in 1917. Since then the production has increased each year, amounting in 1919 to 12,000,000 pounds, which is an increase of nearly one-fourth the 1918 output and about 30 per cent in excess of the 1914 import. Acid dyes rank third in the quantity produced in 1919 and accounted for about 19 per cent of the total output of dyes. This group of dyes ranks next to sulphur dyes, in being the most fully developed in the domestic industry. The consumer should have no trouble in securing a good variety and quantity of acid dyes.

In quantity produced during 1919, the most important dyes in this class were Algama Black 10 B, with a production of 1,877,860 pounds, an increase of 62 per cent over 1918; Indigotine, or indigo extract, 1,699,670 pounds, an increase of 18.5 per cent; and Nigrosine (water soluble), 1,660,149 pounds, an increase of 39 per cent over 1918. Other dyes in this class which showed an important gain in 1919 as against 1918 were: Metanil Yellow, which increased by 100 per cent; Cochineal Red, 400 per cent; and Alizarin Saphirol B, Fast Red A, Azo Rubine, Brilliant Crocein, and Victoria Violet also showed marked increase over 1918 figures which would not be published.

Eosine, Bordeaux B, and Ponceau 2 R showed a marked decline in output during 1919.

Among other important dyes of this class are the following: Naphthol Yellow, Alkali Blue, Tartrazine, Amaranth, Guinea Green, Scarlet EC, Fast Red VR, Resorcin Brown, Azo Yellow and Violet, Sulphonic Acid Blue R, Buffalo Black 10 B, Wool Red B, Chromotrope 6 B, Fuchsine B.

Among the acid dyes produced for the first time in 1919 there may be mentioned Uranine, Sulphonic Acid Blue B, Chromotrope 10 B, Brilliant Cochineal, Wool Green S, Erio-glaucine, Erythrine B, Cloth Red G, Crocein 3 B, Neptune Green, Light Green, Fast Sulphon Black F, Ponceau G.

Sulphur dyes.—In quantity output the sulphur dyes have ranked first each year beginning with 1917, although they ranked only fourth in prewar imports. The domestic output in 1917 was over 15,000,000 pounds, or more than double the imports of 1914. There was an increase to a maximum in 1918 of more than 23,000,000 pounds. During 1919 the output decreased by one-fourth—to 17,624,418 pounds, which is still two and one-half times the prewar import. This reduction is more than accounted for in a decrease of over 8,000,000 pounds in sulphur olives and khakis required in cotton uniform cloth.

Of the total production of dyes in 1919, 28 per cent was sulphur colors; in 1918, 40 per cent, and of the 1914 imports 15 per cent. The production of Sulphur Black is larger than that of any other individual color. In 1919 it was 14,504,770 pounds, an increase of 17 per cent over 1918. This output was 260 per cent greater than the 1914 import of sulphur blacks. The production of Sulphur Blue increased over 50 per cent, to 1,622,762 pounds. Several new sulphur colors—maroon, bronze, orange, and blues—were added to the list in 1919. The sulphur dyes produced in 1919 were of greater purity and higher concentration than those of the previous year. The production of this class is the most highly developed of all classes of colors, and is in excess of the domestic needs so that large quantities have been exported. Sulphur Corinth was practically the only sulphur dye for which no production was reported in 1919. In the absence of vat dyes sulphur dyes have been of special value to the cotton trade.

Mordant dyes.—As is shown in Table 9 this class of dyes in 1917 had reached an output only slightly less than the 1914 import and in 1918 increased to about 5,500,000 pounds, or about 22 per cent in excess of the prewar import. During 1919 the production declined nearly 27 per cent to slightly less than 4,000,000 pounds. This decrease is accounted for by a reduced output of those dyes used in military uniforms—chiefly by Alizarin Yellow GG and Alizarin Yellow R (not true alizarin derivatives) used for khaki shades on woolen cloth and, to a lesser extent, by Gallocyanine used for blue Navy uniforms. Of these dyes the largest decrease in production was that of Alizarin Yellow GG, from over 2,000,000 pounds in 1918 to 160,000 pounds in 1919. If the dyes of this group used for military uniforms are eliminated, then the remaining mordant dyes show a substantial increase.

Marked progress has been made during 1919 in solving the diverse technical problems involved in the manufacture of mordant dyes, particularly those made from anthracene. Probably the most important development in mordant dyes is the large increase shown in the output of Alizarin. The availability of this dye, which is one

of the fastest known, filled an important requirement of dye consumers. Mordant dyes which appeared for the first time in 1919 include Alizarin SX, Galleine, Brilliant Alizarin Blue, Alizarin Green B, Alizarin Orange, Alizarin Garnet, and Coerulein, all of which are important in arriving at a complete dye industry. The successful production of several of these dyes represents intensive research work over an extended period and the investment of a large amount of capital for their commercial output.

Considerable increase was made in those dyes the manufacture of which had been previously established. The most important of these include Salicine Black U, which increased 57 per cent; and Erio Chrome Black A, and Diamond Black, which showed a large increase over 1918.

As previously pointed out the production of mordant dyes of the faster types derived from alizarin is entirely dependent upon an adequate supply of anthracene or synthetic anthraquinone.

The production of mordant dyes for 1919, grouped by color, was as follows:

	Pounds.
Blacks	1,691,064
Yellows	570,663
Blues	473,367
Browns	462,342
Reds	249,093
Greens	214,336
Violets	24,185

Color lake and spirit soluble dyes.—This class of dyes, as can be seen by referring to Table 9, in quantity produced are the least important, amounting in 1919 to less than 3 per cent of the total. But their importance can not be estimated by quantitative production, as they are used largely in the manufacture of color lakes, a very important class of pigments for paint, lithographic ink, and other industries.

The output of these dyes has doubled from 1917 to 1919, or from 934,360 pounds to 1,813,199. The 1919 output is 20 per cent in excess of the 1914 imports. Induline spirit soluble and nigrosine spirit soluble, with an output of 436,201 and 346,167 pounds, respectively, account for 43 per cent of the total production of these dyes. Important spirit soluble dyes also include Sudan I, Butter Yellow, Sudan Brown, Oil Red, Sudan II, Sudan IV, Spirit Yellow R and G.

There were three important dyes used for color lakes produced for the first time in 1919, namely—Lake Red C, Permanent Red 4 B, and Pigment Chlorine.

Dyes used in color lake manufacture include Lithol Red R, with an output in 1919 of 269,169 pounds valued at $103,926. Other impor-

tant dyes of this class include: Para Red, Helio Fast Red, Lake Red D, and Pigment Scarlet G.

Decreased consumption of natural dyes.—In 1916 the scarcity of coal-tar dyes led to an abnormal consumption of natural dyes. Since then the steady increase in the domestic output of coal-tar dyes has caused a marked decrease in the use of natural dyes. This forced use of natural dyes demonstrated their merits for certain purposes and has extended their field of application. Competition between natural and synthetic dyes results largely, but not entirely, in a victory for coal-tar dyes.

Imports of the more important natural dyes have shown a general decrease from 1916 to 1919. The total imports of crude logwood for consumption for the calendar year 1919 were 29,022 tons, as compared with 33,168 tons in 1918, and 40,921 tons in 1914. Logwood, the most important natural dye, is used chiefly for the production of blacks on silk, leather, and wool. It has advantages for black dyeing on silk and leather not possessed by artificial dyes. It also has extensive use for the production of black on wool. Natural indigo imports for consumption also declined from 1,637,914 pounds in 1918 to only 234,991 pounds in 1919, and in all probability will soon be negligible as was the case prior to the war.

Quercitron, the most important natural dye of domestic origin, is prepared from the bark of the black oak (*Quercus tinctoria*). It has extensive use in the dyeing of yellows, olive, and khaki shades.

OTHER FINISHED COAL-TAR PRODUCTS.

Color lakes.—The coal-tar products included in this group are a class of pigments used for paints, lithographic inks, and many other purposes. They are made by "fixing" a coal-tar dye on an inert base material, such as aluminum hydroxide, or barium sulphate (blanc fixe).

The total output of coal-tar color lakes in 1919 was 7,569,921 pounds, or a decrease of 25 per cent from 1918. Red lakes were first with an output of 3,151,149 pounds, or 42 per cent of total lakes. Of this quantity about 17.9 per cent was Lithol Red and 15.3 per cent Para Reds. The other important lakes in order of production in 1919 were scarlet, maroon, yellow, blue, eosine, green, violet, and orange.

Photographic chemicals.—The total output of coal-tar products used as developers in photography increased from 316,749 pounds in 1918 to 335,509 pounds in 1919. Hydroquinone, the most important product in this group, decreased 11 per cent in output to 272,329 pounds. Methyl p-amidophenol sulphate (metol), another impor-

tant photographic developer, showed more than a 400 per cent increase in production in 1919, as against that of 1918.

Medicinals.—The production of coal-tar medicinals in 1919, exclusive of deducting 2,103,101 pounds of disinfectants—a product not reported in 1918—showed an increase of 1,051,535 pounds, or 29 per cent more than the 1918 production. The total output, including the disinfectants, was 6,777,988 pounds, valued at $7,883,071.

Acetylsalicylic acid (aspirin) in 1919 accounted for over one-half of the total value of medicinals, the quantity produced being 1,777,105 pounds, or nearly double the 1918 output.

A large increase was reported in the production of acetphenetidine, chloramine T, phenolphthalein, neoarsphenamine, b-naphthol benzoate, guaiacol crystals U. S. P., and guaiacol liquid; while the following products showed a decrease in output: Arsphenamine, bismuth b-naphthol, bismuth tribromphenol, dichloramine T, phenolsulphophthalein and phenolsulphonates.

The following are among the medicinals which were reported in 1919 for the first time: Anesthesine (ethyl p-amino benzoate), cinchophen (phenylcinchoninic acid), dibromoxy-mercury-fluorescin, copper sulphocarbolate, sodium sulphocarbolate, zinc sulphocarbolate, creosote carbonate, guaiacol carbonate, b-naphthol salicylate, amyl salicylate, and ammonium salicylate. The progress made during 1919 in the production of a greater variety of coal-tar medicinals is an important addition to the American coal-tar industry.

Flavors and perfume materials.—Further progress was made during 1919 in the manfacture of flavors and perfume materials derived from coal tar. There is no sharp difference between these products, many of them being suitable for both flavors and perfumes. One of them, here considered as a flavor, is the substance saccharin, which in recent years because of the scarcity and high price of sugar, has had extensive use as a sugar substitute, and also as a sweetener in chewing tobacco. The output of saccharin was 547,988 pounds, valued at $1,017,091, or an increase of nearly 29 per cent over 1918. This increase was made possible through the release from military control of toluene, the raw material. The average price of saccharin decreased to $1.86 per pound as compared with $10.55 in 1918.

Coumarin, used both as a flavor and as a perfume in scented soaps, has more than doubled in output from 1917 to 1919. Synthetic coumarin has practically replaced the natural product derived from tonka beans.

Benzyl benzoate and benzyl acetate, ordinarily considered as perfume materials, were used in large quantities as solvents in the manufacture of varnish for aeroplane wings. Recently benzyl benzoate has been used with considerable success as a nonnarcotic antispas-

modic. The output of both products decreased in 1919. The output of benzyl benzoate in 1919 was less than one-twelfth the 1918 production, while benzyl acetate decreased nearly 50 per cent. Perfume materials whose output increased in quantity during 1919 include: Bromstyrol, cinnamic alcohol, methyl acetophenone, methyl anthranilate, and methyl phenylacetate. Several perfume chemicals were reported in 1919 for the first time.

Synthetic resins.—Although the total 1919 output of synthetic resins was about the same as in 1918, the production of individual resins differed widely. Those resins, derived from phenol by condensation with formaldehyde and hexamethylenetetramine increased in quantity as compared with the 1918 figures. As a direct effect of this increase there was a decrease in output of resins obtained from cresol, a subsittute for phenol during the war. Resins made by condensation of solvent naphtha and paracoumarone showed an increased output in 1919. The synthetic phenolic resin industry, the products of which have many different uses, was created by inventions of American chemists. The development in the last few years has been achieved by laborious and painstaking research conducted with an intimate knowledge of the requirements in other industries in which these products are now used.

Synthetic tanning materials.—Synthetic tanning materials are of comparatively recent origin, having come into commercial use in Germany and England since 1912. They are made by the condensation of certain coal-tar derivatives and formaldehyde in the presence of an acid. They have proved their value for tanning, but they are sometimes sold in combination with a small amount of natural tanning extract. Their use results in (1) great economy of time required for tanning; (2) a satisfactory leather of light color, and (3) a reduction in the quantity of natural tanning extracts required. As the supply of domestic natural tanning materials is decreasing, the domestic tanning industry is becoming more and more dependent upon natural tanning materials of foreign origin. These synthetic products, therefore, promise to be of great importance in the future of the domestic industry. A single firm in this country reported the manufacture of these materials in 1919.

EMPLOYEES AND RATES OF PAY.

Employees and rates of pay.—Each of the 214 firms reporting the manufacture of coal-tar chemicals was asked to report the number of its employees receiving specified rates of pay on December 15, 1919, or the nearest representative date for which records were available. Twenty-four firms found it impracticable to give

the information. In most of these cases the primary products were not derived from coal tar and the departments were not separately organized in such a way that the number of men engaged in the manufacture of any one class of products could be definitely stated. Certain other firms had gone out of business during 1919.

One hundred and ninety-one firms reported a total of 24,736 employees engaged in the manufacture of coal-tar products, of which 2,605, or 10.5 per cent, were chemists or engineers. This is probably a larger proportion of technically trained men than will be found in any other important manufacturing industry in the United States. Employed in the main under the immediate or general direction of these technically trained men were 22,131 skilled artisans and unskilled laborers. This is an increase over 1918 of 369 in number of the first group, but a decrease of 2,861 in the number of employees without technical training.

Table 10 shows the number and percentage of employees engaged in manufacturing operations receiving specified rates of pay in each of the groups of technically trained and untrained men; and the percentage of the total of each group of employees receiving each specified rate of pay or more. The proportion of technically trained men receiving the higher rates of compensation is much greater than the proportion of untrained men. For example, 57.4 per cent of the technically trained men receive $40 or more per week, whereas only 12.7 per cent of the employees without technical training received $40 or more per week. Thirty-two per cent of the technically trained men received $50 or more per week, whereas only 2.6 per cent of the men without technical training received that sum.

TABLE 10.—*Employees and rates of pay.*

Wages per week.	Number of employees at each specified wage engaged in manufacturing operations.			Percentage receiving each specified wage.		Percentage receiving each specified wage or more.	
	Chemists and technically trained men.	Men without technical training.	All employees.	Of all chemists and technically trained men.	Of all men without technical training.	Of all chemists and technically trained men.	Of all men without technical training.
Under $10	1	120	121	0.04	0.54	100.00	100.00
$10, but under $15	6	440	446	.23	1.99	99.96	99.46
$15, but under $20	95	1,177	1,272	3.65	5.32	99.73	97.47
$20, but under $25	168	5,221	5,389	6.45	23.59	96.08	92.15
$25, but under $30	251	5,407	5,658	9.63	24.43	89.63	68.56
$30, but under $35	312	4,042	4,354	11.97	18.27	80.00	44.13
$35, but under $40	277	2,922	3,199	10.63	13.20	68.03	25.86
$40, but under $15	440	1,457	1,897	16.89	6.58	57.40	12.66
$15, but under $50	220	761	981	8.45	3.44	40.51	6.08
$50, but under $75	505	554	1,059	19.39	2.50	32.06	2.64
$75 and over	330	30	360	12.67	.14	12.67	.14
Total	2,605	22,131	24,736	100.00	100.00	.....	.....

A comparison with the corresponding figures for 1918 shows that wages during 1919 were substantially higher than in 1918. Especially was this true of employees without technical training, and technically trained employees who received less than $50 per week. For example, during 1918, 15.4 per cent of all employees without technical training received less than $20 per week whereas in 1919 only 7.8 per cent of such employees received less than $20 per week. Moreover in 1918, 5.9 per cent of all chemists or technically trained men received less than $20 per week whereas in 1919 only 3.9 per cent were receiving less than this weekly rate. During the same time the group of men without technical training receiving rates of pay greater than $20 per week increased by 7.6 per cent whereas chemists and technically trained men increased by only 2 per cent. At the high rates, however, this increased percentage is quite reversed. For example, there was an increase of 6.3 per cent in the group of technically trained men receiving $40 per week or more as compared with an increase of 0.5 per cent of employees without technical training.

In Table No. 11 a comparison is made of the percentages of technically trained men and men without technical training for 1918 and 1919. There was little change in 1919 as compared with 1918 in the percentages of both classes of men receiving the higher rates of pay ($50 and more per week).

Table 11 shows very clearly the great dependence of the industry on its technically trained employees.

TABLE 11.—*Comparison of employees, rates of pay, 1918 and 1919.*

Wages per week.	Percentage receiving each specified wage or more.					
	Of all chemists and technically trained men.			Of all men without technical training.		
	1918	1919	Increased percentage.	1918	1919	Increased percentage.
$10, but under $15	99.7	99.9	0.2	98.2	99.5	1.3
$15, but under $20	98.4	99.7	1.3	94.6	97.5	2.9
$20, but under $25	94.1	96.1	2.0	84.6	92.2	7.6
$25, but under $30	86.1	89.6	3.5	63.6	68.6	5.0
$30, but under $35	76.9	80.0	3.1	43.0	44.1	1.1
$35, but under $40	62.9	68.0	5.1	22.3	25.9	3.6
$40, but under $45	51.2	57.4	6.2	12.2	12.7	[1].5
$45, but under $50	40.4	40.5	.1	6.5	6.1	.4
$50, but under $75	32.6	32.1	[1].5	2.6	2.6	.....
$75 and over	16.9	12.7	[1]4.2	.1	.1	.....

[1]Decrease.

RESEARCH WORK.

Of the total of 214 firms, 65 had separately organized research laboratories for the solution of technical problems in the manufacture

of their products and for the discovery of new products. During 1919 the net operating expenses of these research laboratories, together with the cost of research work done in the laboratories not separately organized for research, was $4,274,247. This includes salaries, apparatus, and materials, after deducting the value of salable products made in research laboratories. This figure is probably an understatement of the real cost of experimental work, since it does not include in all cases the cost of experimental work done as a part of manufacturing operations and not shown on the books of the companies as a charge against research.

NOTES ON DYE INDUSTRIES IN OTHER COUNTRIES.

Germany.—About 90 per cent of the productive capacity of German dye factories is located within the territory occupied by the allied and American troops. Inspection by the military authorities has disclosed the fact that during the war plants which formerly had manufactured dyes were engaged in a large scale production of explosives, and of poisonous gases. An inventory of the stocks of dyes on hand as of August 15, 1919, showed that the total was approximately 20,000 tons, which is probably about one-tenth of their annual prewar production.

Production of dyes in Germany during the first year after the signing of the armistice was practically negligible compared with the prewar output. Beginning with February, 1920, detailed statements of one-quarter of the monthly production (this portion is required to be reserved for optional purchases of the allied and associated Governments by the peace treaty, Annex VI, Part II) of every dye in each factory were made to the Reparations Commission. Copies of these monthly statements through October, 1920, have been received by the Department of State, which has given permission for their publication by the Tariff Commission. A summary of these reserved stocks in German dye plants is shown in Table 12.

During February, 1920, the quantity of dyes reserved by German plants totaled 876,449 pounds, indicating a total output of over 3,500,000 pounds for that month. A progressive increase is shown in each succeeding month to a maximum of 3,026,247 pounds in August, which indicates a total output of over 12,000,000 pounds monthly. Since August there has been a slight decline in reserved stocks to 2,779,132 pounds in October. The rate of production from July to October inclusive is only about one-third of Germany's prewar output.

TABLE 12.—*One-quarter of production in German dye plants[1] reserved for purchase of allied and associated governments, February to October, 1920.*

[Pounds.]

Group.	Classification of colors.	February.	March.	April.	May.	June.	July.	August.	September.	October.	Total for 8 months.
I	Alizarin red	28,629	100,347	79,070	124,401	241,194	206,251	210,228	198,632	215,028	1,403,880
II	Indigo paste	33,203	124,258	306,371	338,318	291,294	543,747	777,774	642,729	126,599	3,484,293
III	Vat colors, except Indanthrene Blue GCD	15,346	9,361	19,577	62,183	41,786	72,595	54,828	62,608	84,366	422,650
IV	Indanthrene Blue	3,135	.....	3,307	9,489	11,329	14,420	9,370	16,043	1,131	68,224
V	Alizarin colors other than red	17,240	22,862	40,622	54,643	92,022	63,411	69,612	88,658	58,440	507,510
VI	Direct colors for cotton	262,123	346,301	400,221	451,138	541,534	694,709	573,004	593,694	666,239	4,528,963
VII	Direct colors	63,402	51,495	54,586	44,687	88,131	126,983	113,975	95,439	117,562	756,258
VIII	Acid colors for wool	149,827	202,819	265,094	360,192	419,842	512,594	469,589	492,647	487,131	3,359,735
IX	Chrome colors for wool	61,313	91,257	95,605	182,287	182,647	195,246	200,504	208,760	216,057	1,383,676
X	Basic colors	19,912	44,374	72,289	106,555	124,035	126,723	141,595	163,661	151,145	953,289
XI	Sulphur colors	163,822	149,452	235,423	190,515	305,979	323,170	291,832	285,804	262,744	2,208,741
XII	Lake colors	56,958	164,229	156,163	150,085	170,742	136,196	110,838	73,565	92,690	1,111,466
XIII	Intermediate products	1,539	12,599	85,527	89,672	.....	.....	.....	.....	.....	189,337
	Total	876,449	1,319,354	1,813,855	2,111,165	2,510,535	3,016,045	3,026,247	2,922,240	2,779,132	20,378,022

[1] Peace Treaty, Annex VI, Part II

England.—At least six English firms were manufacturing dyes in 1914, and in addition two other factories at Ellsmere Port and Bromborough Port were operated by the Germans in order to comply with the patent act of 1907.

It has been estimated that these firms produced about 10 per cent of the dyes used in the United Kingdom in the year immediately preceding the outbreak of the war, with a total output not exceeding 2,000 tons annually.[1] The production included a fairly wide range of acids, direct, basic, and sulphur colors, and in addition a limited variety of alizarin derivatives. With the exception of indigo, vat dyes were not produced in England. Development since the war has been chiefly in the faster dyes including vats and alizarin derivatives, and has resulted in the production of a considerable variety in this field. The output, however, has not been sufficient to meet the domestic demand. Recent estimates indicate that the present production of fast dyes is about 25,000 tons annually.[1] The range of dyes produced, however, is limited. In January, 1920, the advisory committee of the British Color Users Association visited Germany, and arranged for the purchase of 140 tons of dyes to relieve the shortage of certain types in England.

Switzerland.—Although hampered by a lack of intermediates and other raw materials, the Swiss dye industry developed during the war to a remarkable degree, owing to the absence of German competition in the dye markets of the world.

Since 1915, the Swiss dye manufacturers have been under contract to supply English dye consumers with a large proportion of the dyes made from English intermediates and other English raw materials. England has therefore received more Swiss dyes than any other country. In 1918, the value of the exports of Swiss colors to England was over three times the value of those exported to the United States. Switzerland has also imported intermediates and other raw materials from the United States, France, and Italy.

The leading dye manufacturers of Switzerland have recently been consolidated into a single company. This company controls a branch in England and has purchased control of the dye factory of Ault & Wiborg, at Norwood, Ohio.

France.—The development of a dye industry in France has been slower than in the United States, England, or Switzerland. Several plants maintained by German firms before the war have been taken over and operated by French interests. They were located at Neuilly-sur-Saone (Rhone), Creil (Oise), Flers (Nord), Lyon, St. Fons (Rhone), and Tourcoing (Nord). These factories were probably established mainly for the purpose of evading the high French duty

[1] London Chemical Trade Journal, Mar. 6, 1920.

on manufactured dyes by importing the intermediates from Germany at a lower duty. By the establishment of these factories in France the Germans were able also to avail themselves of the free entry accorded goods of French manufacture by French colonies.

Japan.—Before the war, Japan annually imported, mainly from Germany,[1] dyes to the value of about $4,000,000. In 1915 a law was passed providing for subsidies to companies engaging in dye manufacture. The subsidies were to be in amounts sufficient to enable the companies to pay 8 per cent dividends upon their invested capital, and were to continue for 10 years. It is reported that at least three companies are thus subsidized.

Many companies went into the business and at one time there were more than 100 firms, with an estimated capital of about $7,500,000. But many of these new enterprises proved short lived. Of the 72 firms reported as manufacturers in the spring of 1920, 46 had discontinued by the end of July. The number making sulphur colors was reduced from 33 to 7. Those firms still operating are reported to be working only part time. It is reported that the range of dyes now made in Japan includes direct cotton dyes, basics, and mordants, oxidized colors and sulphurs. The Mitsui Mining Co. is making various anthracene colors and synthetic indigo. The Japan Color Co. produces Sulphur Blacks, which have been exported chiefly to China.

[1] British Trade Journal, May 9, 1918.

Part III. CENSUS OF DYES IMPORTED INTO THE UNITED STATES FROM JULY 1, 1919, TO JUNE 30, 1920.

Section 501 of Title V of the act of September 8, 1916, makes the specific duties on dyes and other finished coal-tar products after September 8, 1921, dependent upon whether as much as 60 per cent of the consumption of these products is being produced in the United States. Unfortunately, however, the provisions are not clear as to whether the domestic consumption is to be considered as the total consumption of each class of finished products or the consumption of individual items within the class. In either case there has been a lack of detailed information as to the importation of individual dyes, and therefore a census of imports was undertaken by the Tariff Commission.

With the cooperation of the Treasury Department all invoices covering dye imports in the fiscal year 1920, with the exception of those of the port of New York, were sent to the commission for tabulation. The statistics of dyes imported through the port of New York were obtained by transcribing the necessary information direct from the invoices in the customshouse files of the collector of the port of New York.

The dyes were classified according to their chemical composition and were tabulated according to the Schultz and Julius Tables, 1914 edition. Various dyes were also identified according to Norton's census[1] as well, and from other sources of information in the files of the Tariff Commission. Dyes identified by Norton as a, b, c classes under a given Schultz number were included in that number in each case without special designation, although it is understood that such dyes are not always chemically identical with the original Schultz types.

The Tariff Commission can not vouch for the accuracy of these classifications, as some identifications were supplied by dye experts and others by foreign manufacturers. Those dyes which could not be identified by Schultz numbers were classified according to their method of application as follows: Direct, vat (including indigo), acid, sulphur, mordant and chrome, basic and oil-soluble dyes. A small number of colors not classified by either method are listed by name under the heading "unidentified and unclassified colors." In

[1] Norton, Thomas H.: "Artificial Dyestuffs Used in the United States," Dept. of Commerce, Sp. Agts. Series No. 121.

addition, 9,352 pounds of dyes are included in "all other," as the trade or chemical name for the dyes was not given in the invoices.

The published values of English dyes include c. i. f. charges, with the exception of a small charge for packing. In the case of Swiss dyes, however, all extra charges are included in every instance. The German invoices varied in the methods used, but in most cases the extra charges are not included in the invoice values.

The date of the consular certification was taken as a basis in converting the foreign invoice value to United States currency. The rate of exchange used as a basis in conversions was the exchange value published by the Treasury Department for that quarter in which the consular certification dates occurred.

SYMBOLS DENOTING MANUFACTURER.

In the table of imports of dyes under the heading "manufacturer" is shown a symbol for each dye, which refers to the following list of manufacturers in foreign countries.

1. THE SIX LEADING COMPANIES.

A_____Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873. Branches in France and Russia.

B_____Badische Anilin- und Soda-Fabrik, Ludwigshafen on the Rhine. Founded 1865. Branches in France and Russia.

By_____Farbenfabriken vorm. Firedr. Bayer & Co., Leverkusen on the Rhine. Founded 1862. Branches in France, Russia, and the United States (Rensselaer, N. Y.).

C_____Leopold Cassella & Co., Frankfort on the Main. Founded 1870. Branches in France and Russia.

K_____Kalle & Co., A. G., Biebrich on the Rhine. Founded 1870. Branch in Russia.

M_____Farbwerke vorm. Meister Lucius & Brüning, Hochst on the Main. Founded 1862. Branches in France and Russia.

2. THE SEVEN SMALLER GERMAN COMPANIES.

BK____Leipziger Anilinfabrik Beyer & Kegel, Furstenberg near Leipsig. Founded 1882.

CG____Chemikalienwerk Griesheim G. m. b. H., Griesheim on the Main. Founded 1881.

CJ____Carl Jäger G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823.

GrE____Chemische Fabrik Griesheim-Elektron, Offenbach on the Main. Founded 1842.

L____Farbwerk Muhlheim vorm. A. Leonhardt & Co., Muhlheim on the Main. Founded 1879. Branch in France.

M____Chemische Fabriken vorm. Weiler ter Meer, Uerdingen on the Rhine. Founded 1877.

WD____Wülfing, Dahl & Co., A.-G. Barmen. Founded 1842.

3. DUTCH, BELGIAN, AND FRENCH COMPANIES.

FA_____Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888.
NF_____Niederlandische Farben- und Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897. Branch in Russia.
LG_____Lazard Godchaux, of Brussels. (These products are probably compounded largely from the dyes made by A. Wiescher & Co., of Haeren, Belgium.)
P_____Societe Anonyme des Matieres colorantes et produits chimiques St. Denis (formerly A. Poirrier), St. Denis, near Paris, France. Founded 1830.

4. SWISS COMPANIES, ALL AT BASEL.

DH_____Farbwerke vorm. L. Durand, Huguenin & Co. Founded 1871. Branches in Germany and France.
G_____Anilinfarben- und Extract-Fabriken vorm. Joh. Rud. Geigy. Founded 1764. Branches in France, Germany, and Russia.
I_____Gesellschaft fur chemische Industrie. Founded 1885. Branch in France.
S_____Chemische Fabrik vorm. Sandoz & Co. Founded 1887.

5. ENGLISH COMPANIES.

ClCo____The Clayton Aniline Co. (Ltd.), Clayton, near Manchester. Founded 1876.
CR_____Clauss & Co. (formerly Clauss & Ree), Clayton, near Manchester. Founded 1890.
CV_____Colne Vale Chemical Co., Milnsbridge, near Huddersfield.
RHS____Read Holliday & Sons (Ltd.), Huddersfield. Founded 1830. (Purchased by British Dyes (Ltd.).)
BD_____British Dyes (Ltd.). Founded 1915.
Lev____Levinstein (Ltd.), Crumpsall Vale, near Manchester. Founded 1864.
Q_____Importations of unknown source, through dealers in colors.

TABLE 13.—*Summary of dyes imported into the United States during the fiscal year 1920, classified by application.*

Class.	Quantity.	Per cent of total.
	Pounds.	
Direct	691,757	19.8
Vat (including indigo)	942,145	26.9
(*a*) Indigo	520,347	14.9
(*b*) Other vats	421,798	12.0
Acid	851,220	24.3
Sulphur	276,809	7.9
Mordant and chrome	447,869	12.7
Basic	230,529	6.7
Dyes for color lakes and spirit soluble dyes	15,516	.4
Unclassified	42,311	1.3
Total	3,501,147	100.0

TABLE 14.—*Imports of dyes for fiscal year 1920.*

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
4	Naphthol green		450	
	Naphthol green G	Lev		
9	Direct yellow R		1,840	$1,455
	Afghan yellow GX	RHS		
	Sun yellow	G		
	Afghan yellow GX	BD		
18	Diphenyl fast yellow G		771	1,610
	Diphenylchlorine yellow FF	G		
	Diphenylchlorine yellow FF supra	G		
19	Fast light yellow 2G	By	1,153	3,035
	Fast light yellow 3G, concentrated 80/100	By		
22	Xylene yellow		59,909	92,078
	Xylene light yellow 2G	S		
	Xylene light yellow R	S		
23	Tartrazine		48,614	50,458
	Tartrazine cone	LG		
	Tartrazine cone	G		
	Tartrazine cone, pure	S		
	Tartrazine DS cone	BDC		
	Tartrazine X	B		
28	Pigment fast yellow G		400	559
	Pigment fast yellow G	M		
	Pigment fast yellow G powder	M		
34	Chrysoidine R		1,102	
	Cotton orange conc. 110 per cent	WD		
38	Orange G		11,143	3,450
	Crystal orange	BD		
	Orange crystals	LG		
	Orange crystal 2G	WD		
	Orange crystals 2G 95	WD		
45	Brilliant lake red R paste	M	723	
58	Alizarine yellow R		860	
	Terra cotta RRN powder	G		
61	Victoria violet		6,632	10,051
	Victoria violet 4BS	S		
	Ethyl acid violet S 4BXX	B		
63	Azo acid blue		9,222	
	Azo acid blue B	S		
64	Lanafuchine SB	C	374	48
	Lanafuchine 6B	C		
65	Azo coralline		6,194	
	Azo coralline L conc. 230 per cent	WD		
66	Amido naphthol red BB	M	95	
73	Helio fast red RL pdr	By	1,001	
74	Tannin orange		171	103
	Tannin orange R	Q		
	Tannin orange R powder	C		
88	Acid anthracene brown RH extra	By	51	
91	Anthracylchrome green D		3,316	2,334
	Anthracylchrome green A conc. 150 per cent	WD		
	Anthracylchrome green A	WD		
100	Eosamine B	A	800	
107	Sulphamine brown A		2,630	
	Sulphamine brown A conc. 110 per cent	WD		
112	Bordeaux B		7,882	
	Bordeaux G conc. 110 per cent	WD		
121	Erika BN	A	225	
122	Erika GN	A	146	
132	Lake red P		1,750	
	Lake red P paste	M		
134	Metanil yellow		8,456	2,923
	Metanil yellow	LG		
	Metanil yellow 77 conc. 120 per cent	WD		
	Metanil yellow Y conc	BD		
137	Acid yellow		7,848	
	Fast yellow G conc. 120 per cent	WD		
139	Orange IV		6,419	1,268
	Orange IV powder	G		
	Orange IV powder	WD		
140	Curcumeine		661	
	Curcumeine GG conc. dk. pdr	BK		
141	Azo yellow		3,814	
	Helianthine G	G		
144	Orange I		1,323	
	Naphthol orange conc. 130 per cent	BK		
145	Orange II		2,265	
	Orange II	CG		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
146	Azo fuchsine G	By	3,495	$725
	Azo fuchsine 4G extra	By		
152	Lithol rubine BN powder	B	1,471	459
	Permanent red B ex	A		
153	Lake red C lumps	M	15	
154	Anthracyl chrome brown GO conc	WD	159	
158	Chrome brown RR		2,734	
	Chrome brown RVV	G		
159	Acid alizarin black R	M	159	
161	Fast red A		948	117
	Fast red A	WD		
	Fast red AN conc. 135 per cent	WD		
163	Azo rubine		14,425	7,556
	Azo rubine S	CG		
	Azo acid rubine 2B conc. 160 per cent	WD		
	Azo acid rubine RV conc. 210 per cent	WD		
	Carmoisine conc	S		
	Carmoisine L	Lev		
	Carmoisine L	BD		
	Chrome blue R	LG		
	Azo rubine S	S		
167	Croceine scarlet 3BX	By	450	
176	Scarlet 2R		1,653	
	Scarlet 4R ex. conc. 145 per cent	BK		
177	Mordant yellow		10,767	2,249
	Milling yellow	WD		
	Anthracene yellow C paste	C		
	Anthracene yellow C powder	C		
	Mordant yellow O	M		
180	Eriochrome blue black B		24,317	
	Eriochrome blue black BC	G		
181	Salicine black U		2,001	
	Chrome fast black PWRL conc	I		
182	Brilliant sulphone red		4,632	6,900
	Brilliant sulphone red B	S		
	Fast sulphone violet 5BS	S		
183	Eriochrome black T	G	14,087	
184	Eriochrome black A	G	41,642	
185	Anthracene chrome black F	C	2,317	301
	Anthracene chrome black PF extra	C		
	Anthracene chrome black 5B 120 per cent	C		
	Anthracene chrome black 5B	C		
198	Mimosa		11,381	8,933
	Mimosa Z	G		
	Titan yellow G	BD		
	Thiazol yellow G conc	S		
210	Congo orange R	By	51	
211	Resorcin brown		1,648	1,641
	Resorcin brown	LG		
	Resorcin brown conc. 150 per cent	BK		
	Resorcin brown F	K		
217	Algama black 10B		11,411	4,231
	Naphthylamine black 4B	LG		
	Naphthol blue black 6B 350 per cent	BK		
	Acid black 4BD	CG		
221	Anthracene acid brown G		110	
	Anthracene acid brown R	C		
222	Janus yellow G	M	580	
227	Brilliant croceine		2,618	1,216
	Brilliant croceine MOO	WD		
	Brilliant croceine	WD		
	Cotton scarlet extra	B		
231	Cloth red 3B extra	By	24	
236	Wool red B		551	
	Cloth red 2B 133 per cent	WD		
240	Janus red B	M	216	
241	Neutral gray G	A	125	
255	Croceine scarlet 7B	By	99	
264	Fast sulphon black F	S	2,204	
266	Naphthylamine black		360	
	Naphthylamine black S	C		
269	Acid black		220	
	Acid black AS conc	BK		
273	Diaminogen blue		2,639	3,317
	Diaminogen blue NA	C		
	Diazanil blue BB	M		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
274	Diaminogen		11,479	$1,674
	Diaminogen extra	Q		
	Diazo indigo blue br. ex. conc. 70/100	By		
	Diazo indigo blue 2RL	By		
	Diazo indigo blue 3RL	By		
	Zambesi pure blue 4B	A		
275	Diamond black		8,859	3,130
	Diamond black	LG		
	Diamond black FB	LG		
	Chrome black PON	CG		
279	Benzo fast scarlet		10,733	10,574
	Benzo fast scarlet 4BS conc	By		
	Benzo fast scarlet 5BS	By		
	Benzo fast scarlet 8BS	By		
	Benzo fast scarlet GS	By		
	Benzo fast scarlet 4BS	LG		
	Direct fast scarlet SE	S		
294	Anthracene yellow C paste	C	358	70
	Fast mordant yellow G	B		
296	Cotton yellow		3,115	5,050
	Cotton yellow G	B		
	Cotton yellow GI	B		
	Benzo fast yellow 4GL extra	By		
	Benzo fast yellow 5GL	By		
	Benzo fast yellow RL	By		
	Cotton yellow CH	I		
297	Benzo fast pink 2BL	By	800	
303	Paper yellow		2,331	968
	Brilliant yellow	By		
	Paper yellow extra conc. 118 per cent	WD		
304	Chrysophenine		3,661	5,514
	Chrysophenine	S		
	Chrysophenine conc. pure	S		
	Chrysophenine conc	LG		
	Chrysophenine G	CG		
306	Pyramine orange 3G	B	397	
313	Congo rubine		4,859	6,021
	Congo rubine	BD		
	Congo rubine L	BK		
315	Congo orange G	By	75	
319	Diamine scarlet		11,340	17,250
	Diamine scarlet 3B	C		
	Diamine scarlet B 130 per cent	C		
	Diamine scarlet HS	C		
	Diamine scarlet 3B	Q		
	Chloramine red B	S		
	Chloramine red 3b	S		
322	Trisulphone violet B	S	12,112	
326	Oxydiamine violet		992	528
	Benzo violet O	LG		
	Benzo violet R	By		
	Oxamine violet	B		
	Oxamine violet XX	B		
330	Zambesi brown		296	280
	Zambesi brown 4RF	LG		
	Zambesi brown 2GF	LG		
	Zambesi brown 4R	A		
332	Benzo fast red 9BL	By	990	308
	Benzo fast red 8BL	By		
333	Oxamine black		46,268	33,583
	Chloramine black BH	S		
	Chloramine black BH conc. double	S		
	Diamine black BH conc	Q		
	Direct black BH conc	S		
	Direct black BH 100 per cent	CG		
	Diamine black BH	CG		
	Melantherme BH	I		
340	Benzo orange R	S	220	
342	Chrysamine		13,405	
	Chrysamine K	S		
343	Diamine fast red F		6,444	12,331
	Chloramine fast red F	S		
	Diamine fast red 8BL	C		
	Diamine fast red 8BL 140 per cent	C		
	Dianol fast red FG	BD		
	Dianol fast red FG	Lev		
	Direct fast red F	S		
	Diphenyl fast red B supra	G		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
346	Oxamine red	B	399	
349	Diamine brown B	C	24	
354	Direct gray R		4,927	
	Direct gray R paste	G		
355	Anthracene red	By	99	
356	Dianol brown		26,476	$67,127
	Dianol brown GM	Lev		
	Dianol orange brown	BD		
	Dianol orange brown 170 per cent	BD		
	Dianol orange brown 200 per cent	BD		
	Dianol orange brown X	Lev		
	Dianol orange brown X	BD		
	Dianol orange brown X 200 per cent	BD		
358	Diphenyl red		1,113	
	Diphenyl red SC	G		
360	Pyramine orange R	B	5,762	
362	Oxydiamine orange		1,653	
	Toluylene orange R conc. 166 per cent	WD		
363	Benzopurpurine 4B		7,243	3,323
	Benzopurpurine 4B 25 per cent	CG		
	Benzopurpurine 4B 250 per cent	CG		
	Cotton fast red 4BS	B		
364	Diazo brilliant black B	By	3,109	
366	Deltapurpurine 5B		1,896	797
	Deltapurpurine 5B	CG		
	Deltapurpurine 5B conc	BK		
370	Brilliant congo		5,586	4,651
	Brilliant congo R	S		
	Brilliant congo R	By		
386	Benzo blue BX		6,570	767
	Chloramine blue BXR	S		
	Chloramine blue BXR conc	S		
	Chlorine blue BXA	S		
391	Benzo blue 3B		1,124	
	Diamine blue 3B	Q		
392	Toluylene orange		3,467	1,111
	Toluylene orange G conc. 150 per cent	WD		
	Toluylene fast orange GL	By		
400	Acid anthracene red		1,882	457
	Milling scarlet 4R conc	M		
	Acid anthracene red 3B	M		
	Milling scarlet 4RO	M		
404	Diamine yellow N. pdr	C	313	
405	Benzo purpurine 10B	S	275	
410	Benzazurine G		287	
	Benzoin blue RH conc. 300 per cent	BK		
416	Brilliant azurine 5G		783	
	Brilliant azurine 5G conc. 30/100	By		
419	Chicago blue RW	A	150	
421	Oxamine blue 3RXX	B	13	
424	Chicago blue 6B		14,529	59,739
	Brilliant benzo blue 6B	By		
	Chicago blue 6B	A		
	Chicago blue 6B extra	LG		
	Chloramine sky blue FF	S		
	Dianol brilliant blue 6B	Lev		
	Dianol brilliant blue 6B	BD		
	Direct sky blue 250 per cent (gr. shade)	I		
	Oxamine pure blue 6B highly conc	B		
426	Benzamine pure blue		2,976	12,595
	Chloramine sky blue A	S		
	Chloramine sky blue A conc. pure	S		
	Chloramine sky blue A 400 per cent	S		
428	Direct blue B		4,633	2,796
	Direct blue GX 250 per cent	CG		
	Direct blue 4GX 250 per cent	CG		
432	Diamine cutch	C	49	
434	Coomassie Navy blue		42,357	43,705
	Coomassie Navy blue 2RNX	BD		
	Coomassie Navy blue 2RNX	Lev		
436	Columbia black FF		1,560	1,869
	Dianol black BH	BD		
	Dianol black FFX	Lev		
449	Trisulphon brown		69,986	78,217
	Trisulphon brown B	S		
	Trisulphon brown MB	S		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
449	Trisulphon brown—Continued.		*Pounds.*	
	Trisulphon brown MB conc. 7:10	S.		
	Trisulphon brown MB conc	S.		
	Trisulphon brown BR	S.		
456	Benzo fast blue 4GL	By.	156	$105
	Benzo fast blue B	By.		
457	Trisulphon brown GG		43,751	54,280
	Trisulphon brown GG	S.		
	Trisulphon brown GG conc	S.		
467	Diphenylgreen G		2,337	
	Diphenyl green KGW, supra	G.		
469	Chloramine black N		1,102	
	Chloramine black extra	S.		
471	Chloramine blue 3G	S.	4,078	
474	Dianol green BG	Lev.	2,460	2,990
	Direct green B	S.		
475	Oxamine green GX		2,742	2,120
	Direct green G	S.		
	Chloramine green G	S.		
	Alkali green D	WD.		
477	Congo brown G		200	
	Naphthamine brown 3G	K.		
478	Columbia green		6,282	8,251
	Direct green 21	S.		
	Direct green B	S.		
483	Rosophenine		550	
	Rosophenine 6B conc. 85 per cent	ClCo.		
485	Benzo brown G	By.	31	
493	Auramine		48,879	87,043
	Auramine O	S.		
	Auramine conc	LG.		
	Auramine conc	Q.		
495	Malachite green		100	
	Malachite green crystals 50 per cent	BD.		
496	Setoglaucine		3,329	10,106
	Setoglaucine	S.		
	Setoglaucine	G.		
498	Turquoise blue G	By.	227	
499	Brilliant green		3,418	2,754
	Brilliant green 6B	LG.		
	Brilliant green crystals No. 10	CG.		
500	Setopaline	G.	1,102	
502	Acid green B	C.	278	
503	Neptune green		1,894	5,968
	Benzyl green B	I.		
	Benzyl green K	I.		
	Brilliant acid green 6B	Q.		
	Brilliant acid green 6B conc	By.		
	Erioviridine B, supra	G.		
505	Light green		986	897
	Acid green conc. 250 per cent	WD.		
	Acid green extra conc	C.		
	Acid green GG extra	By.		
506	Erioglaucine		3,426	11,890
	Eriocyanine A	G.		
	Erioglaucine EP	G.		
	Erioglaucine supra	G.		
507	Xylene blue VS	S.	30,573	
508	Xylene blue AS	S.	7,309	
512	Magenta		189	
	Magenta P powder	BD.		
514	Red violet powder		750	
	Red violet	tM.		
515	Methyl violet		3,312	1,620
	Methyl violet 2B	WD.		
	Methyl violet 3B	CG.		
	Methyl violet 5BO	S.		
	Methyl violet RBM	WD.		
516	Crystal violet		1,836	2,670
	Crystal violet extra	B.		
	Crystal violet 6B	A.		
	Crystal violet powder	B.		
	Violet 5BO	I.		
	Violet 5BO powder	I.		
517	Benzyl violet		1,900	
	Benzyl violet 5BN	I.		
521	Aniline blue		5,967	
	Aniline blue BCBH	CG.		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
522	Victoria blue 4R	B	24	
523	Fast light green	By	3,612	$4,302
	Fast green extra	By		
	Fast green extra bluish	By		
524	Acid magenta		660	312
	Acid magenta G 260 per cent	BK		
	Fuchsine S	B		
	Acid fuchsine O	M		
527	Acid violet 4BN		33,439	77,643
	Acid violet 4BN	B		
	Acid violet 4BNS	S		
	Acid violet BW	By		
528	Fast acid violet 10B	By	799	995
	Fast acid violet 10B conc. 40/100	By		
530	Acid violet		1,814	2,617
	Acid violet 4B extra	LG		
	Acid violet 4BS	S		
	Acid violet 4BLOOF	B		
	Acid violet 4RO	B		
	Formyl violet S4B	C		
	Guinea violet 4B	A		
531	Eriocyanine		4,585	
	Eriocyanine A	G		
534	Acid violet 7B conc	B	51	
536	Alkali blue		5,494	6,046
	Alkali blue II	WD		
	Alkali blue 3B	C		
	Alkali blue 3B	M		
	Alkali blue 2B	A		
	Alkali blue 4B	A		
	Alkali blue 4BE	A		
	Alkali blue 6B	By		
	Alkali blue 6B	C		
	Alkali blue IIHRROOO	GrE		
	Alkali blue R	C		
	Alkali blue 2R	M		
537	Methyl blue for silk		3,139	13,540
	Methyl Lyons blue	G		
	Methyl silk blue new	G		
	Methylene silk blue	G		
539	Soluble blue		4,374	4,110
	Pure blue RT	BK		
	Soluble blue 2R	BD		
	Soluble blue 3R	CG		
	Soluble blue 3M	BD		
543	Patent blue		20,067	37,691
	Acid blue V conc	LG		
	Acid blue VS conc	BK		
	Patent blue	Q		
	Patent blue B	M		
	Patent blue L	M		
	Patent blue V	M		
	Patent blue V	CG		
	Patent blue B conc	M		
	Patent marine blue LE	M		
	Tetra cyanole extra	C		
544	Cyanine B	M	14	
545	Patent blue A		26,709	57,875
	Patent blue A	M		
	Patent blue A	CG		
	Patent blue H	LG		
	Patent blue AN	LG		
	Brilliant acid blue CB	By		
	Brilliant acid blue FF conc. 60/100	By		
546	Cyanole		336	139
	Cyanole blue	Q		
	Cyanole extra	C		
548	Acid violet 6BN		7,351	18,530
	Acid violet 6BN	L		
	Acid violet 6BN	LG		
	Acid violet 6BNO	B		
551	Eriochrome azurol BC		4,365	
	Eriochrome azurol BX	G		
553	Eriochrome cyanine RC	G	2,205	
554	Chrome azurol S conc		771	2,697
	Chrome azurol SX	G		
	Chrome azurol SXT	G		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
553	Aurine	Q	580	
558	New victoria blue B	By	97	
559	Victoria blue B		5,823	$12,839
	Victoria blue	M		
	Victoria blue B	I		
	Victoria blue B	S		
	Victoria blue B base, dark shade	I		
	Victoria blue B base	B		
	Victoria navy blue B	By		
562	Intensive blue B	By	874	3,170
	Wool blue SR extra	By		
	Wool blue N extra	By		
564	Naphthalene green		9,242	29,006
	Erio green B supra	G		
	Naphthalene green V	M		
	Naphthalene green conc. extra	M		
	Naphthalene green V extra conc	M		
565	Acid blue B		466	702
	Acid blue BS conc	BK		
	Wool blue 5B	A		
	Wool blue 2BA	A		
	Wool blue G extra	A		
566	Wool green S		158,360	323,443
	Wool green BS	By		
	Wool green	S		
	Wool green conc. 200 per cent	S		
	Wool green S conc. pure	S		
	Wool green SC	S		
	Wool green S extra conc. new	C		
	Cyanol green B	S		
	Cyanol green B	C		
570	Rhodamine S extra	B	22	
571	Rhodamine 6G		4,675	46,313
	Rhodamine 6G extra	I		
	Rhodamine 6G extra conc	S		
	Rhodamine 6G	Q		
572	Rhodamine G	M	220	
573	Rhodamine B	B	4,917	55,493
	Rhodamine B extra	I		
	Rhodamine B extra	S		
	Rhodamine B conc	S		
576	Rhodamine 3G		472	80
	Irisamine G extra	C		
	Irisamine G extra	Q		
580	Fast acid violet R	M	175	130
	Fast acid violet RGE	M		
581	Fast acid phloxine A		211	904
	Fast acid eosine G extra	M		
	Fast acid phloxine A	M		
582	Fast acid violet A2B	M	127	94
	Violamin R	M		
	Violamin R conc	M		
584	Fast acid blue R	M	500	
587	Eosine		3,420	2,364
	Eosine conc. 115 per cent	WD		
	Eosine D	WD		
590	Fast eosine L paste	B	720	
592	Erythrosine B	Q	9	
599	Galleine		7,469	3,455
	Galleine 100 per cent	B		
	Galleine 10 per cent paste	B		
	Galleine JRG paste	G		
	Galleine L paste	Lev		
601	Coerulein S		2,496	3,435
	Coerulein I paste 14 per cent	B		
	Coerulein MS powder	DH		
	Coerulein S powder	DH		
	Coerulein S powder	BD		
	Coerulein S powder	B		
	Coerulein SL powder	M		
603	Rhoduline orange N	By	450	1,000
	Euchrysine 3RX	B		
606	Phosphine		44,287	101,506
	Acid phosphine R	BD		
	Brilliant phosphine 5G 300 per cent	I		
	Brilliant phosphine 5G	I		
	Brilliant phosphine SG	I		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
606	Phosphine—Continued.		*Pounds.*	
	Paraphosphine G extra	Q		
	Paraphosphine G	C		
	Patent phosphine R	I		
	Patent phosphine G conc. 300 per cent	I		
	Patent phosphine M 300 per cent	I		
	Phosphine 3R	A		
	Phosphine extra	M		
	Phosphine I	LG		
	Saba phosphine GG	S		
	Saba phosphine G	S		
608	Euchrysine RRO	B	999	
609	Flavophosphine 4G, conc	M	7	
613	Quinoline yellow, water soluble		33,437	$46,032
	Chinaldine yellow, ord	I		
	Chinoline yellow	A		
	Chinoline yellow	By		
	Chinoline yellow	M		
	Quinoline yellow N extra	LG		
	Silk yellow	S		
615	Thioflavine S	C	675	
616	Primuline		13,481	10,750
	Primuline	Lev		
	Primuline E	Q		
	Primuline extra	BD		
	Primuline yellow	LG		
617	Columbia yellow	LG	5,180	4,651
	Chloramine yellow G	S		
	Chloramine yellow GG	By		
	Diamine fast yellow 3G	C		
618	Thioflavine T	Q	3,348	917
	Thioflavine T	C		
	Thioflavine T 140 per cent	C		
	Rhoduline yellow 6G	By		
624	Violet moderne N		2,425	
	Violet moderne powder	DH		
626	Galleocyanine		27,070	12,944
	Brilliant chrome blue P	S		
	Galleocyanine paste	S		
631	Chromocyanine V		1,259	
	Chromocyanine B paste	DH		
633	Indalizarine R		551	
	Indalizarine paste I	DH		
635	Modern violet		5,950	
	Ultra violet MO	S		
	Ultra violet powder	DH		
636	Prune		3,601	
	Prune pure	S		
637	Gallamine blue extra paste	G	13,790	
642	Phenocyanine TC		2,940	2,091
	Phenocyanine R paste	DH		
	Phenocyanine TV powder	DH		
	Phenocyanine VS paste	DH		
649	Cotton blue		9,816	11,819
	Meldola blue 3R	S		
	Meldola blue 3R conc	S		
653	Nile blue A	B	9	
658	Gallophenine P	By	1,713	
659	Methylene blue		3,122	7,737
	Methylene blue	Q		
	Methylene blue	BD		
	Methylene blue BB	S		
	Methylene blue FZP	Lev		
	Methylene blue GSF	Lev		
	Methylene blue medicinal	Q		
	Toluidine blue	B		
660	Methylene green		605	1,239
	Methylene green G extra	S		
	Methylene green W	G		
661	Thionine blue		330	
	Thionine blue GO powder	M		
663	New methylene blue		443	53
	New methylene blue N	Q		
	Methylene blue NNX	B		
667	Indochromine		12,752	31,275
	Indochromine T	S		
	Indochromine T conc	S		
	Indochromine T conc. double	S		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
671	Induline scarlet	B	77	
672	Azo carmine GX		330	$3,320
	Rosazine	S		
	Rosazine conc	S		
673	Azo carmine B		404	
	Rosinduline 2B bluish	K		
679	Safranine		386	
	Safranine FF extra	LG		
681	New fast gray		50	
	Methylene gray ND	M		
684	Brilliant rhoduline red B	By	24	
685	Tannin heliotrope	C	249	
687	Rosolane O	M	42	71
	Rosolane B conc	M		
690	Diphene blue R	A	541	
692	Naphtazine blue		2,249	
	Napthazine navy blue	WD		
699	Induline (water soluble)		100	
	Soluble blue 2R	BD		
705	Indamine 6R		5,675	4,898
	Acid cyanine BF	A		
	Acid cyanine BF	LG		
	Indocyanine B	A		
709	Pyrogene green 2G		5,095	5,673
	Pyrogene dark green yellow B shade	I		
	Pyrogene green 3G	I		
734	Pyrogene yellow		3,307	
	Pyrogene yellow O	I		
736	Katigene green		11,855	17,543
	Thional brilliant green GG	S		
	Thional brilliant green G	S		
747	Thional red brown		25,078	8,643
	Thional brown G	S		
	Thional brown GD	BD		
748	Hydron blue		21,593	8,375
	Carbindol blue R	Lev		
	Hydron blue G paste 20 per cent	C		
	Hydron blue G paste 30 per cent	C		
	Hydron blue G paste 40 per cent	C		
	Hydron blue G powder	C		
	Hydron blue R paste 20 per cent	C		
	Hydron blue R powder	C		
759	Anthraflavone G paste	B	1,353	232
	Anthraflavone GC paste	B		
760	Indanthrene golden orange G paste	B	2,837	3,735
	Indanthrene golden orange G powder			
	Indanthrene golden orange G double paste			
	Indanthrene golden orange G double paste, sand free			
761	Indanthrene golden orange R paste	B	15,208	28,649
	Indanthrene golden orange R paste, sand free	B		
	Indanthrene golden orange RRT paste	B		
	Indanthrene golden orange RRT paste, sand free	B		
	Indanthrene golden orange R double paste, sand free	B		
762	Indanthrene scarlet G paste	B	395	237
	Indanthrene scarlet G paste, sand free	B		
	Indanthrene scarlet G double paste	B		
	Indanthrene scarlet G double paste, sand free	B		
763	Indanthrene dark blue BO paste, sand free	B	906	101
	Indanthrene dark blue B.O.S. powder	B		
765	Indanthrene green B paste	B	3,427	1,304
	Indanthrene green B powder	B		
	Indanthrene green B double paste	B		
	Indanthrene green B double paste, sand free	B		
766	Indanthrene violet R ex. paste	B	842	244
	Indanthrene violet R ex. paste, sand free	B		
767	Indanthrene violet RR extra	B	11,198	24,934
	Indanthrene violet RR extra paste	B		
	Indanthrene violet RR extra paste, sand free	B		
	Indanthrene violet RR extra powder	B		
	Indanthrene violet RR extra double paste, sand free	B		
768	Indanthrene black BB double paste	B	25,027	40,802
	Indanthrene black BB powder	B		
772	Gallollavine 10 per cent paste	B	24	
774	Alizarin black S paste	B	14,703	1,765
	Alizarin black WR 16 per cent paste	B		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
778	Alizarin (synthetic)		8,575	$2,762
	Alizarin paste YCA 20 per cent	Q		
	Alizarin red paste 1P 20 per cent	Q		
	Alizarin red paste YCA	Q		
	Alizarin red 1B 20 per cent paste	M		
	Alizarin red 1B 40 per cent paste	M		
779	Alizarin orange R paste	By	500	
780	Alizarin red		5,072	1,524
	Alizarin red 1 WS	M		
	Alizarin red S powder	B		
	Alizarin red SWB powder	B		
	Alizarin red W powder	By		
782	Alizarin brown		1,235	450
	Anthracene brown 20 per cent	B		
	Anthracene brown 100 per cent powder	B		
	Anthracene brown WL paste	Lev		
	Alizarin brown G	M		
	Alizarin brown 20 per cent paste	M		
	Anthracene brown WLP paste	Lev		
784	Alizarin SX		2,289	818
	Alizarin paste SX 20 per cent	Q		
	Alizarin GX 20 per cent paste	B		
787	Alizarin Bordeaux GG paste [Mixture with 778.]	By	20	
788	Alizarin cyanine NS powder	By	187	92
	Alizarine cyanine WRB powder			
789	Anthracene blue WR paste	B	29,608	32,114
	Anthracene blue WR paste double	B		
790	Anthracene blue SWGG powder	B	856	939
	Anthracene blue SWGG powder	B		
	Anthracene blue SWGG ex powder	B		
	Anthracene blue SWR powder	B		
	Anthracene blue SWB powder	B		
791	Indanthrene olive G powder	B	11	
792	Cibanone orange R		6,188	11,610
	Cibanone green G paste	I		
	Cibanone orange R paste	I		
	Cibanone orange R paste 9 per cent	I		
	Cibanone orange R paste 7 per cent	I		
	Cibanone orange R paste 8 per cent (yellow shade)	I		
	Cibanone orange R paste 10 per cent	I		
795	Cibanone yellow R paste 10 per cent		15,886	21,488
	Cibanone yellow R paste	I		
	Cibanone yellow R paste	S		
	Cibanone yellow R paste 10 per cent	I		
798	Alizarin maroon paste, 10 per cent	B	70	
799	Alizarin cyanine GG powder	By	3,165	10,958
	Alizarin cyanine green G extra powder	By		
800	Anthracene blue WG paste	B	49	
803	Alizarin blue WX 10 per cent paste	B	2,031	144
	Alizarin blue JR powder	By		
804	Alizarin blue S		12,298	8,527
	Alizarin blue SB 45	M		
	Alizarin blue S powder	By		
	Alizarin blue S powder	B		
	Alizarin sky blue B conc. 70/100 powder	By		
	Alizarin sky blue B powder	By		
	Alizarin blue SB 45 conc. 50 per cent	M		
808	Alizarin green S paste	B	2,997	
810	Helindone yellow 3 GN		1,440	3,751
	Helindone yellow CG	M		
	Helindone yellow CAK powder and paste	M		
	Helindone yellow 3GN paste and powder	M		
	Helindone yellow 3GN	M		
811	Algole yellow 3GL paste	By	440	112
	Algole yellow 3 G powder	By		
	Algole yellow 3 G L powder	By		
812	Indanthrene orange RT	B	382	43
	Indanthrene orange RT paste	B		
814	Algole yellow WF	By	3	
815	Algole scarlet G paste	By	552	1,517
	Algole scarlet G powder	By		
816	Algole red 5G paste	By	146	21
	Algole red 5G powder			
	Algole yellow 3G paste			
817	Algole yellow R powder	By	801	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
818	Algole pink R paste	By	1,113	$879
	Algole pink R powder	By		
819	Algole red FF extra paste	By	2,910	365
	Algole red FF extra powder	By		
	Algole brilliant red 2B paste	By		
	Algole red R extra paste	By		
	Algole red R extra powder	By		
820	Algole brilliant violet R paste	By	3,016	10,820
	Algole brilliant violet RP powder	By		
821	Algole brilliant violet 2B paste	By	556	2,970
	Algole brilliant violet 2B powder	By		
	Algole blue 3R paste	By		
	Algole blue 3R powder	By		
822	Algole brilliant orange FR paste	By	449	510
	Algole brilliant orange FR powder	By		
823	Algole violet B powder	By	29	
824	Algole orange R paste	By	373	355
	Algole orange R powder	By		
825	Algole red B paste	By	3,552	5,477
	Algole red B powder	By		
828	Indanthrene claret B paste	B	2,721	418
	Indanthrene claret B extra paste	B		
829	Algole bordeaux 3B paste	By	61	35
	Algole bordeaux 3B powder	By		
830	Indanthrene red R paste	B	1,538	876
	Indanthrene red R powder	B		
	Indanthrene red R double paste	B		
	Indanthrene red R double powder	B		
	Indanthrene red R double paste, sand free	B		
831	Indanthrene red BN extra paste	B	2,916	1,466
	Indanthrene red BN extra paste, sand free	B		
	Indanthrene red BN extra powder	B		
	Indanthrene violet RN extra powder	B		
833	Algole olive R paste	By	461	208
	Algole olive R powder	By		
834	Algole gray B powder	By	101	490
	Algole gray 2B powder	By		
835	Helindone orange GRN		10,010	
	Helindone orange GRN paste	M		
836	Helindone brown 3GN paste	M	15,000	4,389
838	Indanthrene blue RS	B	8,144	1,559
	Indanthrene blue RS for paper paste	B		
	Indanthrene blue RS for paper trip. powder	B		
	Indanthrene blue RS paste	B		
	Indanthrene blue RS double paste	B		
	Indanthrene blue RS paper paste, sand free	B		
	Indanthrene blue RS trip. paper	B		
839	Algole blue K powder	By	124	
840	Indanthrene blue 3G powder	B	551	129
	Indanthrene blue 3G paste	B		
842	Indanthrene blue GCD paste	B	54,478	92,205
	Indanthrene blue GCD paste, sand free	B		
	Indanthrene blue GCD powder	B		
	Indanthrene blue GCD double paste	B		
	Indanthrene blue GCD double paste, sand free	B		
844	Algole blue 3G paste	By	2,079	
845	Indanthrene maroon R paste	B	46	
847	Algole green B paste	By	339	717
	Algole green B powder	By		
	Algole dark green B powder	By		
848	Indanthrene gray B paste	B	1,940	991
	Indanthrene gray B powder	B		
	Indanthrene gray B double paste	B		
	Indanthrene gray B double paste, sand free	B		
849	Indanthrene yellow G double paste	B	22,812	66,203
	Indanthrene yellow G paste	B		
	Indanthrene yellow G paste, sand free	B		
	Indanthrene yellow R paste double	B		
	Indanthrene yellow R paste	B		
	Indanthrene yellow R paste, sand free	B		
	Indanthrene yellow R double paste, sand free	B		
	Indanthrene yellow powder	B		
850	Indanthrene blue WB powder	B	1,499	
851	Alizarin direct blue B		213	588
	Alizarin cyanole B	C		
	Alizarin direct blue B	M		
	Alizarin direct blue EB	M		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
852	Alizarin irisol DR		251	$481
	Alizarin direct violet R	M		
	Alizarin irisole R powder	By		
853	Anthraquinone violet powder	B	750	
854	Alizarin viridine FF paste	By	4,422	3,523
	Alizarin viridine FF powder	By		
	Alizarin viridine F paste	By		
856	Alizarin astrole B powder	By	5,798	16,603
	Alizarin rubinole 3G powder	By		
	Alizarin rubinole R conc. 50/100 powder	By		
	Alizarin rubinole R powder	By		
858	Alizarin sapphirole B powder	By	22,890	25,732
	Alizarin sapphirole SE powder	By		
	Alizarin sapphirole WSA powder	By		
859	Cyananthrol R powder	B	529	5,557
	Cyananthrol RBX	B		
	Cyananthrol RXO	B		
862	Alizarin blue black B powder	By	16,884	17,624
	Alizarin blue black 3B powder	By		
863	Anthraquinone blue green BXO	B	99	
864	Anthraquinone green GXN	B	98	
865	Alizarin direct green G		10,818	23,297
	Alizarin direct green GC	M		
	Alizarin cyanine green E powder	By		
	Alizarin cyanine green G extra conc. 70/100 powder	By		
	Alizarin cyanine green G extra powder	By		
	Alizarin direct green G	M		
866	Leuco dark green B powder	By	60	
867	Indanthrene brown B double paste	B	1,676	150
	Indanthrene brown B powder	B		
	Indanthrene brown B paste sand free	B		
869	Algole brown R paste	By	2,687	6,554
	Algole brown R powder	By		
870	Algole Corinth R powder	By	88	597
	Algole Corinth R powder	By		
873	Helindone brown AN		2,857	3,694
	Helindone brown AN 10 per cent paste	Q		
	Indanthrene pink B paste	B		
	Indanthrene pink B paste sand free	B		
	Indanthrene pink BL powder	B		
	Indanthrene red violet RRN paste	B		
	Indanthrene red violet RRN powder	B		
874	Indigo (synthetic)		520,317	351,440
877	Indigotine or indigo extract		5,512	3,810
	Indigotine 0512O	WD		
	Indigotine conc	WD		
880	Indigo RB		3,945	2,215
	Helindone blue BB paste	M		
	Indigo MLB 2B powder	M		
	Indigo MLB 2B paste 20 per cent	M		
	Helindone blue BB paste	M		
881	Brom-indigo		49,646	89,670
	Ciba blue 2B powder	S		
	Ciba blue 2B powder	I		
	Ciba blue 2BD paste 16 per cent	I		
	Ciba blue 2BD paste	I		
	Ciba blue 2B	I		
	Brom-indigo FB powder	By		
	Indigo MLB 4B 20 per cent	M		
883	Indigo KG		1,467	2,405
	Indigo MLB 6B powder	M		
	Indigo MLB 6B paste	M		
	Indigo MLB 6B paste, 40 per cent	M		
885	Brilliant indigo B, 20 per cent	B	3,502	1,624
	Brilliant indigo B powder	B		
	Brilliant indigo B paste 20 per cent	B		
887	Brilliant indigo 4G, 20 per cent	B	501	359
	Brilliant indigo 4G paste 20 per cent	B		
888	Indigo G paste	B	452	
892	Helindone green G		796	4,779
	Helindone green G paste	M		
	Helindone green G powder	M		
893	Alizarin indigo G paste	By	798	
894	Alizarin indigo B paste	By	291	
895	Alizarin indigo 3 R paste	By	1,673	322
	Alizarin indigo 3 R powder	By		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
896	Helindone blue 3GN		427	$5,574
	Helindone blue 3GN	M		
	Helindone blue 3GN concentrated	M		
901	Ciba violet B		40,441	118,796
	Ciba violet B	I		
	Ciba violet B paste 10 per cent	I		
	Ciba violet R paste 10 per cent	I		
	Ciba violet 2B powder	I		
	Ciba violet R	I		
	Ciba violet R	S		
	Ciba violet R powder	I		
	Ciba violet B powder	I		
	Ciba violet B powder 95 per cent	I		
	Ciba violet B paste 10 per cent	SA		
902	Helindone brown 2R		155	290
	Helindone brown 2R paste	M		
	Helindone brown 2R powder	M		
904	Helindone brown G		1,884	7,218
	Helindone brown CR	M		
	Helindone brown CR powder	M		
	Helindone brown G powder	M		
	Helindone brown G paste	M		
906	Thioindigo scarlet G		451	
	Ciba red G powder	I		
907	Ciba scarlet		21,818	24,908
	Helindone fast scarlet C	M		
	Helindone fast scarlet C paste	M		
	Ciba scarlet G paste	I		
	Ciba scarlet G extra paste and powder	I		
	Ciba scarlet G extra paste	I		
	Ciba scarlet G extra paste 20 per cent	I		
910	Helindone pink		11,122	21,966
	Helindone pink	M		
	Helindone pink AN 10 per cent	M		
	Helindone pink BN 10 per cent	M		
	Helindone pink BN 10 per cent paste	M		
	Thioindigo rose AN paste	K		
	Thioindigo rose BN paste	K		
912	Thioindigo red B paste	K	276	438
	Thioindigo red B powder	K		
915	Helindone fast scarlet R		179	1,389
	Helindone fast scarlet R powder	M		
	Helindone fast scarlet R paste	M		
916	Helindone scarlet S		21	
	Helindone scarlet S paste	M		
918	Helindone red 3B		838	1,805
	Helindone red 3B paste	M		
	Helindone red 3B powder	M		
919	Ciba Bordeaux B paste 10 per cent		1,786	3,492
	Ciba Bordeaux B paste	I		
	Ciba Bordeaux B powder	I		
920	Helindone violet		6,809	27,991
	Helindone violet B paste	M		
	Helindone violet BB paste	M		
	Helindone violet B powder	M		
	Helindone violet BB powder	M		
	Helindone violet R	M		
	Helindone violet R paste	M		
	Helindone violet R powder	M		
921	Helindone gray 2 BBR		139	330
	Helindone gray BB paste	M		
	Helindone gray BB powder	M		
	Helindone gray BR powder	M		
923	Ursol DD		100	
	Ursol 4R paste	A		

UNIDENTIFIED DIRECT DYES.

Alkali black 3 conc	WD	2,205	
Alkali chrome black B	WD	1,014	254
Alkali chrome black D	WD		
Alkali dark green	WD	661	
Alkali orange G	WD	1,102	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports	
			Quantity.	Invoice value.
			Pounds.	
	Alkali pink G	WD	510	$101
	Alkali pink B	WD		
	Alkali rubin G conc. 300 per cent	WD	1,675	
	Alkali scarlet	WD	322	
	Aminogene base RN	I	661	
	Aminogene blue RN	I	1,942	
	Benzamine azo blue G conc. 350 per cent	WD	2,197	1,467
	Benzamine azo blue 3R conc. 215 per cent	WD		
	Benzamine fast yellow 2G conc. 200 per cent	WD	220	
	Benzamine violet C	WD	236	
	Benzo Bordeaux 6B	By	1,149	
	Benzo chrome brown G	By	2,398	
	Benzo chrome brown CR	By	104	
	Benzo fast black	LG	1,572	1,439
	Benzo fast black	By		
	Benzo fast black L	By	3,377	
	Benzo fast blue FFL	By	299	
	Benzo fast blue G	By	800	
	Benzo fast Bordeaux 6BL	By	1,226	
	Benzo fast brown 3GL	By	176	
	Benzo fast eosine BL	By	99	
	Benzo fast heliotrope BL	By	1,312	
	Benzo fast heliotrope 4BL	By	112	
	Benzo fast heliotrope 2RL	By	703	
	Benzo fast orange S	By	450	
	Benzo fast scarlet 4BA	By	201	
	Benzo red 12B	By	600	
	Benzo rhoduline 3B	By	97	
	Benzo rhoduline red B	By	150	
	Benzoin black	BK	1,764	
	Benzoin blue black RH 150 per cent	BK	287	
	Brilliant benzo green B	By	225	
	Brilliant benzo violet B	By	351	
	Brilliant benzo violet 2R	By	24	
	Brilliant fast blue B	By	450	
	Brilliant fast blue B conc. 50/100	By	201	
	Brilliant fast blue 2G	By	100	
	Brilliant fast blue 2G conc. 60/100	By	242	
	Chicago red III	G	2,205	
	Chloramine black	S	672	855
	Chloramine black HW	S		
	Chloramine black EX conc	S		
	Chloramine brilliant red 8B	S	21,796	81,419
	Chloramine brilliant red 8B conc	S		
	Chloramine brown 2R	S	1,102	
	Chloramine fast red F	S	550	
	Chloramine pink R	BD	625	1,569
	Chlorazol pink R	RHS		
	Chlorazol pink R	BD		
	Chloramine red 8BS	By	7,237	
	Chloramine violet R	By	397	
	Chloramine violet WBX	BD	1,052	1,397
	Chlorazol violet WBX	BD		
	Chloramine red BH	S	220	
	Chlorazol brown G	BD	8,962	
	Chlorazol green B	BD	256	
	Chlorazol dark green PL	BD	10,098	9,893
	Chlorazol green	BD		
	Chloramine dark green PL	BD		
	Chlorazol dark green PO	BD	1,028	
	Chlorazol sky blue FFS	BD	40	
	Columbia brown RK	A	200	
	Congo brilliant R	S	220	
	Cotton blue H double	M	1,102	
	Cotton yellow GI	B	291	
	Cupranite brown G	I	590	
	Cutch brown 2R	S	7,715	
	Diamine azo blue R	C	51	
	Diamine Bordeaux S	C	626	
	Diamine catechine B	C	417	
	Diamine fast blue FFB	C	2,919	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Diamine fast brown G	C	2,665	$1,548
	Diamine fast brown R	C		
	Diamine fast gray BN	C	3,171	1,184
	Diamine fast gray BN	Q		
	Diamine fast gray G	Q		
	Diamine fast gray G	C		
	Diamine fast Bordeaux 6BS	C	99	
	Diamine fast Bordeaux	C	73	
	Diamine fast orange EG	C	99	
	Diamine fast scarlet 10BF	C	187	
	Diamine fast scarlet GG	C	9	
	Diamine fast scarlet SBN	C	64	
	Diamine fast violet FFBN	C	13	
	Diamine orange F	C	1,100	1,401
	Diamine orange B	C		
	Diamine orange G	C		
	Diamine scarlet B	C	137	
	Diamine sky-blue FF	C	26	
	Diamine violet red	C	2	
	Diamine violet red K extra	C	37	
	Diamineral blue CVB	C	51	
	Dianil light red 8BW	M	4	
	Dianol black FFX	BD	1,680	
	Dianol dark blue B	BD	23,436	
	Dianol dark blue B	Lev		
	Dianol fast blue 2B	Lev	4,034	
	Dianol fast blue G	BD	840	
	Dianol fast blue RB	BD	1,814	
	Dianol fast blue RB	Lev		
	Dianol fast pink BK	BD	7,342	
	Dianol fast pink BK	Lev		
	Dianol fast red K	BD	120	
	Dianol fast yellow ARX	Lev	4,475	
	Dianol fast yellow ARX	BD		
	Dianol orange brown X	BD	5,064	
	Dianol violet R	BD	5,480	
	Dianol violet R	Lev		
	Diazanil blue BB	M	48	
	Diazenil pink B	M	543	
	Diazo Bordeaux 7B	By	181	
	Diazo brilliant green 3G	By	2	
	Diazo brilliant orange GR extra	By	4	
	Diazo brilliant orange 5G extra	By	4	
	Diazo brilliant scarlet B extra	By	194	
	Diazo brilliant scarlet 2BL extra conc	By	818	
	Diazo brilliant scarlet 5BL extra	By	24	
	Diazo brown 3G	By	289	
	Diazo brilliant scarlet 3B extra	By	284	
	Diazo brilliant scarlet 6B extra	By	308	
	Diazo brilliant scarlet G extra	By	317	
	Diazo brown 3G	By	212	
	Diazo brown 3RB	By	4	
	Diazo fast bordeaux BL	By	220	
	Diazo fast red 5BL	By	11	
	Diazo fast violet BL	By	143	
	Diazo sky-blue 3G	By	443	
	Diazo fast red 7BL	By	509	
	Diazo fast violet BL	By	88	
	Diazo fast yellow G	By	119	
	Diazo fast yellow 2G	By	9	
	Diazo fast yellow 3RL	By	2	
	Diazo geranine B extra	By	511	
	Diazo indigo blue 4GL extra	By	161	
	Diazo olive G	By	4	
	Diazo rubine B	By	606	
	Diazo rubine B conc., 60/100	By	99	
	Diazo sky-blue	By	11	
	Diazo sky-blue 3G	By	953	
	Diazo violet BL	By	2	
	Diazo yellow R	By	2	
	Diphene blue R	A	459	
	Diphenyl blue KFC	G	1,587	
	Diphenyl violet BVC	G	220	
	Direct black B conc	Q	200	
	Direct blue BXR	S	2,863	
	Direct brown G	CG	1,087	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED DIRECT DYES—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Direct brown 3GNC	S	661	
	Direct brown R	CG	2,204	
	Direct fast yellow CR	Q	1,729	
	Direct fast yellow GR	Q	2,855	
	Direct green	CG	7,760	$3,540
	Direct green B	CG		
	Direct sky-blue green shade	I	2,692	
	Direct violet B	S	1,981	
	Direct violet R, 360 per cent	CG	1,213	
	Heligoland black FFNA	CG	21,089	10,454
	Heligoland black FFN extra	CG		
	Heligoland black BH 100 per cent	CG		
	Heligoland blue 6B	CG	9,951	
	Naphtamine fast green B	K	325	
	Naphtogene blue BM	A	731	
	Naphtogene blue 2R	A	2,221	
	Naphtogene blue 4R	A	12[illegible]	
	New yellow for cotton, 333 per cent	WD	3,978	3,724
	New yellow for cotton, 335 per cent	WD		
	New yellow for cotton	WD		
	Oxamine yellow 3G	B	40	
	Oxydiamine brown G	C	201	
	Oxydiamine brown RN	C	2	
	Oxydiaminogen ED	C	24	
	Oxydiaminogen OB	C	560	
	Polyphenyl blue GNH conc	G	483	
	Polyphenyl orange RC	G	908	1,036
	Polyphenyl orange SP	G		
	Polyphenyl yellow RC	G	1,179	
	Pyrazol brown G	S	1,984	
	Pyrazol orange G	S	25,078	
	Rosanthrene Bordeaux B	L	500	
	Rosanthrene R	S	1,773	3,866
	Rosanthrene R paste	S		
	Rosanthrene R	L		
	Solomine blue FF	LG	606	
	Thional yellow B	S	493	
	Tolylene fast orange GL	LG	597	
	Tolylene yellow G	By	20	
	Trazol Bordeaux B	GrF	65	
	Triazol brown S000	GrF	2	
	Trisulphone bronze B	S	972	
	Zambesi black D extra		18,862	17,287
	Zambesi black D extra	LG		
	Zambesi black D	A		
	Zambesi black V	A		
	Zambesi black V	LG		

UNIDENTIFIED VAT COLORS.

Algole brown G powder	By	196	
Algole yellow 3GL powder	By	33	
Caledon blue R	G	20	
Chloranthrene Bordeaux R paste	BD	10	
Chloranthrene red 5G	BD	351	
Cibanone green B paste 10 per cent	I	2,824	$5,964
Cibanone green B paste	I		
Cibanone green B	S		
Durindone blue 4B	BD	4,802	6,182
Durindone blue 5B	BD		
Durindone blue 5B	Lev		
Durindone blue 6B	BD		
Durindone blue 6B	Lev		
Durindone blue 4B extra	Lev		
Durindone red B	Lev	120	
Durindone scarlet R	BD	1,050	
Durindone scarlet R	Lev		
Helindone black 2RG paste (for printing)	M	389	
Helindone black paste (for printing)	M		
Helindone fast scarlet B powder	M	40	
Indanthrene bluish green BN paste, sand free	B	15	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED VAT COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Indanthrene blue RC powder	B.	51	
	Indanthrene brown RR paste	B	739	
	Indanthrene brown RR	B	26	
	Indanthrene violet BN extra paste	B	3,007	$739
	Indanthrene violet BN extra paste, sand free	B.		
	Indanthrene violet RRN paste, sand free	B.		
	Vat violet R paste	Q	110	
	Vat yellow R paste	Q	440	

UNIDENTIFIED ACID COLORS.

	Acetyl red BB	B	201	
	Acid blue RBF	I	200	
	Acid Bordeaux	S	220	
	Acid brilliant blue A	LG	549	
	Acid green	Q	76	$249
	Acid green 300 per cent	Q		
	Acid milling black B	G	1,146	
	Acid rhodamine BG	B	51	
	Acid rhodamine R	B	4	
	Acid rhodamine	I	330	
	Acid violet 4RN	B	2	
	Acid violet 6B	LG	84	
	Acid violet R extra conc	WD	77	
	Alkali blue 2G	M	328	
	Alkali blue 2R 1918	M	207	
	Alkali fast green 3B	By	326	
	Alkali fast green 3G	By	300	
	Anthracyanine 3FL		438	960
	Anthracyanine 3FL	LG		
	Anthracyanine 3FL	By		
	Anthracyanine 3FL conc., 40/100	By		
	Anthracyanine FL conc., 50/100	By		
	Anthracyanine 3 FL reddish	LG		
	Anthracyanine S powder	DH	1,102	
	Anthosine 5B	B	22	
	Azo acid blue B	S	220	
	Azo crimson L	By	249	
	Azo dark green A	G	485	
	Azo geranine 3BN	BD	4,480	6,719
	Azo geranine 3BN	Lev		
	Azo rhodine	S	2,811	4,512
	Azo rhodine 6B	S		
	Azo rhodine 2G	S		
	Azo rhodine 2GN	S		
	Azorubin 2B conc. 166 per cent	WD	6,680	
	Azo wool violet 7R	C	99	
	Brilliant acid blue CB	By	110	
	Brilliant acid carmine 6B	Gr. E	99	
	Brilliant anthrazurol	B	11	
	Brilliant fast red L 125 per cent	BK	165	
	Brilliant milling red R	C	99	
	Brilliant scarlet 4R conc	WD	11,179	2,208
	Brilliant scarlet RN	WD		
	Brilliant scarlet PHT	WD		
	Brilliant silk blue 10B	A	11	
	Brilliant sulphone red 10B	S	664	
	Calcutta blue	S	43,857	
	Cochineal B extra	G	214	
	Coomassie fast black BW	BD	10,080	
	Coomassie fast black BW	Lev		
	Cyananthrol BGA	B	75	
	Cyananthrol BGA00	B	40	
	Cyananthrol R	B	26	
	Cyananthrol RBX powder	B	165	
	Cyananthrol RXO	B	602	
	Double scarlet S conc. 115 per cent	WD	1,477	
	Eosine L paste	B	146	
	Fast acid cosine G extra	M	4,951	
	Formyl blue BX	C	213	
	Erio fast fuchsine BBL	G	1,654	
	Erio flavine SX	G	2,535	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED ACID COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Erio green B conc	G	6,856	$26,151
	Erio green B supra	G		
	Erio violet BC	G	7,914	14,859
	Erio violet AL supra	G		
	Erio violet RL supra	G		
	Fast acid green BB extra	M	1,100	
	Fast cyanine Navy blue extra conc	WD	1,102	
	Fast light blue B	WD	187	
	Fast light yellow	WD	1,102	
	Fast red AN conc. 135 per cent	WD	2,569	24,595
	Fast red V	Q		
	Fast blue wool BL	LG	3,857	2,977
	Fast wool blue R	LG		
	Green 21	S	441	
	Guinea fast green B	A	500	
	Guinea fast red 2R	A	100	
	Jasmine high conc	G	4,189	
	Jersey black B	Q	100	
	Kiton fast violet 10B	S	661	1,446
	Kiton fast violet 10B	I		
	Kiton fast yellow S	I	642	894
	Kiton yellow S	I		
	Milling red 4BA	A	100	
	Milling yellow 3G	C	15	
	Milling yellow 3G, 200 per cent	C	243	
	Milling yellow O	C	11	
	Milling yellow OO	C	60	
	Naphthalene black 12B	BD	6,110	
	Naphthalene blue B	M	110	
	Naphthylamine blue black	CG	6,658	
	Navy blue A	I	225	363
	Navy blue	Q		
	New acid brown	Lev	60	
	Palatin light yellow R	B	62	
	Patent blue E	M	300	
	Pink M	BD	25	
	Polar red G conc	G	1,543	
	Resorcin havana brown	BK	411	
	Rosinduline GXF	K	20	
	Special blue G	B	82	
	Sulphone blue R	LG	3,022	
	Victoria navy blue B	By	522	
	Wool blue RL	G	2,866	
	Wool blue S conc. 333 per cent	WD	1,489	
	Wool brown	WD	441	
	Wool fast violet B, conc. 50/100	By	55	
	Wool green NB	Q	3,292	
	Wool violet R	K	94	
	Xylene fast green B	S	1,720	

UNIDENTIFIED SULPHUR COLORS.

	Cross dye green B	BD	16,274	
	Cross dye green 2G conc	BD	7,056	89,429
	Cross dye green 2G	BD		
	Cross dye yellow Y	BD	4,480	
	Eclipse brown BK	G	5,952	
	Hydrosulphon green S	Q	500	
	Immedial olive B	C	201	
	Immedial purple C	C	4	
	Immedial direct blue B	C	450	
	Pyrogene yellow O	I	2,205	
	Sulphur blue	Q	300	299
	Sulphur blue extra	Q		
	Sulphur brown	Q	300	135
	Sulphur brown conc	Q		
	Sulphur cutch	Q	400	
	Sulphur green	Q	200	
	Sulphur green B	BD	3,178	
	Sulphur indigo	Q	100	
	Sulphur yellow	Q	3,600	1,267
	Sulphur yellow	BD		

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED SULPHUR COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Sulphur yellow G	S	2,424	
	Sulphurol dark brown	WD	992	$131
	Sulphurol dark brown G	WD		
	Sulphurol indigo blue, conc	WD	1,157	232
	Sulphurol indigo B. conc	WD		
	Sulphurol indigo R. conc	WD		
	Sulphurol orange	WD	441	
	Thiamine green, 2G	Q	4,850	
	Thiamine brilliant green 2Y	Q	2,381	
	Thiazol yellow G conc	S	330	
	Thiogene New blue 2RL	M	500	
	Thional brilliant blue 6B	S	7,670	22,763
	Thional brilliant blue 6B conc. pure	S		
	Thional brilliant green GG	S	386	
	Thional yellow G	S	8,377	15,988
	Thional brilliant yellow G	S		
	Thional brilliant yellow GG	S		
	Thional bronze GY	S	220	
	Thional brown GD	BD	27,887	
	Thional brown GD	Lev		
	Thional blue BR	Lev	470	
	Thional orange G	S	1,638	
	Thional yellow 3RD	S	6,407	
	Thional brilliant green 4GX	BD	9,166	
	Thional brilliant green 4GX	Lev		
	Thional brown R	BD	15,432	
	Thional brown R	Lev		
	Thional corinth RBX	BD	19,970	
	Thional direct blue S	BD	2,240	
	Thional green 3B	BD	7,840	6,273
	Thional green 3B	Lev		
	Thional green DY	Lev	30,332	
	Thional green DY	BD		
	Thionine green 2G	Q	11,647	
	Thional yellow GR	Lev	4,980	
	Thional yellow GR	BD		
	Thional yellow 3RD	BD	27,618	
	Thional yellow 3RD	Lev		

UNIDENTIFIED MORDANT AND CHROME COLORS.

	Acid alizarine black EN	M	6,596	$3,273
	Acid alizarine black ENT	M		
	Acid alizarine black ENT, conc	M		
	Acid alizarine black SE, paste	M		
	Acid alizarine black SET	M		
	Acid alizarine SET paste	M		
	Acid alizarine blue A	M	40	
	Acid alizarine blue black A	M	59	
	Acid alizarine gray G	M	411	
	Acid alizarine red B	M	201	
	Acid chrome violet B	By	227	
	Acid milling red G conc	G	2,424	
	Acid milling red G conc	S		
	Alizarine acid blue	Q	25	
	Alizarine blue OCR conc	S	1,332	2,793
	Alizarine blue OCR conc. double	S		
	Alizarine chrome green A	S	500	
	Alizarine claret 100	M	15	
	Alizarine claret R paste 15 per cent	M	26	
	Alizarine cyanine WRB paste	By	2,401	
	Alizarine cyanine WRR paste	By	9,755	
	Alizarine cyanine green G extra powder	By	500	
	Alizarine cyanine NS powder	By	330	
	Alizarine cyanine WRB powder	By	330	
	Alizarine cyanole EF	C	7	
	Alizarine cyanole SR	C	9	
	Alizarine delphinol SE	BD	112	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED MORDANT AND CHROME COLORS—Continued.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Alizarine delphinol blue SE	Q	300	
	Alizarine emeraldole G powder	By	231	
	Alizarine saphirole WSA powder	By	994	
	Alizarine sky blue 3R powder	By	24	
	Alizarine uranole 2B powder	By	64	
	Anthracene acid brown R	C	115	
	Anthracene blue LG	BD	2,177	
	Anthracene blue SWB powder	B	86	
	Anthracene brown RD paste	G	5,908	
	Anthracene brown WLP paste	BD	634	
	Anthracene chrome blue	G	62	
	Anthracene yellow	G	20	
	Anthracyanine 3FL	By	145	
	Anthracyanine FL conc. 60/100	By	95	
	Anthracyl blue BT	WD	165	
	Anthracyl chrome blue D conc. 125 per cent	WD	8,950	
	Anthracyl chrome brown G	WD	556	
	Anthranol black T double conc	WD	1,389	
	Anthranol blue RD	WD	926	
	Anthranol Bordeaux	WD	6,377	
	Anthranol brown M	WD	311	
	Anthranol green D	WD	242	
	Anthranol orange	WD	381	
	Anthranol yellow	WD	185	
	Brilliant alizarine cyanine 3G paste	By	500	
	Brilliant chrome blue F	S	220	
	Brilliant delphine blue BS	S	90,838	
	Brilliant milling blue B	C	66	
	Cheshire chrome black R	Q	100	
	Cheshire chrome violet R	Q	100	
	Chromazurine G. powder	DH	661	
	Chrome black	WD	6,243	82,751
	Chrome black G	LG		
	Chrome black PON	CG		
	Chrome brilliant blue G	G	1,102	
	Chrome brown DO	WD	8,434	3,141
	Chrome brown RVV	G		
	Chrome fast brown GR	WD		
	Chrome fast cyanine G	L	1,102	
	Chrome green Y paste	Lev	15,806	4,964
	Chrome green Y	Lev		
	Chrome green Y paste	BD		
	Chrome yellow BN	CG	4,562	
	Chromophenine FKN powder	DH	771	
	Chromorhodine B extra	DH	110	
	Diadem chrome red BR	Q	25	
	Diamond Bordeaux R	LG	597	
	Diamond magenta crystals	WD	666	
	Era black J conc	Lev	120	
	Era chrome dark blue G	Lev	2,240	
	Erio alizarine blue G 150 per cent powder	G	1,984	
	Erio chrome azurol BX	G	441	
	Erio chrome red PEI	G	441	
	Erio chrome violet B	G	10,715	
	Erio floxine 6B conc	G	4,431	7,749
	Erio floxine 2G conc			
	Fast violet 222 per cent	WD	220	
	Gallo violet D	By	51	
	Indalizarine I paste	DH	624	372
	Indalizarine I paste	Q		
	New Gallophenine R	By	222	
	Omega chrome brown PB	S	24,096	23,761
	Omega chrome brown P	S		
	Omega chrome brown CPM	S		
	Omega chrome brown G	S		
	Omega chrome green F	S	1,873	
	Omega chrome red B	S	991	
	Palatine chrome brown RX	B	4	
	Salicine dark green CS	K	99	

TABLE 14.—*Imports of dyes for fiscal year 1920*—Continued.

UNIDENTIFIED BASIC COLORS.

Schultz No.	Name of dye.	Manufacturer.	Imports.	
			Quantity.	Invoice value.
			Pounds.	
	Corn blue B conc. 143 per cent	WD	644	$180
	Corn blue R	WD		
	Indocyanine B	LG	441	
	Pyrophosphine GG	WD	441	
	Rosazeine 6G extra	M	220	
	Rosolane B conc.	M	80	
	Seto Blue VE	G	1,651	
	Tannin yellow GE	Q	125	
	Turquoise blue BB	By	201	
	Rhoduline heliotrope B	By	11	
	Rhoduline heliotrope 3B	By	24	
	Victoria blue 4BS	S	772	

UNIDENTIFIED OIL-SOLUBLE DYES.

	Oil-soluble dyes		1,334	$381
	Olisol blue	WD		
	Olisol carmoisine	WD		
	Olisol yellow	WD		
	Spirit aurine	Q		
	Sudan 6	WD		

UNIDENTIFIED DYES FOR COLOR LAKES.

	Brilliant lake blue G extra	By	498	
	Helio Bordeaux BL powder	By	500	
	Helio fast blue BL conc	By	339	
	Lithol fast orange R paste	B	110	
	Lithol Rubine G powder	B	249	
	Pigment scarlet 3B	M	1,000	

UNIDENTIFIED UNCLASSIFIED COLORS.

	Bistre T	Q	1,653	
	Du Olive GL powder	Lev	2,249	
	Ink Blue BJIBN	GrE	29	
	Mounsey Olive brown	Q	100	
	New fast red GGL conc	BK	1,598	
	Nitro orange OT 115 per cent	BK	662	$258
	Nitro orange RR conc. 110 per cent	BK		
	Paper black	M	1,146	
	Paper red O	WD	13,701	5,370
	Paper Red O conc	WD		
	Paper red 690	WD		
	Paper red R	WD		
	Parasulphone brown V	S	611	
	Parasulphone bronze GS	S	110	
	Peacock blue	Q	1,182	
	Red bluish CPBN	Q	1,102	
	Scarlet Z	BK	1,186	
	Tartraphenine	Q	720	
	Thianine Brilliant green 2Y	Q	1,120	
	Tibet black FWN	WD	882	
	All other		9,352	14,743
	Total		3,501,147	4,548,109

Part IV.—APPENDIX

STATISTICS OF IMPORTS AND EXPORTS

DIRECTORY OF MANUFACTURERS OF COAL-TAR PRODUCTS

TABLE 15.—*Imports of dyes entered for consumption for 1917, 1918, 1919, and first 6 months of 1920 (calendar years).*

	1917		1918		1919		1920 (6 months).	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Alizarin:								
Natural, 30 per cent	*Pounds.* 6,899	$12,216	*Pounds.* 108,711	$158,816	*Pounds.* 6,684	$8,612	*Pounds.*	.....
Synthetic, 30 per cent	19,180	55,179	.....	.....	.....	.....	58,810	$18,785
Colors or color lakes obtained, derived, or manufactured from alizarin, 30 per cent plus 5 cents per pound	7,062	18,680	1,499	4,490	15,358	14,495	9,061	7,387
Dyes obtained, derived, or manufactured from alizarin, 30 per cent	34	75	6,446	13,399	1,920	3,864	17,777	6,220
Colors or color lakes obtained, derived, or manufactured from anthracene and carbazol, 30 per cent plus 5 cents per pound	53,205	49,729	27,900	22,546	38,073	55,475	40,991	42,122
Dyes obtained, derived, or manufactured from anthracene and carbazol, 30 per cent	23,146	11,326	12,827	20,087	7,162	7,772	29,275	60,760
Indigo:								
Natural	2,261,122	4,230,510	1,637,914	2,007,958	234,991	285,925	20,574	33,831
Synthetic	1,379,349	871,267	690,414	342,589	537,697	327,133	99,419	115,672
Indigoids, whether or not obtained from indigo	129,983	140,932	3,376	13,744	34,049	82,779	38,372	99,198
All other colors, dyes, or stains, whether soluble or not, etc., 30 per cent plus 5 cents per pound	2,257,476	2,574,363	1,799,467	2,161,799	1,991,687	2,848,294	1,368,604	1,813,211

TABLE 16.—*Imports of natural dyes and extracts of, entered for consumption, 1917 to June 30, 1920.*

Calendar year.	Annatto.		Cochineal.		Cudbear.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
1917	660,102	$77,238	121,879	$48,345	55,897	$7,515
1918	655,250	62,961	237,402	116,660	54,447	9,411
1919	356,432	19,972	116,014	52,029	33,391	4,150
1920 (6 months)	759,117	31,002	106,804	44,215	17,924	2,842

Calendar year.	Dyewoods, diverse.		Fustic wood.		Indigo, natural.	
	Tons.		*Tons.*		*Pounds.*	
1917	7,565	$94,029	10,442	$289,756	2,261,122	$4,230,510
1918	45,966	407,190	11,866	280,813	1,637,914	2,007,958
1919	922	23,286	696	15,091	234,991	285,925
1920 (6 months)	1,539	29,913	829	16,567	20,574	33,831

TABLE 16.—*Imports of natural dyes and extracts of, entered for consumption, 1917 to June 30, 1920*—Continued.

Calendar year.	Logwood.		Logwood (and other wood extracts).		Madder, ground.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.		*Pounds.*		*Pounds.*	
1917	61,714	$1,509,878	736,038	$86,672	2,193	$253
1918	33,168	776,735	277,748	45,895	.....	.....
1919	29,022	549,885	539,252	62,601	7,875	1,545
1920 (6 months)	30,585	874,439	453,932	28,706	1,609	338

Calendar year.	Orchil.		Persian berries, extract.		Safflower, saffron.	
	Pounds.		*Pounds.*		*Pounds.*	
1917	.....	$50,005	.....	.....	.....	$105,516
1918	.....	56,284	.....	.....	.....	70,032
1919	372,606	42,085	5,209	$2,691	23,663	106,951
1920 (6 months)	345,801	30,207	11,357	3,631	6,692	80,990

Calendar year.	Turmeric.		Gambier.		All other extracts of vegetable origin.	
	Pounds.		*Pounds.*		*Pounds.*	
1917	.....	$1,331	12,050,848	$1,138,833	150,078	$20,757
1918	.....	11,278	8,735,270	949,971	2,889,865	234,375
1919	1,230,229	68,852	4,744,651	432,499	443,749	80,079
1920 (6 months)	758,782	59,071	5,949,423	476,418	253,595	43,397

NOTE.—No imports of camwood and madder extract.

TABLE 17.—*Imports of coal-tar products entered for consumption, Jan. 1, 1917–June 30, 1920.*

Calendar year.	Quantity.	Value.	Duty collected.	Actual and ad valorem rates.
	Pounds.			*Per cent.*
Acetanilid [1] (25 per cent) [2]	.....	.....	.....	.....
Acetphenetidin (25 per cent): [2]				
1917	3,280	$40,352	$10,088	25.00
1918	.....	.....	.....	.....
1919	.....	.....	.....	.....
1920 (6 months)	.....	.....	.....	.....
Acetylsalicylic acid (25 per cent): [2]				
1917	1,474	4,670	1,168	25.00
1918	.....	.....	.....	.....
1919	26	76	19	25.00
1920 (6 months)	.....	.....	.....	.....
Antipyrene (25 per cent): [2]				
1917	21,842	62,411	15,603	25.00
1918	9,416	106,643	26,661	25.00
1919	13,736	135,565	33,891	25.00
1920 (6 months)	10,653	37,576	9,394	25.00
Aspirin [3] (25 per cent) [2]	.....	.....	.....	.....
Salol [1] (25 per cent) [2]	.....	.....	.....	.....
Phenolphthalein (25 per cent): [2]				
1917	.....	.....	.....	.....
1918	100	1,200	300	25.00
1919	.....	.....	.....	.....
1920 (6 months)	200	726	181	25.00
Saccharin (65 cents per pound): [2]				
1917	554	6,544	360	.55
1918	.....	.....	.....	.....
1919	.....	.....	.....	.....
1920 (6 months)	.....	.....	.....	.....

[1] No imports.
[2] Dutiable under the act of Oct. 3, 1913, rather than under the act of Sept. 8, 1916.
[3] Included under acetylsalicylic acid.

TABLE 17a.—*Imports of coal-tar products entered for consumption, Jan. 1, 1917, to June 30, 1920 (act of Sept. 8, 1916).*

GROUP I (FREE).

	Calendar years.						1920 (Jan. 1 to June 30).	
	1917		1918		1919			
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Acids, carbolic, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of original distillate....pounds..	151,254	$9,894	155,236	$17,260	1,965,289	$187,788	69,159	$6,318
Anthracene oil....gallons..	61,200	3,105	.....	.....	18,699	3,994	5,180	1,550
Benzol.....pounds..	3,598,733	341,700	2,673,855	87,570	217,865	5,617	146,819	1,836
Cresol.....do....	7,665,442	532,529	8,873,271	779,045	6,435,650	557,214	5,658,649	440,745
Dead or creosote oil, gallons.....	9,817,085	786,638	1,545,247	162,869	11,268,379	1,374,217	5,239,223	799,536
Naphthalene having a solidifying point less than 79° C.....pounds..	5,206,980	175,554	3,902,731	130,098	3,239,256	92,265	4,713,067	124,706
Pyridine and quinoline, pounds.....	12,247	1,480	9,237	1,036	165,064	20,543	445,411	50,314
Coal tar, crude.....barrels..	6,780	10,745	13,087	21,200	22,339	38,476	11,439	22,291
Pitch coal tar.....do....	5,926	12,039	14,029	29,095	3,364	8,598	2,909	7,104
Metacresol, orthocresol, and paracresol—purity less than 90 per cent, pounds.....	20,708	1,404	.....	.....	11,200	1,221	.....	.....
Toluol.....pounds..	.....	.....	.....	.....	1,195,706	30,768	.....	.....
Xylol.....do....	9,332	2,928	.....	.....	.....	.....	.....	.....
All other products found naturally in coal tar whether produced or obtained from coal tar or other sources, n. s. p. f., pounds.....	.....	10,448	.....	2,756	380,525	6,334	50,500	1,369
All other distillates, which on being subjected to distillation yield in the portion distilling below 200° C. a quantity of tar acids less than 5 per cent of the original distillate, pounds.....	.....	1,502	.....	10,473	104,568	10,548	.....	.....

GROUP I, CRUDE (FREE).

Anthracene, purity less than 25 per cent.....	*Pounds.* (1)	(1)	*Pounds.* 18	$5	*Pounds.* 82,669	$2,022	*Pounds.* 7,451	$499
Acenaphthene, cumol fluorene, methylanthracene and methylnaphthalene..	(1)	(1)	.....	.....	15,759	946	.....	.....
Carbazol, purity less than 25 per cent.....	(1)	(1)	.....	.....	112	82	.....	.....

[1] Imports not available by calendar year.

TABLE 17b.—*Imports of coal-tar products entered for consumption, Jan. 1, 1917, to June 30, 1920.*

(Act of Sept. 8, 1916.)

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND).

	Quantity.	Value.	Duty.	Actual and computed ad-valorem rate.
Not colors, dyes or stains, photographic chemicals, medicinals, flavors, or explosives, and n. s. p. f.:	*Pounds.*			*Per cent.*
Jan. 1, 1917–Dec. 31, 1917	4,653	$20,539	$3,190.00	15.53
Jan. 1, 1918–Dec. 31, 1918	1,791	14,060	2,153.78	15.32
Jan. 1, 1919–Dec. 31, 1919	63	374	57.68	15.42
Jan. 1, 1920–June 30, 1920	250	1,087	169.30	15.58
Carbolic acid (phenol) which on being subjected to distillation yields in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate:				
Crystal—				
Jan. 1, 1917–Dec. 31, 1917	30,676	4,954	1,510.00	30.48
Jan. 1, 1918–Dec. 31, 1918	148,261	47,085	10,769.28	22.87
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Liquid—				
Jan. 1, 1917–Dec. 31, 1917	314,585	24,246	11,502.00	47.44
Jan. 1, 1918–Dec. 31, 1918	134,406	15,186	5,638.05	37.13
Jan. 1, 1919–Dec. 31, 1919	2,061	264	91.13	34.52
Jan. 1, 1920–June 30, 1920	30	14	2.18	15.57
Salicylic acid:				
Jan. 1, 1917–Dec. 31, 1917	26,273	23,575	4,193.00	17.79
Jan. 1, 1918–Dec. 31, 1918	117	112	19.73	17.62
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Anthraquinone:				
Jan. 1, 1917–Dec. 31, 1917	.....	.....	.....	.....
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	3,147	2,643	375.13	14.20
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Methylanthraquinone:				
Jan. 1, 1917–Dec. 31, 1917	1,432	95	50.00	52.68
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Binitrotoluol:				
Jan. 1, 1917–Dec. 31, 1917	61,632	10,471	3,111.00	29.71
Jan. 1, 1918–Dec. 31, 1918	22,635	3,333	1,065.83	31.98
Jan. 1, 1919–Dec. 31, 1919	6,896	1,331	372.05	27.95
Jan. 1, 1920–Jan. 20, 1920	.....	.....	.....	.....
Naphthalene solidifying at 79° C. or above:				
Jan. 1, 1917–Dec. 31, 1917	267,057	12,125	8,497.00	70.02
Jan. 1, 1918–Dec. 31, 1918	2,795	171	95.53	55.87
Jan. 1, 1919–Dec. 31, 1919	7,650	384	248.85	64.80
Jan. 1, 1920–June 30, 1920	154,281	7,700	5,012.00	65.09
Naphthol:				
Jan. 1, 1917–Dec. 31, 1917	1,027	1,069	186.00	17.40
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Nitronaphthalene:				
Jan. 1, 1917–Dec. 31, 1917	18,102	7,758	1,616.00	20.83
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Nitrotuluol:				
Jan. 1, 1917–Dec. 31, 1917	.....	.....	.....	.....
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	542	452	81.35	18.00
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Phthalic anhydride:				
Jan. 1, 1917–Dec. 31, 1917	98	1,853	280.00	15.13
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Naphthylamine:				
Jan. 1, 1917–Dec. 31, 1917	.....	.....	.....	.....
Jan. 1, 1918–Dec. 31, 1918	11,761	5,985	1,192.00	19.91
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....

TABLE 17b.—*Imports of coal-tar products entered for consumption, Jan. 1, 1917, to June 30, 1920*—Continued.

GROUP II (DUTIABLE AT 15 PER CENT PLUS 2½ CENTS PER POUND)—Continued.

	Quantity.	Value.	Duty.	Actual and computed ad-valorem rate.
Amidonaphthol:	*Pounds.*			*Per cent.*
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	150	$72	$14.55	20.21
Jan. 1, 1920–June 30, 1920				
Amidophenol:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	1,028	2,417	388.25	16.06
Jan. 1, 1920–June 30, 1920				
Anthracene, purity of 25 per cent or more:				
Jan. 1, 1917–Dec 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	51,895	8,011	2,499.02	31.19
Jan. 1, 1920–June 30, 1920				
Benzaldehyde:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	24,472	17,790	3,280.30	18.44
Jan. 1, 1920–June 30, 1920	9,479	5,928	1,126.00	19.00
Dimethylaniline:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	1,120	427	92.05	21.56
Jan. 1, 1920–June 30, 1920				
Nitrobenzol:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	21,513	4,003	1,138.28	28.44
Jan. 1, 1920–June 30, 1920	22,110	3,219	1,036.00	32.18
Phenylenediamine:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	2,746	1,769	334.00	18.88
Jan. 1, 1920–June 30, 1920	2,429	1,887	345.00	18.28
Resorcin:				
Jan. 1, 1917–Dec. 31, 1917	134	672	104.00	15.50
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919				
Jan. 1, 1920–June 30, 1920	5,159	2,642	525.00	19.87
Anilin salt:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918	21,273	3,250	1,019.00	31.36
Jan. 1, 1919–Dec. 31, 1919				
Jan. 1, 1920–June 30, 1920				
Benzylchloride:				
Jan. 1, 1917–Dec. 31, 1917	5	7	1.00	16.86
Jan. 1, 1918–Dec. 31, 1918				
Jan. 1, 1919–Dec. 31, 1919	1,000	430	89.50	20.81
Jan. 1, 1920–June 30, 1920	150	22	7.05	
All distillates, n. s. p. f., which on distillation yield in the portion distilling below 200° C. a quantity of tar acids equal to or more than 5 per cent of the original distillate:				
Jan. 1, 1917–Dec. 31, 1917				
Jan. 1, 1918–Dec. 31, 1918	1,550	2,008	339.95	16.93
Jan. 1, 1919–Dec. 31, 1919	3,170	4,587	767.30	16.73
Jan. 1, 1920–June 30, 1920	22,399	18,423	3,323.00	18.04
All similar products obtained, derived, or manufactured in whole or in part from the products provided for in Group I (free):				
Jan. 1, 1917–Dec. 31, 1917	193,021	17,595	7,465.00	42.43
Jan. 1, 1918–Dec. 31, 1918	13,445	8,640	1,632.12	18.89
Jan. 1, 1919–Dec. 31, 1919	51,214	39,861	7,259.50	18.21
Jan. 1, 1920–June 30, 1920	38,575	35,463	6,284.00	17.72

TABLE 17b.—*Imports of coal-tar products entered for consumption, Jan. 1, 1917, to June 30, 1920*—Continued.

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM).

	Quantity.	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:				
Alizarin, natural—	*Pounds.*			*Per cent.*
Jan. 1, 1917–Dec. 31, 1917	6,899	$12,216	$3,665.00	30.00
Jan. 1, 1918–Dec. 31, 1918	108,711	158,816	47,644.80	30.00
Jan. 1, 1919–Dec. 31, 1919	6,684	8,612	2,583.60	30.00
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Alizarin, synthetic—				
Jan. 1, 1917–Dec. 31, 1917	19,180	55,179	16,554.00	30.00
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	58,810	18,785	5,636.00	30.00
Dyes obtained, derived, or manufactured from alizarin—				
Jan. 1, 1917–Dec. 31, 1917	34	75	22.50	30.00
Jan. 1, 1918–Dec. 31, 1918	6,446	13,399	4,019.70	30.00
Jan. 1, 1919–Dec. 31, 1919	1,920	3,864	1,159.20	30.00
Jan. 1, 1920–June 30, 1920	17,777	6,220	1,866.00	30.00
Dyes obtained, derived, or manufactured from anthracene and carbazol—				
Jan. 1, 1917–Dec. 31, 1917	23,146	11,326	3,398.00	30.00
Jan. 1, 1918–Dec. 31, 1918	12,827	20,087	6,026.10	30.00
Jan. 1, 1919–Dec. 31, 1919	7,162	7,772	2,331.60	30.00
Jan. 1, 1920–June 30, 1920	29,275	60,760	18,228.00	30.00
Indigoids, whether or not obtained from indigo—				
Jan. 1, 1917–Dec. 31, 1917	129,983	140,932	42,280.00	30.00
Jan. 1, 1918–Dec. 31, 1918	3,376	13,744	4,123.20	30.00
Jan. 1, 1919–Dec. 31, 1919	34,049	82,779	24,833.70	30.00
Jan. 1, 1920–June 30, 1920	38,372	99,198	29,759.00	30.00
Flavors—				
Jan. 1, 1917–Dec. 31, 1917	35	408	122.00	30.00
Jan. 1, 1918–Dec. 31, 1918	160	816	244.80	30.00
Jan. 1, 1919–Dec. 31, 1919	.....	.....	.....	.....
Jan. 1, 1920–June 30, 1920	.....	.....	.....	.....
Indigo, natural—				
Jan. 1, 1917–Dec. 31, 1917	2,261,122	4,230,510	1,269,153.00	30.00
Jan. 1, 1918–Dec. 31, 1918	1,637,914	2,007,958	602,387.40	30.00
Jan. 1, 1919–Dec. 31, 1919	234,991	285,925	85,777.50	30.00
Jan. 1, 1920–June 30, 1920	20,574	33,831	10,149.00	30.00
Indigo, synthetic—				
Jan. 1, 1917–Dec. 31, 1917	1,379,349	871,267	261,380.00	30.00
Jan. 1, 1918–Dec. 31, 1918	690,414	342,589	102,776.70	30.00
Jan. 1, 1919–Dec. 31, 1919	537,697	327,133	98,139.90	30.00
Jan. 1, 1920–June 30, 1920	99,419	115,672	33,702.00	30.00
Medicinals—				
Jan. 1, 1917–Dec. 31, 1917	.....	284,346	85,304.00	30.00
Jan. 1, 1918–Dec. 31, 1918	.....	301,074	90,322.20	30.00
Jan. 1, 1919–Dec. 31, 1919	.....	168,466	50,539.80	30.00
Jan. 1, 1920–June 30, 1920	.....	63,813	19,144.00	30.00

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM PLUS 5 CENTS PER POUND).

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:				
Colors, or color lakes obtained, derived, or manufactured from alizarin—	*Pounds.*	*Dollars.*	*Dollars.*	*Per cent.*
Jan. 1, 1917–Dec. 31, 1917	7,062	18,680	5,957.00	31.89
Jan. 1, 1918–Dec. 31, 1918	1,499	4,490	1,421.95	31.67
Jan. 1, 1919–Dec. 31, 1919	15,358	14,405	5,089.40	35.33
Jan. 1, 1920–June 30, 1920	9,061	7,387	2,669.00	36.13
Colors, or color lakes obtained, derived, or manufactured from antracene and carbazol—				
Jan. 1, 1917–Dec. 31, 1917	53,205	49,729	17,579.00	35.35
Jan. 1, 1918–Dec. 31, 1918	27,900	22,546	8,158.80	36.19
Jan. 1, 1919–Dec. 31, 1919	38,073	55,475	18,546.15	33.43
Jan. 1, 1920–June 30, 1920	40,991	42,122	14,686.00	34.87

TABLE 17b.—*Imports of coal-tar products entered for consumption, Jan. 1, 1917, to June 30, 1920*—Continued.

GROUP III (DUTIABLE AT 30 PER CENT AD VALOREM PLUS 5 CENTS PER POUND—Continued.

	Quantity.	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.				
All other colors, dyes, or stains, whether soluble or not in water, color acids, color bases, or color lakes—				
Jan. 1, 1917–Dec. 31, 1917	*Pounds.*	*Dollars.*	*Dollars.*	*Per cent.*
Jan. 1, 1918–Dec. 31, 1918 [1]	2,257,476	2,574,363	885,183.00	34.38
Jan. 1, 1919–Dec. 31, 1919	1,799,467	2,161,799	738,013.05	34.16
Jan. 1, 1920–June 30, 1920	1,991,687	2,848,294	954,072.55	33.50
Phenolic resin, synthetic—	1,368,604	1,813,211	612,394.00	33.77
Jan. 1, 1917–Dec. 31, 1917	134,702	11,596	10,214.00	88.08
Jan. 1, 1918–Dec. 31, 1918	.....	.....	.....	.....
Jan. 1, 1919–Dec. 31, 1919	1,114	2,860	913.70	31.95
Jan. 1, 1920–June 30, 1920	1,530	949	361.20	38.05
Photographic chemicals—				
Jan. 1, 1917–Dec. 31, 1917	12,632	101,406	31,053.00	30.62
Jan. 1, 1918–Dec. 31, 1918	14,550	108,537	33,288.60	30.67
Jan. 1, 1919–Dec. 31, 1919	12,059	77,876	23,965.75	30.77
Jan. 1, 1920–June 30, 1920	9,918	32,186	10,152.40	31.54

[1] Does not include 110 pounds, valued at $322, duty $81.68, from Cuba.

TABLE 18.—*General imports of coal-tar products, by countries, for calendar years 1918*[1]*–June 30, 1920.*

DEAD OR CREOSOTE OIL (FREE).

Imported from—	1918		1919		Jan. 1, 1920–June 30, 1920.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Gallons.		*Gallons.*		*Gallons.*	
England	.....	.....	8,934,045	$1,085,617	2,551,835	$318,644
Scotland	1,125	$862	60,756	10,462	63,934	9,476
Canada	1,543,660	161,693	2,273,578	278,138	608,324	88,541
All other	462	314	.....	.....	2,015,130	[2] 382,875
Total	1,545,247	162,869	11,268,379	1,374,217	5,239,223	799,536

[1] Imports not available for 1917 calendar year. [2] All from Netherlands.

CARBOLIC ACID.

Imported from—	1918				1919	
	Carbolic acid, free.		Carbolic acid, dutiable (phenol).		Carbolic acid, free.	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
England	155,236	$17,260	208,037	$54,884	1,619,823	$158,820
Canada	.....	.....	75,300	7,613	.....	.....
Scotland	.....	.....	.....	.....	345,466	28,968
Total	155,236	17,260	283,337	62,497	1,965,289	187,788

TABLE 18.—*General imports of coal-tar products, by countries, for calendar years 1918–June 30, 1920*—Continued.

CARBOLIC ACID—Continued.

Imported from—	1919		Jan. 1, 1920–June 30, 1920.			
	Carbolic acid, dutiable (phenol).		Carbolic acid, free.		Carbolic acid dutiable (phenol).	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
England	2,061	$264	55,119	$4,728	30	$14
Scotland			14,040	1,590		
Total	2,061	264	69,159	6,318	30	14

ANILIN SALTS.

(Free under act of 1909; dutiable under act of Oct. 3, 1913, and under the act of Sept. 8, 1916.)

Imported from—	1918		1919		Jan. 1, 1920–June 30, 1920.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
England	*Pounds.* 21,273	$3,250	*Pounds.*		*Pounds.*	
Total	21,273	3,250				

INDIGO.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918				1919	
	Indigo, natural, (dutiable).		Indigo, synthetic (dutiable).		Indigo, natural (dutiable).	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Switzerland	25,762	$38,719	770,212	$410,421	15,796	$29,857
England	261,975	463,510	6,817	5,587	10,584	16,647
British India	1,138,176	1,284,434			99,597	99,901
Salvador	234,452	299,554			60,940	67,262
All other	83,709	108,150			40,557	46,448
Total	1,747,074	2,194,367	777,029	416,008	227,474	260,115

Imported from—	1919		1920 (6 months)			
	Indigo, synthetic (dutiable).		Indigo, natural (dutiable).		Indigo, synthetic (dutiable).	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Switzerland	726,440	$388,067			119,551	$123,084
England	1,468	1,970	18,262	$29,951	1,229	361
Salvador	8,400	5,729				
France			21,116	16,246	381,751	156,917
Germany			4,326	5,155		
India			2,850	7,392		
All other	87,570	36,607	321	405		
Total	823,878	432,373	46,878	59,149	502,531	280,362

TABLE 18.—*General imports of coal-tar products, by countries, for calendar years 1918–June 30, 1920*—Continued.

ALIZARIN AND ALIZARIN DYES.

(Free under act of Oct. 3, 1913; dutiable under act of Sept. 8, 1916.)

Imported from—	1918		1919		Jan. 1, 1920–June 30, 1920.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Pounds.		*Pounds.*		*Pounds.*	
Switzerland	440	$572	220	$2,517	218,539	$73,084
United Kingdom	4,310	3,739	23,417	21,084	22,169	13,541
Canada	1	2	215	414	80	800
Japan	15,141	58,948				
All other	500	7,629	23	265	224	534
Total	20,392	70,890	23,875	24,280	241,012	87,959

COAL-TAR COLORS OR DYES (DUTIABLE).

	1918, value.	1919		Jan. 1, 1920–June 30, 1920.	
		Quantity.	Value.	Quantity.	Value.
		Pounds.		*Pounds.*	
Belgium		36,968	$63,119	139,524	$101,108
France	$76,506	11,746	20,853	8,555	19,023
Germany		143,031	83,563	305,684	267,036
Switzerlad	1,762,688	1,284,199	2,176,463	801,265	1,412,044
England	561,699	609,703	661,548	165,734	166,599
All other	68,546	165,750	160,730	35,416	25,277
Total	2,469,139	2,215,397	3,169,276	1,456,178	1,991,087

TABLE 19.—*Domestic exports of coal tar and of dyes and dyestuffs for calendar years 1918*[1]*–June 30, 1920.*

COAL TAR.

Exported to—	1918		1919		Jan. 1, 1920–June 30, 1920.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Barrels.		*Barrels.*		*Barrels.*	
Europe	2,069	$12,297	230	$900	214	$1,100
North America [1]	54,149	139,456	71,749	158,205	26,834	72,749
South America	808	6,288	2,759	20,166	2,470	13,160
Asia	198	1,505	475	3,174	10	65
Oceania	154	1,739	45	301	34	339
Africa	1,176	7,435	1,334	15,757	17	142
Total	58,554	168,720	76,592	198,503	29,579	87,555

[1] Exports not available for 1917 calendar year.

TABLE 19.—*Domestic exports of coal tar and of dyes and dyestuffs for calendar years 1918–June 30, 1920*—Continued.

DYES AND DYESTUFFS (VALUE).

Exported to—	Calendar years.					
	1918			1919		
	Aniline dyes.	Logwood extracts.	All other.	Aniline dyes.	Logwood extracts.	All other.
Portugal	$176,769	$10,541	$131,280	$70,296	$2,319	$36,063
Belgium				90	34,737	19,193
France	6,345	263,610	496,875	127,059	596,042	229,689
Germany				150	290	
Italy	274,903	70,237	234,238	269,130	58,716	180,359
Netherlands				26,284	21,735	9,104
Russia			12,825	8,570		
Switzerland	22,500	7,728	5,000	193	22,824	
United Kingdom	380,181	345,458	524,576	413,700	304,686	423,719
Canada	836,445	82,292	724,522	1,015,334	119,871	1,007,892
Mexico	289,327	5,666	181,029	467,806	17,438	230,359
Central America	5,617	400	5,498	5,941	892	14,544
West Indies	23,447	742	35,473	34,307	137	40,900
South America	1,719,408	128,645	931,600	1,651,872	66,099	585,127
Asia	4,248,367	504,542	2,720,399	5,565,053	48,063	1,921,202
Oceania	109,490	20,194	133,493	177,964	14,041	143,223
Africa	3,993	715	15,534	45,566	1,508	8,281
Denmark			1,055	5,334	9,671	2,438
Spain	518,895	104,748	472,222	535,383	18,349	84,544
Sweden				22,694	8,584	15,708
Norway		985	4,529	13,663	1,300	7,303
All other	22,924	4,877	6,761	267,682	8,584	44,780
Total	8,639,611	1,551,380	6,636,099	10,724,071	1,355,936	5,004,428

DYES AND DYESTUFFS (VALUE).

Exported to—	Jan. 1–June 30, 1920.		
	Aniline dyes.	Logwood extracts.	All other.
Portugal	$34,789	$1,840	$6,240
Belgium	214,693	92,200	30,788
France	369,693	360,773	230,235
Germany	404	66	7,369
Italy	281,249	166,255	191,452
Netherlands	22,254	34,133	44,659
Russia (European)	100		
Switzerland	48,334	18,965	64,592
United Kingdom	558,510	393,117	518,599
Canada	888,420	81,621	538,836
Mexico	527,991	4,021	114,575
Central America	7,034	726	6,642
West Indies	22,183	2,914	56,678
South America	900,829	16,938	277,907
Asia	7,317,211	187,609	2,216,568
Oceania	96,410	1,016	70,762
Africa	32,027	1,350	21,670
Denmark	6,620	22,574	2,130
Spain	418,878	1,250	101,068
Sweden	6,268	1,110	12,663
Norway	1,710	20,251	9,964
All other	61,139		27,962
Total	11,816,743	1,415,709	4,551,359

TABLE 20.—*Inks and ink powders.*

(A) IMPORTS FOR CONSUMPTION, 1918[1]–JUNE 30, 1920.

Calender year.	Printer's ink.				Writing and copying ink.				All other, including ink powders.			
	Rate of duty.	Value.	Duty collected.	Actual and computed ad valorem rate.	Rate of duty.	Value.	Duty collected.	Actual and computed ad valorem rate.	Rate of duty.	Value.	Duty collected.	Actual and computed ad valorem rate.
	Per ct.			*Per ct.*	*Per ct.*			*Per ct.*	*Per ct.*			*Per ct.*
1918	15	$4,154	$623	15	15	$13,363	$2,004	15	15	$6,343	$951	15
1919	15	199	30	15	15	15,116	2,267	15	15	8,143	1,221	15
1920 (6 months)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

(C) DOMESTIC EXPORTS OF PRINTER'S INK AND ALL OTHER INKS, 1918[1]–JUNE 30, 1920.

Exported to—	Calendar years.				1920 (6 months).	
	1918		1919			
	Printer's ink.	All other inks.	Printer's ink.	All other inks.	Printer's ink.	All other inks.
Europe	$18,391	$25,371	$210,482	$68,382	$118,174	$49,653
North America	256,507	206,360	320,008	297,959	183,910	158,859
South America	353,023	100,833	603,758	210,212	218,626	90,054
Asia	224,345	67,736	435,664	155,420	323,975	101,525
Oceania	116,424	42,452	113,288	109,962	79,574	43,270
Africa	42,189	5,429	29,726	14,282	4,944	4,354
Total	1,040,882	448,181	1,712,926	856,217	929,203	447,715

[1] Figures for 1917 not available.

Directory of manufacturers of coal-tar products during 1919.

[The list below includes all firms that reported to the Tariff Commission the production of coal-tar products during 1919, except 56 that objected to the publication of their names. These 56 firms, almost without exception, are either out of business at the present time or manufacture coal-tar products for their own consumption and not for sale. Included among these 56 firms are firms engaged, primarily, in the manufacture of textiles, soap, rubber goods, perfumes, and inks. Coke-oven plants and gas houses which reported to the Geological Survey and not to the Tariff Commission are not included. The list includes manufacturers of crudes, intermediates, dyes, lakes, medicinals, flavors, photographic chemicals, synthetic phenolic resins, and synthetic tanning materials.]

No.	Name of company.	Office address (location of factory given in parentheses if not in same city as the office).
1	The Abbott Laboratories	4753 East Ravenswood Avenue, Chicago, Ill.
2	Acme Dyestuff Co	133 Maiden Lane, New York, N. Y. (Metuchen, N. J.).
3	Agawam Chemical Works (Inc.)	531 Grosvenor Building, Providence, R. I. (North Attleboro, Mass.).
4	Althouse Chemical Co. (Inc.)	540 Pear Street, Reading, Pa.
5	Amalgamated Dyestuff & Chemical Works.	75 Hudson Street (New York, N. Y.) (Newark, N. J.).
6	American Aniline Products (Inc.)	80 Fifth Avenue, New York, N. Y. (Lockhaven, Pa.).
7	American Chemical Works	1030 Folsom Street, San Francisco, Calif.
8	American Nitration Co. (Inc.)	River Road, Nutley, N. J.
9	American Tar Products Co.	208 South La Salle Street, Chicago, Ill. (St. Louis, Mo., Youngstown, Ohio, Woodward, Ala., Carrollville, Wis.; Follansbee, W. Va.).
10	Ansbacher & Co., A. B.	527 Fifth Avenue, New York, N. Y.
11	Anthrakone Dye Products & Chemical Co. (Inc.).	1834 Broadway, New York, N. Y. (Jersey City, N. J.).
12	Georgia Railway & Power Co.	75 Marietta Street, Atlanta, Ga.

Directory of manufacturers of coal-tar products during 1919—Continued.

No.	Name of company.	Office address (location of factory given in parentheses if not in same city as the office).
13	Atlantic Dyestuff Co	88 Ames Building, Boston, Mass. (Burrage, Mass.).
14	Atlas Color Works (Inc.)	322 Ninth Street, Brooklyn, N. Y.
15	The Barrett Co	17 Battery Place, New York N. Y. (refinery, Frankfort, Pa.).
16	Bayway Chemical Co	81 Fulton Street, New York, N. Y. (Elizabeth, N. J.).
17	Beaver Chemical Co	Damascus, Va.
18	Beaver Manufacturing Co	Ballardvale, Mass.
19	Bennett & Davis (Inc.)	327 South La Salle Street, Chicago, Ill.
20	British-American Corporation of New Jersey.	109 Beekman Street, New York, N. Y. (Ridgefield Park, N. J.).
21	Brooklyn Color Works (Inc.)	601 Sackett Street, Brooklyn, N. Y.
22	Bulls Ferry Chemical Co	Edgewater, N. J. (Shadyside, N. J.).
23	Butterworth-Judson Corporation	61 Broadway, New York, N. Y. (Newark, Lyndhurst, N. J.).
24	Calco Chemical Co	Bound Brook, N. J. (Burlington, Newark, Jersey City, Woodbridge, N. J.).
25	Philip Carey Manufacturing Co	Lockland, Ohio.
26	Carus Chemical Co	La Salle, Ill.
27	Central Dyestuff & Chemical Co	Plum Point Lane, Newark, N. J.
28	Certainteed Products Corporation	1801 Boatman's Bank Building, St. Louis, Mo. (East St. Louis, Ill.).
29	Certified Chemical Corporation	246 Plymouth Street, Brooklyn, N. Y.
30	Chatfield Manufacturing Co	Seventy-fourth and Lebanon Streets, Cincinnati, Ohio.
31	Chemical Co. of America (Inc.)	176 Front Street, New York, N. Y. (Springfield, N. J.).
32	Chemical Products Laboratories	Belleville, Ill.
33	Chemical Products Corporation	104 Thirty-second Street, Milwaukee, Wis.
34	Charles M. Childs & Co. (Inc.)	43 Summit Street, Brooklyn, N. Y.
36	Clifton Chemical Laboratories	Clifton, N. J.
37	Color Co. of America	14 Cedar Street, New York, N. Y. (Valley Stream, N. Y.).
38	Commonwealth Chemical Corporation.	15 Park Row, New York, N. Y. (Newark, N. J.).
39	Condensite Co. of America	Bloomfield, N. J. (Wyandotte, Mich.).
40	Consolidated Color & Chemical Co	122 Hudson Street, New York, N. Y. (Newark, N. J.).
41	Coopers Creek Chemical Co	West Conshohocken, Pa.
43	Croton Color & Chemical Co. (Inc.)	293 Broadway, New York, N. Y. (Croton, N. Y.).
44	Cumberland Chemical Corporation	Bristol, Va.
45	Davis Chemical Corporation, Everly M.	25 West Forty-fourth Street, New York, N. Y. (Union, N. J.).
46	Denver Gas & Electric Light Co	900 Fifteenth Street, Denver, Colo.
47	Dermatological Research Laboratories.	1720 Lombard Street, Philadelphia, Pa.
48	Devoe & Raynolds (Inc.)	101 Fulton Street, New York, N. Y. (Brooklyn, N. Y.).
49	Dicks, David Co. (Inc.)	19 North Moore Street, New York, N. Y.
50	Dicks, David & Heller Co	Chicago Heights, Ill.
51	Dissosway-Schad Co. (Inc.)	830 Humbolt Street, Brooklyn, N. Y. (55 Eckford Street, Brooklyn, N. Y.).
52	Dow Chemical Co., The	Midland, Mich.
53	DuPont de Nemours & Co., E. I	Wilmington, Del. (Penns Grove, N. J.).
54	Dye Products & Chemical Co. (Inc.)	200 Fifth Avenue, New York, N. Y. (Newark, N. J.).
56	Eakins (Inc.), J. S. & W. R	24 Wallabout Street, Brooklyn, N. Y.
57	Eastman Kodak Co	343 State Street, Rochester, N. Y.
58	Essex Aniline Works (Inc.)	88 Broad Street, Boston, Mass. (South Middleton, Mass.).
59	Exedol Laboratories (Inc.)	Edgewater, N. J.
60	Fine Colors Co. (Inc.)	21–29 McBride Avenue, Paterson, N. J.
61	Florasynth Laboratories (Inc.)	Unionport, N. Y.
62	Gary Chemical Co	738 Broadway, Gary, Ind. (Chesterton, Ind.).
63	Goodyear Tire & Rubber Co	Akron, Ohio.
64	Grasselli Chemical Co., The	Cleveland, Ohio (Rensselaer, N. Y.).
65	Haarmann-de-Lair-Schaefer Co	Maywood, N. J.
66	Harmer Laboratories Co	1704 Market Street, Philadelphia, Pa.
67	Helena Light & Railway Co	Helena, Mont.
68	Helkulin Chemical Co	900 Jefferson Street, Hoboken, N. J.
69	Heller & Merz Co	Newark, N. J.
70	Morris Hermann & Co	788 President Street, Brooklyn, N. Y. (Newark, N. J.).
72	Heyl Laboratories, The (Inc.)	437 Barretto Street, New York, N. Y.
73	Hind Harrison Plush Co., The	Clark Mills, N. Y.
74	Holland Aniline Co	Holland, Mich.
75	Holliday-Kemp Co. (Inc.)	Betts Avenue and Queens Boulevard, Woodside, Long Island.
76	Hooker Electro-Chemical Co	40 Wall Street, New York, N. Y.
77	Hord Color Products Co	Sandusky, Ohio.
78	Hub Dyestuff & Chemical Co	595 East Seventh Street, South Boston, Mass.
79	Huron Chemical Co	100 Fifth Avenue, New York, N. Y. (51 Bergen Street, Brooklyn, N. Y.).
80	Hydrocarbon Chemical Products Co	35 Cottage Avenue, Lancaster, Pa.
81	Hynson, Westcott & Dunning	Charles and Franklin Streets, Baltimore, Md.
83	Independent Coal Tar Co	26 Broad Street, Boston, Mass. (Taunton, Mass.).
84	Industrial Chemical Co	P. O. Box 1288, Providence, R. I.
85	International Consolidated Chemical Corporation.	11 East Thirty-sixth Street, New York, N. Y. (Long Island City, N. Y.).
86	Iridescent Dyestuff & Color Co	326 Broadway, New York, N. Y. (587 Sheepshead Bay Road, Brooklyn, N. Y.).

Directory of manufacturers of coal-tar products during 1919—Continued.

No.	Name of company.	Office address (location of factory given in parentheses if not in same city as the office).
89	K. & T. Chemical Corporation	100 Broadway, New York, N. Y. (Hillburn, N. Y.).
91	Kettle River Co	Madison, Ill.
92	Klipstein & Sons Co., E. C	644 Greenwich Street, New York, N. Y. (Chrome, N. J.; South Charleston, W. Va.).
94	Koppers Products Co	Union Arcade, Pittsburgh, Pa.
95	Lamie Chemical Co	Huntington, W. Va.
96	Lasher & Co., F. G	104 Grove Street, Brooklyn, N. Y.
97	Lewis Manufacturing Co., F. J	2513 South Robey Street, Chicago, Ill. (Chattanooga, Tenn.; Canal Dover, Ohio; Moline, Ill.).
98	Lindsay Light Co	161 East Grand Avenue, Chicago, Ill.
100	McKesson & Robbins (Inc.)	91 Fulton Street, New York, N. Y. (Brooklyn, N. Y.).
101	Mallinckrodt Chemical Works	3600 North Second Street, St. Louis, Mo.
102	Max Marx Color & Chemical Co	192 Coit Street, Irvington, N. J.
103	Massachusetts State Department of Health.	540 State House, Boston, Mass.
104	Merck & Co	45 Park Place, New York, N. Y. (Rahway, N. J.).
105	Merrimac Chemical Co	148 State Street, Boston, Mass. (North Woburn, Mass.).
106	Metz Laboratories, H. A. (Inc.)	122 Hudson Street, New York, N. Y. (Brooklyn, N. Y.).
107	Miller, J. Augustus	44 Bergen Street, Brooklyn, N. Y.
108	Monroe Drug Co	Fourth and Oak Streets, Quincy, Ill.
109	Monsanto Chemical Works	1800 South Second Street, St. Louis, Mo.
110	Montana Power Co	40 East Broadway, Butte, Mont.
111	National Ammonia Co. of Pennsylvania.	Philadelphia, Pa.
112	National Aniline & Chemical Co	21 Burling Slip, New York, N. Y. (Buffalo, N. Y.; Marcus Hook, Pa.; Wappinger Falls and Brooklyn, N. Y.).
113	Naugatuck Chemical Co	1790 Broadway, New York, N. Y. (Naugatuck, Conn.).
114	New England Chemical Manufacturing Co.	North Billerica, Mass.
115	New Haven Gas Light Co	80 Crown Street, New Haven, Conn.
116	Newport Chemical Works (Inc.)	1112 First National Bank Building, Milwaukee, Wis. (Carrollville, Wis.; Passaic, N. J.).
117	New York Color & Chemical Co	98 John Street, New York, N. Y. (Philadelphia, Pa.).
118	Niagara Alkali Co	Buffalo Avenue, Niagara Falls, N. Y.
119	Nitro Products Co., The	Eddy Building, Saginaw, Mich.
120	Noil Chemical & Color Co. (Inc.)	152 West One hundred and eighth Street, New York, N. Y.
121	Organic Products Corporation	301 Liberty Street, Schenectady, N. Y.
122	Palatine Aniline & Chemical Corporation.	176 Purchase Street, Boston, Mass. (Poughkeepsie, N. Y.).
123	Peerless Color Co. (Inc.)	Bound Brook, N. J.
124	Po Ambo Chemical Co	Matawan, N. J.
125	Radiant Dye & Color Works	2837 West Twenty-first Street, Brooklyn, N. Y.
126	Redmanol Chemical Products Co	636 West Twenty-second Street, Chicago, Ill.
127	Reliance Aniline & Chemical Co	15 William Street, New York, N. Y. (Poughkeepsie, N. Y.).
129	Republic Creosoting Co., The	1614 Merchants Bank Building, Indianapolis, Ind. (Seattle, Wash.; St. Louis Park, Minn.).
131	Rhodia Chemical Co	135 Cedar St., New York, N. Y. (New Brunswick, N. J.) .
132	Rollin Chemical Corporation	Charleston, W. Va.
133	Philip Ruxton (Inc.)	220 West Forty-second Street, New York, N. Y. (247 Water Street, Brooklyn, N. Y.).
134	Semet Solvay Co	Syracuse, N. Y. (Solvay, N. Y.).
135	Seydel Manufacturing Co	66 Forest Street, Jersey City, N. J.
136	Sherwin-Williams Co	Cleveland, Ohio. (Kensington, Chicago, Ill.).
138	Sinclair & Valentine Co	611 West One hundred and twinty-ninth Street, New York, N. Y. (Edgewater, N. J.).
139	Special Materials Co. (Inc.)	140 Livingstone Street, Brooklyn, N. Y.
140	Staier Chemical Co. (Inc.)	81 Fulton Street, New York, N. Y. (Newark, N. J.).
141	Standard Chemical Co	West Fifth Street, Bayonne, N. J.
142	Sunbeam Chemical Co	Cable, Wis.
143	T. M. & G. Chemical Co	517 Cortland Street, Belleville, N. J.
144	T. Taylor	Newman, Ga.
145	Thatcher Electrochemical Co	254 North Tenth Street, Brooklyn, N. Y.
146	Tower Manufacturing Co. (Inc.)	326 Broadway, New York, N. Y. (Brooklyn, N. Y.).
147	Transatlantic Chemical Corporation	192 Broadway, New York, N. Y. (Linden, N. J.).
148	Trico Chemical Co. (Inc.)	502 Iroquois Building, Buffalo, N. Y.
149	Paul Uhlich	11 Cliff Street, New York, N. Y. (Brooklyn, N. Y.).
150	Ultro Chemical Corporation	41 Union Square, New York, N. Y.
151	Union Dye & Chemical Corporation	80 Fifth Avenue, New York, N. Y. (Kingsport, Tenn.).
152	United States Color & Chemical Co	93-95 Broad Street, Boston, Mass. (Ashland, Mass.).
153	University of Illinois	Urbana, Ill.
154	Universal Aniline Dyes & Chemical Co.	1010 Wells Building, Milwaukee, Wis.
155	Van Dyk & Co. (Inc.)	4-6 Platt Street, New York, N. Y. (Jersey City, N. J.).
156	Verona Chemical Co	Verona and Riverside Avenues, North Newark, N. J.
157	Walker Chemical Co., The	P. O. 1145, Pittsburgh, Pa.
158	Warner-Jenkinson Manufacturing Co	2526 Baldwin Street, St. Louis, Mo.
159	Washington Dye & Chemical Corporation.	Davidson Building, Washington D. C. (Alexandria, Va.).
160	Waugh Chemical Corporation	2 Rector Street, New York, N. Y. (Perth Amboy, N. J.).
161	Western Dry Color Co	Fifty-second and Wallace Streets, Chicago, Ill.

Directory of manufacturers of coal-tar products during 1919—Continued.

No.	Name of company.	Office address (location of factory given in parentheses if not in same city as the office).
162	Western Reserve Chemical Co.	3434 East Ninty-third Street, Cleveland, Ohio.
163	Wilbur White Chemical Co., The	Owego, N. Y.
164	White Tar Co. of N. J. (Inc.), The	56 Vesey Street, New York, N. Y. (Kearney, N. J.).
165	Widder Dye & Chemical Co. (Inc.)	100 South Second Street, Brooklyn, N. Y.
166	Williamsburg Chemical Co. (Inc.)	230 Morgan Avenue, Brooklyn, N. Y.
167	Wolf & Co., Jacques	342 Lexington Avenue, Clifton, N. J.
168	Youngstown Chemical Co	Youngstown, Ohio.
169	Zinsser & Co. (Inc.)	Hastings-on-the-Hudson, N. Y.
170	Zobel Co. (Inc.) Ernst	112 Second Avenue, Brooklyn, N. Y.
171	Zobel Color Works	326 Broadway, New York, N. Y. (Brooklyn, N. Y.).

[Total of 227 firms, including the 56 firms that did not consent to the publication of their names in the list above.]