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COSTS OF PRODUCTION IN THE DYE INDUSTRY 1918 AND 1919

Details of Costs for a Selected List of Dyes and Intermediates

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LETTER OF TRANSMITTAL.

UNITED STATES TARIFF COMMISSION,
Washington, February 20, 1920.

The COMMITTEE ON FINANCE,
United States Senate:

I have the honor to transmit herewith, in accordance with your request, a report of the United States Tariff Commission on costs in the dye industry.

Very respectfully,

THOMAS WALKER PAGE,
Chairman.

INTRODUCTION.

This report, which is transmitted to the Committee on Finance of the United States in accordance with the request of the chairman of the committee, is divided into two parts:

First. A study of the cost of production of a selected list of dyes and intermediates for the last half of 1918 and the first three quarters of 1919: Statistical tables are given showing (1) the costs of production of dyes and intermediates in dollars per pound; (2) costs in 1919 in relation to 1918 figures; (3) analysis of costs for the periods; (4) variations of costs by companies for the third quarter of 1919; (5) details of overhead expenses for third quarter of 1919; and (6) miscellaneous special charges for third quarter 1919.

Second. A comparison of domestic costs in the third quarter of 1919 with the prices of dyes and intermediates in various markets at different periods: Statistical tables are given showing (1) a comparison of costs with prewar and present prices for dyes and intermediates; (2) relative prices of a selected list of dyes compared with prewar prices.

COSTS OF PRODUCTION IN THE DYE INDUSTRY, 1918 AND 1919.

In May, 1919, the United States Tariff Commission held a conference with the accounting representatives of the important dye manufacturers of this country and discussed the methods of conducting a cost investigation in the dye industry.

At this meeting it was decided that costs should be submitted for the last half of 1918 and the first quarter of 1919 upon a selected list of dyes and intermediates. This information was received by the commission, but after it was analyzed and tabulated it was found that the data did not cover a sufficiently long period of time to show the cost tendencies in the industry. It was therefore decided to obtain also the cost reports for the second and third quarters of 1919.

With the cooperation of the manufacturers in the industry the cost reports for these later periods have been received, tabulated, and verified on the books of most of the companies reporting, and the Tariff Commission is now able to put before Congress the results of this investigation covering the period from July, 1918, to September, 1919, inclusive.

In presenting these figures of cost, however, the Tariff Commission desires to point out that the averages here submitted do not represent the condition of the industry in as accurate a manner as the average costs usually represent industries that are long established and that have well-tested and standardized methods both of production and of cost accounting.

The fundamental idea upon which the following tables are based is that the cost records as kept by the reporting companies shall be accepted as the accounting facts in the case without revision by the commission. It is true some uniformity in the reports has been introduced by our methods of tabulation, but in the main the averages were compiled from figures actually found to be upon the books of records as kept by the various companies.

Peculiarities of various items of expense will be pointed out in the detailed discussion of the tables, but a preliminary statement of possible errors is necessary here.

There are two kinds of difficulties in this particular industry which render conclusions based upon average cost figures of doubtful value.

The first is that the manufacturing methods in the industry are not well organized and are not reduced to a normal routine. To a considerable extent the production in the past has proceeded almost regardless of cost. As with most of the war industries, the question of quantity output and prompt deliveries was of primary importance, and attention was diverted from the nicer adjustments that characterize routine operations. In many cases the management of particular plants thought it wiser to build full-sized productive units upon the chance that they would be successful in operation rather than to go through a long process of building small "semiplants,"

or "pilot" plants as they are sometimes called, where the engineering and chemical problems are worked out before quantity production is attempted. In many cases, also, the haste with which operations were carried on led to abnormal costs through low yields from the material consumed, or through the spoiling of valuable products by inexperienced or careless operators. Not only has this lack of organization of the productive processes led to great discrepancies in the cost between different firms but it also has led to great variations in the cost for a given product at different periods for the same plant. Many of the tendencies toward lower cost of production due to a greater output have been hidden, therefore, by fortuitous circumstances connected with the productive processes.

The second difficulty that renders average costs unreliable is the fact that uniform methods of accounting have not been applied in the industry. This is especially true with respect to the distribution of overhead expenses to the various products. Because of the large capital investment necessary in the dye industry the overhead charges are relatively large as compared with the direct labor cost. Therefore differences in the method of distributing them have a great influence upon the apparent cost of particular products.

Without going into the details of the various methods of distribution of expenses we may mention the following that are in use:

(*a*) Distribution upon the basis of the direct labor. That is to say, if all the overhead expenses for the dye factory are, say, 50 per cent of the total direct labor cost, a given product which has labor cost of $1 should have an overhead charge of 50 cents.

(*b*) Distribution based upon the cost of the raw material used in a given product as compared with the total raw material used in the plant.

(*c*) Distribution based upon the direct superintendence chargeable to a particular product.

(*d*) Distribution upon the basis of the relative sales value of the products.

(*e*) Still another method in use, and one that seems to be particularly well suited to the dye industry, is a distribution upon the basis of capital investment in the various productive divisions of the plant. That is to say, if a given product or class of related products requires a capital investment of 10 per cent of the whole value of assets this product or class should bear 10 per cent of the overhead burden.

No attempt will be made here to explain these various methods of distribution, nor was any attempt made to reconcile the differences in cost growing out of them in tabulating the reports as received. It is probable that some uniform method could have been applied, but because of the great diversity in the manufacturing and accounting methods of the various firms any scheme of distribution applicable to all reports would have been crude and arbitrary and likely to involve more errors than it corrected.

Another class of cost that is especially irregular upon the reports of the various companies is that of selling expenses, and they have been excluded from the report except in the case of one company where it was impossible to separate them from administrative charges.

In view of the unstandardized and varying methods of production and of accounting in this industry the Tariff Commission must

strongly emphasize the uncertainty of conclusions drawn from the cost figures in this report, and the possibility of error in administrative action based upon such data. The figures, are, however, the most trustworthy and the most significant that can be immediately procured under present conditions in the industry, and in any discussion of the cost of production the following tables must be accepted as the nearest approach to accuracy now possible.

TABLE I.

Table I shows the average cost per pound of certain dyes and intermediates for the last half of 1918 and for each of the first three quarters of 1919. The average cost per pound has been obtained by taking the aggregate of the pounds produced of a particular product for all companies reporting and dividing it into the aggregate costs for the same product. In this manner unit costs are weighted according to the quantity produced. That is to say, the costs for a company with a large output has a greater influence upon the average cost per pound than those for a company whose production is small.

TABLE I.—*Cost of production of a selected list of dyes and intermediates.*[1]

[Dollars per pound.]

Product.	Average cost per pound.			
	1 Last half of 1918.	2 First quarter 1919.	3 Second quarter 1919.	4 Third quarter 1919.
Intermediates:				
Acetanilid	0.4022	0.3368	0.3800	0.4024
Anilin	.3460	.3361	.2426	.2412
Benzaldehyde	1.6109	1.3338	.....	.....
Benzidin	1.0767	.9648	1.6216	1.2139
Benzoic acid	1.3005	.8631	.....	.....
Beta naphthol	.5286	.5049	.4343	.3148
Dianisidin	7.8353	9.2999	5.9850	3.4966
Dimethylanilin	.4943	.4604	.5173	.4829
Dinitrobenzol	.2961	.2755	.2837	.2865
H-acid	1.0267	1.0682	.7110	1.1893
Metaphenylenediamin	1.1359	.9732	1.0312	1.5165
Nitrobenzol	.1476	.1168	.1065	.1047
Ortho-toluidin	1.0084	.7958	.8220	.8491
Paranitranilin	1.1974	.9431	.6778	.8459
Paratoluidin	1.4815	1.0202	.7726	.8406
Phthalic anhydride	3.3524	2.5226	1.3814	1.2928
Dyes:				
Benzo blue 2B	.7824	.5606	1.5127	1.0714
Bismarck brown	1.4177	1.1160	.9915	1.1382
Chrysoidine	1.2836	.8628	.8344	.7476
Direct black	.5344	.4271	.5140	.6065
Indigo	.7206	.5733	.7577	.6308
Magenta	3.8894	5.6908	5.5420	5.8234
Malachite green	5.5410	5.3262	.....	.....
Methylene blue	2.3640	2.3202	2.2785	2.1359
Methyl violet	2.2536	1.8101	1.7130	1.8102
Naphthylamine black	.9080	.8013	1.1976	.8773
Crude nigrosine	.....	.6582	.....	.....
Rein nigrosine	.7109	.....	.....	.....
Nigrosine (finished)	.....	.4979	.5640	.5307
Orange II	.7345	.5095	.6342	.6007
Sulphur black	.4432	.4177	.3539	.3009

[1] These costs are the weighted average cost for 2 to 5 companies reporting upon each product.

TABLE I-A.

Table I-A shows the same items of cost expressed in percentages with the average unit cost of each product for the last half of 1918 as the base or 100 per cent. From this table it will be seen that the costs of intermediates have in general been falling and that the costs of dyes, especially in the later period of 1919, have been rising. Why these two divergent tendencies should manifest themselves in the cost of two classes of products as closely related as are intermediates and dyes is an interesting question but one that can not be answered with any certainty from data now available. However, some factors involved in the solution that may throw some light upon the question may be pointed out. An examination of cost figures, especially of intermediates, shows that the products (such as anilin, beta naphthol, and nitrobenzol) that are produced in large quantities and under routine processes have successively lower costs in each period since 1918. The "law of increasing returns" seems to apply in these cases and from the causes which underlie the tendency to lower cost we may predict that as the industry develops more and more products will be produced under such conditions.

The same tendencies are shown, when the individual cost sheets are studied, in the case of many dyes of large production, such as sulphur black, orange II, indigo, and direct black, but the average cost figures do not show this tendency in all cases because of accidental circumstances affecting the costs for particular companies. For example, in the case of orange II, one company had some "off color" runs which inflated their costs greatly and kept up the average for all companies higher than it otherwise would have been. Direct black and benzo blue 2B show inconsistencies in costs in various periods largely because of the fact that an important constitent of both dyes, H-acid, is not being produced satisfactorily by all companies. In some plants H-acid costs several times as much as in other plants, and when the abnormal expense is carried over into dyes they themselves show a high cost for the given company, no matter how standardized their processes of production may be.

Other instances of rising costs of dyes are not so easily explained, but it is possible that in some cases the processes are not sufficiently standardized to permit of economical production upon a large scale, even though small quantities may be produced at a reasonable figure.

TABLE I-A.—*Cost of production of a selected list of dyes and intermediates.*[1]

[Comparative costs in percentages.]

Product.	1 Last half of 1918.	2 First quarter 1919.	3 Second quarter 1919.	4 Third quarter 1919.
Intermediates:	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Acetanilid	100	83	94	100
Anilin	100	97	70	69
Benzaldehyde	100	88	.....	.....
Benzidin	100	91	150	113
Benzoic acid	100	64	.....	.....
Beta napthol	100	80	60	56
Dianisidin	100	118	76	44
Dimethylanilin	100	208	104	97
Dinitrobenzol	100	96	95	96

[1] These costs are the weighted average cost for 3 to 5 companies reporting upon each product.

TABLE I-A.—*Cost of production of a selected list of dyes and intermediates*—Continued.

Product.	1 Last half of 1918.	2 First quarter 1919.	3 Second quarter 1919.	4 Third quarter 1919.
Intermediates—Continued.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
H-acid	100	104	69	115
Metaphenylenediamin	100	85	90	133
Nitrobenzol	100	79	73	71
Ortho-toluidin	100	79	81	54
Paranitranilin	100	78	56	70
Paratoluidin	100	68	52	36
Phthalic anhydride	100	47	25	24
Dyes:				
Benzo blue 2B	100	79	206	146
Bismark brown	100	78	69	80
Chrysoidine	100	67	65	58
Direct black	100	79	152	130
Indigo	100	121	106	100
Magenta	100	146	142	149
Malachite green	100	96	.....	.....
Methylene blue	100	98	96	90
Methyl violet	100	80	76	80
Naphthylamine black	100	88	131	96
Crude nigrosine	.....	.....	.....	.....
Rein nigrosine	100	.....	.....	.....
Nigrosine (finished)	.....	100	118	106
Orange II	100	77	84	81
Sulphur black	100	94	79	67

TABLE II.

In Table II are shown some of the elements of cost classified under the heads of "Material," "Direct labor," "Overhead," and "All other."

Material.—Attention is called to the fact that the cost of material listed here does not represent the cost of basic raw materials such as coal tar, sulphuric acid, and fuel, but rather it is the cost of intermediates, which are themselves highly elaborated products. It therefore follows that the cost of material involves considerable labor costs in previous processes of manufacture. Some information has been received as to the labor involved in manufacturing dyes from the crude material through the various intermediate stages up to the finished product, but the data are not sufficiently comprehensive to justify their incorporation in this report.

Another point that should be noted in connection with the cost of material is the fact that the values of intermediates, whether purchased or manufactured, are taken at their cost to the various companies reporting. If a company manufactures its own intermediates they are listed at cost in the further processes of manufacture. If it buys them in the open market, they are listed at the purchase price in calculating the cost of dyes made from them.

At first glance it may seem that such a procedure is open to objections upon the grounds that the costs from various companies are not comparable where both methods of valuation of materials are used. In a sense this is true, but only because the manufacturing conditions themselves are not exactly comparable. If one firm manufactures its intermediates, we may assume that it can do so cheaper than it can buy them; whereas if another company purchases them, the presumption is that the price is lower than would be its cost of manufacturing them. From this it follows that to increase the valuation of intermediates for one firm by an amount equal to the difference between its cost and market value or to reduce the

valuation used by the other firm by the difference between the market value and a purely hypothetical cost of production is to run counter to the actual cost facts in the case. If one firm is fortunate enough to be able to produce intermediates cheaper than the market price, or if another is so situated that the open market offers its best source of supply, on the whole we are not justified in applying to the two companies a leveling factor that does not actually exist.

As a matter of fact in the particular case of the dye industry the small firm may be able to purchase its intermediates about as cheaply as other dye manufacturers can make them, because certain companies specialize in intermediates, and therefore are able to sell them relatively cheap. The larger firms, which manufacture them for their own use, gain something by being self-sustaining and independent of the market, but perhaps lose something by way of a higher cost; or at least they may not be able to make a profit upon both dyes and intermediates until their volume of production offsets the higher cost due to a great variety of products.

Direct labor.—Little comment is necessary upon the item of direct labor given in Table II. It will be seen that it constitutes a small part of the cost of the finished product. These figures, of course, do not represent all the labor cost involved in the manufacture of dyes; first, because the cost of material includes much labor cost in making the intermediates, and, second, because considerable labor, usually called "indirect labor," is charged in the column of "Overhead" expenses.

The same idea may be expressed in other terms by saying that the complexity of the industry is so great and the capital investment in machinery and equipment for a given process is so large that there are practically no hand processes of production, and that relatively little of the total labor cost may be charged directly to a particular product.

It is not to be supposed, however, that these conditions render labor unimportant in the process of manufacture. Indeed, although it is true that the processes are carried on chiefly by machinery, the responsibility resting upon the labor force is greater than under conditions of hand labor, because of the valuable material and equipment used. A slight mistake in controlling chemical reactions may cause the loss of thousands of dollars worth of products or machinery. So true is this that one of the most important assets in the dye industry is a skilled labor force whose senses are trained to detect subtle changes in the productive processes whereby the maximum efficiency of the plant and the greatest yield from the raw materials may be obtained.

Overhead expenses.—The term "overhead," as used in this report, includes various classes of expense, such as "works expense," "fixed charges," and "administrative expense."

Works expense is composed of such items as fuel, water, supplies, repairs, sundry, and indirect labor. In short, it is made up of those expenses that vary somewhat directly with the volume of production.

Fixed charges are composed of depreciation, taxes (State or local), rentals, insurance, and in some cases interest; that is to say, of those expenses which do not vary with the volume of output.

Administrative expense represents the proportional share of the general office expense, including administrative salaries, chargeable to the dye department.

All other.—In addition there are numerous other expenses to be accounted for in various ways which we have included in the category of "All other."

TABLE II.—*Analysis of costs by periods.*

[Dollars per pound.]

Product.	Period.	Average per pound.				
		1	2	3	4	5
		Material.	Direct labor.	Overhead.	All other.	Total.
INTERMEDIATES.						
Acetanilid	Last half 1918	0.3899	0.0117	0.0450	0.0056	0.4022
	First quarter 1919	.2576	.0147	.0644	.0001	.3368
	Second quarter 1919	.2618	.0168	.1009	.0015	.3800
	Third quarter 1919	.2834	.0144	.1028	.0018	.4024
Anilin	Last half 1918	.2107	.0149	.0770	.0434	.3460
	First quarter 1919	.1925	.0379	.0926	.0231	.3461
	Second quarter 1919	.1586	.0132	.0580	.0128	.2426
	Third quarter 1919	.1543	.0110	.0565	.0188	.2412
Benzaldehyde	Last half 1918	.7427	.2862	.5820	....	1.6109
	First quarter 1919	.6048	.3116	.3644	.0530	1.3338
	Second quarter 1919	....	....	....	....	....
	Third quarter 1919	....	....	....	....	....
Benzidin	Last half 1918	.6600	.0687	.2116	.1364	1.0767
	First quarter 1919	.5397	.0734	.2888	.0829	.9848
	Second quarter 1919	.8678	.0944	.5240	.1354	1.6216
	Third quarter 1919	.6478	.0966	.3711	.0984	1.2139
Benzoic acid	Last half 1918	.6368	.2266	.5271	....	1.3905
	First quarter 1919	.4078	.2280	.2573	....	.8931
	Second quarter 1919	....	....	....	....	....
	Third quarter 1919	....	....	....	....	....
Beta naphthol	Last half 1918	.2750	.0681	.2361	.0494	.6286
	First quarter 1919	.2180	.0528	.2086	.0255	.5049
	Second quarter 1919	.1712	.0511	.1924	.0196	.4343
	Third quarter 1919	.1504	.0375	.1222	.0047	.3148
Dianisidin	Last half 1918	7.1520	.3290	.3543	....	7.8353
	First quarter 1919	7.0653	.7782	1.4564	....	9.299
	Second quarter 1919	4.4601	.4086	.9267	.1896	5.985
	Third quarter 1919	2.6610	.2098	.5622	.0636	3.430
Dimethylanilin	Last half 1918	.3484	.0155	.0788	.0516	.494
	First quarter 1919	.3324	.0223	.0874	.0183	.4604
	Second quarter 1919	.3807	.0182	.0867	.0317	.5173
	Third quarter 1919	.3508	.0158	.0851	.0312	.4829
Dinitrobenzol	Last half 1918	.1861	.0134	.0640	.0326	.2961
	First quarter 1919	.1532	.0135	.0885	.0153	.2705
	Second quarter 1919	.1479	.0141	.1004	.0213	.2837
	Third quarter 1919	.1636	.0114	.0867	.0248	.2865
H-acid	Last half 1918	.4990	.0781	.3029	.1467	1.0267
	First quarter 1919	.4430	.0743	.4694	.0815	1.0682
	Second quarter 1919	.3074	.0403	.3277	.0356	.7110
	Third quarter 1919	.6621	.0621	.3936	.0715	1.1893
Metaphenylenediamin	Last half 1918	.6907	.0389	.2316	.1747	1.1359
	First quarter 1919	.6155	.0431	.2183	.0963	.9732
	Second quarter 1919	.6870	.0667	.2232	.0544	1.0313
	Third quarter 1919	.7908	.1125	.5842	.0290	1.5165
Nitrobenzol	Last half 1918	.1029	.0040	.0220	.0187	.1476
	First quarter 1919	.0947	.0042	.0069	.0110	.1168
	Second quarter 1919	.0810	.0033	.0184	.0058	.1085
	Third quarter 1919	.0764	.0028	.0180	.0075	.1047
Ortho-toluidin	Last half 1918	.6472	.0609	.2115	.0839	1.0034
	First quarter 1919	.4986	.0436	.2050	.0486	.7958
	Second quarter 1919	.6286	.0353	.1308	.0273	.8220
	Third quarter 1919	.4130	.0215	.0936	.0210	.5491
Paranitranilin	Last half 1918	.7965	.0593	.2359	.1057	1.1974
	First quarter 1919	.5720	.0485	.2567	.0659	.9431
	Second quarter 1919	.3976	.0404	.2341	.0057	.6778
	Third quarter 1919	.6037	.0599	.1804	.0019	.8459
Paratoluidin	Last half 1918	.8179	.1141	.3531	.1964	1.4815
	First quarter 1919	.5777	.0424	.1725	.2376	1.0302
	Second quarter 1919	.5639	.0593	.1469	.0096	.7796
	Third quarter 1919	.3831	.0364	.1011	.0200	.5406
Phthalic anhydride	Last half 1918	2.0906	.3717	2.6000	.2901	5.3524
	First quarter 1919	1.3763	.1902	.9561	....	2.5226
	Second quarter 1919	.9284	.0795	.3735	....	1.3814
	Third quarter 1919	....	....	....	....	....

TABLE II.—*Analysis of costs by periods*—Continued.

Product.	Period.	Average per pound.				
		1 Material.	2 Direct labor.	3 Overhead.	4 All other.	5 Total.
DYES.						
Benzo blue 2B	Last half 1918	0.5321	0.0221	0.1267	0.0515	0.7324
	First quarter 1919	.4039	.0131	.1268	.0370	.5808
	Second quarter 1919	1.2766	.0402	.1711	.0258	1.5137
	Third quarter 1919	.8224	.0474	.1721	.0295	1.0714
Bismarck brown	Last half 1918	.8272	.0558	.2969	.2378	1.4177
	First quarter 1919	.7365	.0713	.2741	.1081	1.1190
	Second quarter 1919	.5448	.0466	.2031	.1070	.9015
	Third quarter 1919	.7300	.0679	.2598	.0805	1.1382
Chrysoidine	Last half 1918	.5923	.0940	.5214	.0759	1.2836
	First quarter 1919	.4555	.0566	.2842	.0650	.8623
	Second quarter 1919	.3918	.0564	.3166	.0696	.8344
	Third quarter 1919	.4179	.0346	.2062	.0889	.7476
Direct black	Last half 1918	.3278	.0123	.0949	.0994	.5344
	First quarter 1919	.3206	.0138	.0289	.0598	.4271
	Second quarter 1919	.5654	.0256	.1749	.0420	.8149
	Third quarter 1919	.4465	.0223	.1630	.0647	.6965
Indigo	Last half 1918	.4666	.0680	.1840	.0020	.7206
	First quarter 1919	.5715	.0563	.1943	.0512	.8733
	Second quarter 1919	.4743	.0447	.2041	.0346	.7577
	Third quarter 1919	.3788	.0403	.1866	.0251	.6308
Magenta	Last half 1918	2.6262	.4249	.7639	.0744	3.8894
	First quarter 1919	2.5274	.6268	2.5451	.....	5.6993
	Second quarter 1919	2.8599	.5515	2.0569	.0737	5.5420
	Third quarter 1919	3.5650	.5345	1.6974	.0265	5.8234
Malachite green	Last half 1918	4.5545	.3325	.8765	.2775	5.5410
	First quarter 1919	2.8605	.2993	2.1664	.....	5.3262
	Second quarter 1919	.....	.....	.....	.....	.....
	Third quarter 1919	.....	.....	.....	.....	.....
Methylene blue	Last half 1918	1.6527	.1211	.3965	.1937	2.3640
	First quarter 1919	1.4804	.1613	.5692	.1183	2.3292
	Second quarter 1919	1.2614	.1355	.7028	.1788	2.2785
	Third quarter 1919	1.4449	.1229	.4718	.0963	2.1359
Methyl violet	Last half 1918	1.1099	.2005	.8234	.1198	2.2536
	First quarter 1919	.8261	.1459	.6602	.1779	1.8101
	Second quarter 1919	.8734	.0959	.5677	.1760	1.7130
	Third quarter 1919	.8131	.1400	.7057	.1514	1.8102
Naphthylamine black	Last half 1918	.5536	.0283	.1550	.1709	.9080
	First quarter 1919	.4667	.0288	.2010	.1048	.8013
	Second quarter 1919	.7069	.0364	.2639	.1904	1.1976
	Third quarter 1919	.5183	.0294	.2364	.1033	.8773
Nigrosine (finished)	Last half 1918	.....	.....	.....	.....	.....
	First quarter 1919	.3118	.0111	.1100	.0650	.4979
	Second quarter 1919	.3108	.0101	.1473	.0868	.5540
	Third quarter 1919	.2992	.0167	.1297	.0351	.5307
Orange II	Last half 1918	.4344	.0389	.1735	.0577	.7345
	First quarter 1919	.3452	.0299	.1532	.0902	.5685
	Second quarter 1919	.3310	.0465	.2246	.0321	.6342
	Third quarter 1919	.3624	.0393	.1969	.0021	.6007
Sulphur black	Last half 1918	.2399	.0282	.1116	.0635	.4432
	First quarter 1919	.2185	.0269	.1367	.0356	.4177
	Second quarter 1919	.1823	.0209	.1243	.0264	.3539
	Third quarter 1919	.1427	.0170	.1161	.0251	.3009

TABLE II-A.

Table II-A is especially important in estimating the reliability of the average cost figures given in Tables I and II.

In this table an attempt is made to show by means of percentages the range of costs for particular products as reported by various companies. It is impossible to give the actual cost figures of the individual companies because of the probability of the identification of particular concerns. Further, to prevent identification of individual producers the products are given by number instead of by name and are arranged in a haphazard manner. Moreover, no distinction is made between dyes and intermediates in the arrangement of this table.

In column 1 will be found the relative quantity of output for a particular product by the various companies, the total of which

equals 100. In subsequent columns are found the range of costs based upon the average cost as 100 per cent.

Attention is called to the fact that the range of costs of material is almost as great as for direct labor and overhead expenses. This is due to the peculiar nature of the dye industry that has been mentioned above, namely, that the materials used in the production of both dyes and intermediates may themselves be highly elaborated products. Their value as incorporated in subsequent processes is subject therefore to a great number of cost variations during the several steps necessary for their manufacture. Moreover, the fact that many of the intermediates are made by the same plants that produce the dyes causes a greater irregularity in the valuation of intermediates than would be the case if there was a regular market for them in which all manufacturers made their purchases.

The direct labor column also shows great variations among the costs for different companies. This is explainable upon the grounds that direct labor is relatively a small part of the total cost of production because of the complex nature of the industry and the predominance of machine processes. Furthermore, the amount of direct labor that may be charged to a particular product is somewhat arbitrary, because in one plant some products may be produced under such conditions that most of the labor can be charged directly to them, whereas in another plant the same products may be produced in a manufacturing unit along with several other colors and relatively little labor may be charged directly to any one of them. However, after allowances are made for the different accounting methods, the fact remains that it is not uncommon for the direct labor charges to vary 100 per cent.

The column of overhead expense likewise shows great variation. This is due, to some extent perhaps, to various methods of distributing overhead expenses, but more especially to an actual difference in expenses incurred by the various concerns reporting.

The variations in the column marked "All other" are not significant, because the charges shown in this column are miscellaneous and may be large or small according to whether or not the sundry items could be distributed to other classes of expense.

The variations in the column marked "Total" are more important than the details given in the other columns. In some cases the difference in direct labor may be offset by contra variations in one of the other columns, but in the column representing total costs are shown the fundmental differences among the several plants. Variations running from 50 to 200 per cent of the average cost for particular products are not uncommon. Moreover, there is no unmistakable relation between costs and quantity of output. Not only is there a great difference in the costs of a given product as between two companies having about the same volume of output, but also some companies producing two products in large quantities may show a relatively high cost for one and a relatively low cost for the other.

There are reasons to believe that as the industry develops successively lower costs will come with increasing output, but the conditions in the past, wherein quantity production has been forced almost regardless of cost, hide the tendencies to such an entent that most generalizations with respect to the future of the industry can not be based upon present cost facts.

TABLE II-A.—*Variations of costs by companies for third quarter of 1919.*

[In column 1 the base (100 per cent) is the total output of each product for all companies reporting. In the other columns the base is the average cost for the various classes of expenses for all companies.]

Product	1 Production by companies.	2 Material.	3 Direct labor.	4 Overhead.	5 All other.	6 Total.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
(1)	73	98	110	123	122	109
	27	42	72	37	39	75
	100					
(2)	14	45	99	65		49
	39	142	142	132	32	136
	24	92	89	138	351	109
	23	69	42	24	6	58
	100					
(3)	11	117	149	121		121
	78	94	88	77	127	87
	5	129	175	288		195
	6	121	105	203		149
	100					
(4)	3	99	207	67		83
	10	217	94	124	175	184
	87	86	97	98	94	90
	100					
(5)	9	223	152	284		223
	17	176	132	114	49	157
	23	85	107	168	373	112
	51	61	77	33	10	54
	100					
(6)	21	70	138	95		79
	75	84	54	64	17	73
	4	605	822	877	2,381	770
	100					
(7)	39	115	120	120	88	116
	61	90	87	87	107	90
	100					
(8)	5	270	113	247	12	231
	18	70	191	136	145	109
	34	97	59	23		58
	43	96	94	130	169	115
	100					
(9)	72	101	86	92	139	102
	28	99	135	122		95
	100					
(10)	27	88	44	56		78
	20	94	66	71		87
	7	101	425	224	1,350	149
	46	109	96	12		111
	100					
(11)	18	106	50	27		87
	21	78	155	93		85
	5	107	372	153	2,064	134
	4	243	132	76	223	202
	52	94	69	125		99
	100					
(12)	61	102	43	38	40	82
	22	118	234	204	120	144
	17	67	131	187	292	107
	100					

TABLE II-A.—*Variations of costs by companies for third quarter of 1919*—Continued.

Product.	1 Production by companies.	2 Material.	3 Direct labor.	4 Overhead.	5 All other.	6 Total
	Per cent.	*Per cent.*	*Per cent*	*Per cent.*	*Per cent*	*Per cent*
(13)	1	119	67	72		91
	29	101	179	99	47	102
	51	95	63	105	151	101
	19	110	81	88	47	96
	100					
(14)	3	64	170	163		83
	4	45	80	101		55
	56	147	149	117	65	140
	33	30	18	74	189	41
	4	97	72	40	13	85
	100					
(15)	8	318	497	138	24	254
	88	77	57	97	111	84
	4	163	226	83	13	132
	100					
(16)	18	21	35	14	56	20
	44	98	48	82		88
	38	50	46	103		65
	100					
(17)	7	90	80	75		84
	16	106	21	21	371	75
	6	319	190	106	624	242
	71	80	112	120		95
	100					
(18)	27	8	6	7	2	7
	8	32	18	11	6	23
	65	8	10	11	14	9
	100					
(19)	27	104	176	144		116
	73	99	71	83	138	94
	100					
(20)	27	92	82	53	26	80
	22	88	100	46	16	76
	2	111	210	125		110
	41	110	89	163	214	125
	6	105	217	46		90
	2	154	82	220	108	160
	100					
(21)	39	141	149	75	24	118
	9	118	70	110	177	118
	52	66	68	117	144	83
	100					
(22)	29	79	91	53	19	69
	22	87	110	62	18	77
	43	118	89	154	207	132
	6	113	187	75		99
	100					
(23)	61	89	131	106	113	98
	39	118	52	91	79	103
	100					
(24)	1	195	173	283		211
	23	196	67	71	30	139
	2	97	474	273		169
	52	48	101	125	171	84
	22	113	96	43	20	84
	100					
(25)	47	93	104	83	30	88
	14	93	205	111	37	117
	39	109	58	81	206	108
	100					

TABLE III.

Table III is given for the use of those who are interested in the details of overhead expenses. The chief items constituting "Works expense," "Fixed charges," and "Administrative expense" [1] have been stated above in the discussion of overhead expense, and it is unnecessary to go into detail here. The column marked "Laboratory" includes the charges for the works control laboratory, which tests material and products in various stages of manufacture, and for the general experimental laboratory, which carries on countless experiments in the search for new products and for new raw materials. Strictly speaking, the expenses for these two laboratories should be shown separately, but their slight effects upon unit costs do not seem to justify the separation in this report.

For comparative purposes column 7 of Table III shows the percentage which overhead expense is of total costs.

TABLE III.—*Details of overhead expenses for third quarter of 1919.*

[Dollars per pound.]

Product.	1 Works expense.	2 Fixed charges.	3 Laboratory.	4 Administrative.	5 Other.	6 Total.	7 Per cent of total cost.
Intermediates:							
Acetanilid	0.0522	0.0294	0.0040	0.0019	0.0024	0.0929	24.01
Anilin	.0282	.0203	.0005	.0040	.0035	.0565	23.42
Benzidin	.1158	.1150	.0251	.0744	.0509	.3812	31.11
Beta naphthol	.0688	.0415	.0024	.0068	.0027	.1222	38.81
Dianisidin	.1630	.0588	.2793	.0350	.1406	.6773	16.64
Dimethylanilin	.0249	.0473	.0036	.0043	.0050	.0851	17.03
Dinitrobenzol	.0269	.0314	.0122	.0124	.0038	.0867	30.25
H-acid	.1763	.1413	.0280	.0806	.0291	.4553	36.66
Metaphenylenediamin	.1715	.4227	.0218	.0192	.0857	.7209	43.56
Nitrobenzol	.0064	.0077	.0002	.0010	.0024	.0177	17.02
Orthotoluidin	.0359	.0505	.0041	.0002	.0178	.1145	18.54
Paranitranilin	.1007	.0558	.0080	.0097	.0082	.1824	22.65
Paratoluidin	.0714	.0689	.0022	.0126	.0169	.1720	21.51
Phthalic anhydride	.0847	.....	.....	.0108	.....	.0955	7.39
Dyes:							
Benzo blue 2B	.0834	.0467	.0109	.0130	.0228	.1768	16.38
Bismark brown	.1002	.0831	.0113	.0456	.0196	.2598	22.83
Chrysoidine	.0547	.0972	.0208	.0269	.0066	.2062	27.58
Direct black	.0587	.0664	.0176	.0165	.0049	.1641	23.89
Indigo	.0904	.0526	.0185	.0099	.0152	.1866	29.58
Magenta	.6210	.6156	.2253	.1113	.1242	1.6974	29.15
Methylene blue	.1504	.1863	.0014	.0652	.0655	.4718	22.09
Methyl violet	.2870	.2701	.0138	.1134	.0214	.7057	38.99
Naphthylamine black	.0614	.1066	.0174	.0374	.0036	.2264	25.81
Nigrosine (finished)	.0382	.0650	.0080	.0179	.0006	.1297	24.44
Orange II	.0779	.1079	.0019	.0181	.0216	.2274	36.06
Sulphur black	.0447	0350	.0196	.0151	.0017	.1161	38.58

Column 1, composed of fuel, power, supplies, repairs, etc.; column 2, composed of taxes, insurance, depreciation, etc.; column 3, composed of both the works and experimental laboratory expense; column 4, composed of general office expense chargeable to the dye department; column 5, composed of miscellaneous expenses not included in other classes of expense.

TABLE IV.

In Table IV are given further details of overhead expenses that are of special importance in cost analyses.

The item of depreciation shown in column 1 is perhaps more uncertain than any other element of cost. So uncertain is it that

[1] One item of interest included in administrative expense is that of managerial salaries. The commission received a statement of the 10 highest salaries chargeable to the dye department from each of the larger companies reporting. The highest salary paid to any official in any company was $20,000 per year. The usual pay of men in the chief managerial positions was from $9,000 to $12,000 per annum.

some companies have refused to consider it a part of cost of production and have charged the large replacements of equipment directly against profits.

In actual practice the rate of depreciation used in the accounts of various companies ranges from 20 to 33⅓ per cent for the most perishable classes of equipment and from 5 to 10 per cent for the more permanent kinds, such as buildings, engines, and boilers.

In column 2 of Table IV is shown the interest charges that are included in costs. Not only is the interest paid included but also in some cases an interest charge upon the value of equipment is added. The only excuse for such a procedure is based upon the assumption that this report shall contain only figures derived from the books of the several companies.

We may point out that consistency demands that if any interest is included in cost it should be calculated not upon fortuitous amounts of outstanding bonds, or notes whose quantities vary with the financial policy of the company, but upon the value of the assets necessary to conduct the business, regardless of whether they were purchased out of the proceeds of stock or bond issues, short-term notes, or out of earnings. If interest upon assets is not to be counted in costs neither should any interest paid upon mortgages, bonds, or notes be included.

In this report, however, no attempt is made to settle the propriety of treating interest as an element of cost, but, taking the facts as they are, it is attempted to show how significant the interest charge is if allowed at all.

The method of determining the unit figures in Table IV is of some importance, and unless outlined with care the figures may lead to erroneous conclusions.

At first glance it may be supposed that these averages were obtained by adding the total charges for, say, interest and dividing by the total production of a given product for all companies reporting an interest charge. Such a procedure, however, would defeat the purpose of the table—i. e., to show the influence of these special items upon the total unit cost of the product for the industry as a whole. If, for example, the average cost of an article is $1 per pound for all companies and the interest charge for the companies reporting interest is 5 cents a pound, one might suppose that interest was 5 per cent of the average unit cost for all companies, whereas, as a matter of fact, since few companies report interest, the aggregate interest charge may be less than 1 per cent of the total cost. In order to avoid this misconception, the total charge for any one of these special items is divided not by the total production of the companies reporting the item but by the aggregate production of the particular product for all companies.

Some of these special charges may be large elements in the unit cost of particular companies, but in the average unit cost for the industry as a whole they are not of primary importance. The total of them is by no means negligible, however, as will be seen from column 6 of Table IV, where in some cases they are 15 to 20 per cent of the total cost.

TABLE IV.—*Miscellaneous special charges for third quarter of 1919 (included in cost of production[1])*

[Dollars per pound]

Product.	1 Depreciation.	2 Interest	3 Laboratory	4 Sundry	5 Total	6 Per cent of total cost.
Intermediates						
Acetanilid	0 0147	0 0136	..	0 0064	0 0347	8.62
Anilin	.0203	.0103	0 0005	.0063	.0374	15 50
Benzidin	.1068	.0132	.0115	0146	.1761	14.51
Beta naphthol	.0083	0079	0017	.0130	.0309	9.82
Dianisidin	.0224	..	.1072	.	.1296	3.71
Dimethylanilin	.0369	0172	.0043	.0137	0721	14.93
Dinitrobenzol	0315	.0134	.0005	0062	.0516	18.01
H-acid	.1110	.0358	.0089	.0133	1690	14.21
Metaphenylenediamin	.2944	.	.0152	.	.3096	20.42
Nitrobenzol	.0076	.0041	.0002	.0038	.0157	15.00
Orthotoluidin	0390	.0102	.0006	.0038	.0536	9.76
Paranitranilin	.0355	.0505		.0141	.0804	9 51
Paratoluidin	.0271	.0098		0044	0413	7.64
Dyes.						
Benzo blue 2B	.0437	.0101	.0013	.0025	.0576	5 38
Bismark brown	.0862	.0405	.	.0112	.1379	12.12
Chrysoidine	.	.		.0326	.0326	4 36
Direct black	.0780	.0357	0007	.0075	.1219	17.50
Indigo	.0549	.0123	.0163	.0064	.0899	14 23
Magenta	.2243	.1821	.1877	.3779	.0723	16.70
Methylene blue	.0703	0420	.0089	0615	.1827	8.55
Methyl violet	.1985	.0856		0287	.3128	17.28
Naphthylamine black	.1076	.0500	. . .	0101	.1677	19.11
Nigrosine (finished)	0500	.0321		.0037	.0858	16.16
Orange II	.0218		.0004	.0797	.1009	16 81
Sulphur black	.0321	0143	.0105	.0033	.0602	20.01

[1] The special items of cost appearing in this table are not reported by all companies but in order to show their bearing of these items upon the total cost given in previous tables the aggregate amount of each one of them for all companies reporting is divided not by the aggregate production of these companies, but by the aggregate production of all companies reporting upon each product, the method used in computing all averages in these tables

TABLE V–A.

Table V–A shows the costs of intermediates for the third quarter of 1919 as compared with the market price in 1920 and the German prewar price in 1914.

The market price given in column 2 represents the simple average of prices per pound in 100-pound lots for various firms reporting to the commission.

Column 3 represents foreign invoice values of intermediates in 1914. These figures were taken from a report by Mr. Norton published by the Department of Commerce in 1916.

For reasons given in Mr. Norton's report, these quotations are lower than the true market value of the products sold in this country. In order to approximate the selling price to American consumers in 1914 these prices should be almost doubled because—

(1) The duty of 30 per cent ad valorem had not been paid.

(2) There are considerable possibilities of undervaluation.

(3) The charges for packing, freight, and insurance are not included.

(4) The selling expenses and the necessary profits of the agent in the United States must be added to these quotations.[1]

[1] See Artificial Dyestuffs Used in the United States, Special Agents Series No. 121, by Thomas H Norton, Department of Commerce, pp. 23–25.

Attention is also called to the fact that in many cases the market prices for intermediates are lower than the average costs, as shown in column 1. This is accounted for by the fact that the market prices are fixed by companies which specialize to some extent in the production of intermediates and whose costs are therefore lower than the average cost for all companies because of the volume of output upon a restricted list of commodities.

It is possible that in some instances particular intermediates may be sold for a time at a loss by some companies, but for the most part the cases where average costs are higher than the prevailing market prices are to be accounted for by the high cost of intermediates to those companies who do not sell them but use them in the process of making dyes.

TABLE V-A.—*Comparison of costs with prewar and present prices—intermediates.*

[Dollars per pound.]

Product.	1 Average cost third quarter 1919.	2 Market price February, 1920.	3 German prices, 1914
Intermediates:			
Ac tanilid	0 4024	0 470	0 1548
Aniline	.2412	310	.0807
Benzidine	1 2139	1 183	.3075
Benzoic acid		.950	.1853
Betanaphthol	.3148	.450	0720
Dianisidin	3 4966	9 750	
Dimethylanilin	.4829	.691	.1148
Dinitrobenzol	2865	.290	0631
H acid	1.1893	1 525	.2302
Metaphenylenediamin	1.5165	1.040	
Nitrobenzol	.1047	.135	.0550
Ortho toluidin	.5491	.295	.0884
Paranitranilin	.8459	1.075	.1334
Paratoluidin	.5406	1.750	.1930
Phthalic anhydride		.600	.2153

Column 2: These market prices were determined by averaging price quotations for particular products received from various companies. Column 3: The prices of intermediates were obtained from "Artificial Dyestuffs in the United States," Special Agents Series 21, by Thomas H. Norton, Department of Commerce. These prices were f. o. b. German ports and are probably about half the selling price in the United States.

TABLE V-B.

In Table V-B are shown the prices of certain dyes in various markets as compared with the cost in the United States for the third quarter of 1919. Attention is called especially to the reparation commission's prices in this table.

Under the terms of the treaty of peace (part 8, Annex VI, secs. 4 and 5, inclusive) and supplementing agreements between the reparation commission and the German cartel, the commission has the right of option upon a maximum of 50 per cent of all dyestuffs and chemical drugs in Germany or under German control as of August 15, 1919. Furthermore the commission has the right of option upon a maximum of 25 per cent of specified kinds of dyes and drugs produced in each six month period from the date of the coming into force of the treaty until January 1, 1925.

In August, 1919, however, while the ratification of the treaty was pending, a preliminary agreement was reached with the cartel in which several thousand tons of dyes were to be released to the Allies (1,500 tons to the United States) at a price agreed upon after some discussion. In general, the prices were determined by revising the

wholesale price in 1914 with respect to the estimated increased cost of production under the present conditions. In column 5 of this table, the reparation prices are shown with the mark valued at par. It is possible that these quotations represent something near the true competitive prices in Germany for these particular products. In this connection the testimony of Dr. Herty before the Senate Finance Committee is important. Dr. Herty states that the representatives of the German Dye Syndicate offered to sell general colors (exclusive of vat colors) and dyes not already optioned by the Allies, for a price determined by dividing the list price submitted to the reparation commission by 5 and calling the result "dollars per kilo."[1] That is to say, the mark was to be valued at 20 cents instead of the par of 23.8 cents American money.

TABLE V-B.—*Comparison of costs with prewar and present prices—dyes.*

(Dollars per pound.)

Products.	1 Average cost third quarter 1919.	2 Market prices February, 1920.	3 Contract prices December, 1919.	4 German prices 1914.	5 Reparation commission, mark at par.
Dyes:					
Benzo blue 2B	1 0714	0 963			1 6208
Bismarck brown	1 1382		0 910	0 470	4 5381
Chrysoidine	.7476	800	756	.340	1 9449
Direct black	.6965			.335	
Indigo	.6308	.750	.774	.155	.8102
Magenta	5 8234	4 650	2.871	.600	3 0253
Malachite green		3 500	2 125	.390	3 2414
Methylene blue	2.1359	2 790	2 570	.570	2 7015
Methyl violet	1.8102	2 420	2 160	.360	2.7015
Naphthylamine black	.8773	1 190		.330	
Nigrosine	.5307	.620	.701	.410	1 9449
Orange II	.6007	.550		.220	1.1885
Sulphur black	.3009	240	.236	.190	1.2423

Column 2: These market prices were determined by averaging price quotations for particular products received from various companies. Column 3: The contract prices were obtained from the War Trade Board by permission of the manufacturers who had submitted them. Column 4: The German prices of dyes were obtained from price lists in possession of the Tariff Commission and are quotations f. o. b. warehouse in the United States and therefore include duties and other expenses paid.

TABLE VI.

In Table VI are shown price quotations from various sources of a considerable number of dyes for which quotations are available in various markets. The prices of German dyes for 1914 found in column 1 are the quotations for the products laid down in this country duty paid. In other words, they are taken from the price lists of the agents in this country of the German firms and are therefore higher than quotations given by Mr. Norton for the same period.

It may also be pointed out that the market prices for the early part of 1920 are considerably lower than the prices in 1917 and in 1918 for the same products.

Attention is called to column 2 and column 4 of Table VI, in which are shown the German prices to the reparation commission with the mark at par and the present prices in the United States. It will be seen that for the most part the German prices are a little higher

[1] Hearings on Dyestuff before the Senate Finance Committee on H. R. 8078, p. 130.

than our domestic prices and that if they were revised with the mark valued at 20 cents (the German offer to Dr. Herty), the quotations in the two countries would be surprisingly close together. In this connection it should be borne in mind that considerable additions should be made to the reparation prices because of duties, freight rates, etc., before the dyes can be laid down in this country. This does not mean, necessarily, that the American producers can successfully compete with the German producers in all phases of the dye industry because most of the quotations here are upon products now in quantity production in this country and do not show, for example, prices for vat and alizarin colors which are now being developed here. Other complicating factors which make it impossible to draw general conclusions from the price comparisons here given are the uncertain industrial future of Germany and the disturbed conditions of the rates of international exchange.

TABLE VI.—*Prices of a selected list of dyes.*

[Dollars per pound.]

No.	Product.	1 German prices 1914.	2 Market prices February, 1920	3 Contract prices Dec. 1, 1919.	4 Reparation commission, mark at par.	Tariff Commission reports[1] 5 1917	6 1918
48	Alizarin yellow G	0.110	0.833	0.560	1.0261	0.590	0.68
58	Alizarin yellow R	.410	1.307			.830	.91
536	Alkali blue B	.710		5.370	3.4575	1.714	8.33
493	Auramine O	.370	2.500	2.000	2.7014	4.000	3.76
141	Azo yellow	.420	2.000	1.418	2.1610		
337	Benzo blue 2B		9.000		1.6208	2.000	1.37
340	Benzo orange		1.150		1.2313	2.000	1.56
363	Benzo purpurine 4B	.230	1.788		1.0805	2.820	2.46
112	Bordeaux B	.290	1.040			1.400	1.02
499	Brilliant green	.420	3.000	3.080	3.2411		
342	Chrysamine G		1.075		1.3936	1.970	1.53
33	Chrysoidine	.310	.810	.756	1.9449	1.090	.77
304	Chrysophenine G	.560	2.500		2.1610	12.040	5.71
307	Congo red		1.300		1.0805	2.470	2.01
169	Crocein scarlet 4B	.250	1.500	1.418	1.2936		
516	Crystal violet	.690	4.500		5.7890		
275	Diamond black	.290	1.350		1.3503		
9	Direct yellow		1.788			2.550	2.61
587	Eosine GGB	.570		2.370	3.0252	8.580	7.81
161	Fast red A	.230	.983			1.190	1.03
137	Fast yellow G	.380	1.500	1.581	.9182		
512	Fuchsine or magenta	.600	4.650	2.871	2.4635	9.100	7.72
626	Gallocyanine	.240	3.250				5.12
874	Indigo, 20 per cent	.165	.750	.774	.8102	1.420	.88
173	Lithol red R	.190	.700				2.38
495	Malachite green	.390	3.500	2.125	3.2414	6.280	5.60
89	Metachrome brown		.800				1.64
134	Metanil yellow	.310	1.583		2.1610		
659	Methylene blue 2B	.570	2.788	2.570	2.7015	3.090	2.80
515	Methyl violet 2B	.360	2.417	2.100	2.7015	3.840	2.78
7	Naphthol yellow G	.250			1.6205		
217	Naphthylamine black 10B	.330	1.190			1.080	1.26
700	Nigrosine	.410	.617	.701	1.9449	.800	.63
145	Orange II	.220	.552		1.1885	.980	.68
543	Patent blue A	.520			2.7011		
573	Rhodamin B extra	.870			3.8900		
181	Salicine black	.440	1.550				
82	Scarlet 2R	.530	.804			1.150	.79
720	Sulphur black	.190	.238	.236	1.2422	.600	.37
	Sulphur blue	.150	.730			1.630	1.45
	Sulphur brown	.100	.483			.550	.48
	Sulphur yellow	.320	1.038			.990	1.09
23	Tartrazine	.280	1.700		1.6205		
559	Victoria blue B	.530	5.000		4.5380		

[1] Census of Dyes and Coal Tar Chemicals, 1917 and 1918.

TABLE VII.

Table VII is like Table VI, except that the prices are expressed in percentages with the prewar price of dyes in the United States of German manufacture as the base (100 per cent). No new factors are brought out by this method of presentation, but it shows clearly the relation among the various price quotations. The prices in 1917 and 1918 of American made dyes were several hundred per cent higher than before the war, but in recent periods the decline from this high level is marked.

The reparation commission's prices are in general not far different from the present domestic prices and for the particular products here quoted the American producers probably have little to fear from foreign competition.

TABLE VII.—*Relative prices of a selected list of dyes.*

[Base (100 per cent) is the German prices f. o. b. warehouse in United States in 1914.]

No.	Product.	1 German prices 1914.	2 Market prices Feb ruary, 1920.	3 Contract prices Dec. 1, 1919.	4 Reparation commission, mark at par.	Tariff Commission reports.[1] 5 1917	6 1918
48	Alizarin yellow G	100	595	400	733	421	486
53	Alizarin yellow R	100	311			198	217
556	Alkali blue B	100		754	487	664	1,173
493	Auramine O	100	675	557	730	1,081	1,016
141	Azo yellow	100	476	338	515		
337	Benzo blue 2B						
340	Benzo orange						
363	Benzo purpurine 4B	100	777		470	1,226	1,069
112	Bordeaux B	100	359			503	352
499	Brilliant green	100	714	876	772		
342	Chrysamine G						
33	Chrysoidine	100	235	222	572	320	226
304	Chrysophenine G	100	446		385	2,257	1,019
307	Congo red						
169	Crocein scarlet 4B	100	600	567	505		
516	Crystal violet	100	652		838		
275	Diamond black	100	466		466		
9	Direct yellow						
587	Eosine GG B	100		348	445	1,261	1,148
161	Fast red A		427			517	447
137	Fast yellow G	100	395	608	353		
512	Fuchsine or magenta	100	775	478	410	1,516	1,286
626	Gallocyamine	100	1,354				2,133
874	Indigo, 20 per cent	100	484	499	522	916	567
173	Lithol red R	100	368				1,322
495	Malachite green	100	898	545	831	1,610	1,435
89	Metachrome brown						
134	Metanil yellow	100	511	146			
659	Methylene blue 2B	100	489	451	474	542	491
515	Methyl violet 2B	100	671	600	750	1,066	772
7	Naphthol yellow G	100			648		
217	Naphthylamine black 10B	100	361			327	382
700	Nigrosine	100	150	171	474	195	154
145	Orange II	100	251		540	445	309
543	Patent blue A	100			519		
573	Rhodamin R extra	100			447		
181	Salicine black	100	352				368
82	Scarlet 2R	100	236			338	232
720	Sulphur black	100	125	124	654	315	194
	Sulphur blue	100	487			1,086	966
	Sulphur brown	100	483			550	480
	Sulphur yellow	100	324			413	454
23	Tartrazine	100	607		579		
559	Victoria blue B	100	943		856		

[1] Census of Dyes and Coal Tar Chemicals, 1917 and 1918.

SUMMARY.

Care should be exercised in drawing conclusions from the cost data here submitted.

In the first place the cost records were not kept upon a uniform basis and they reflect the true cost situation with varying degrees of accuracy depending upon the peculiarities of the systems in use among the various companies.

Mistaken conclusions growing out of inadequate cost records may not be so serious, however, as those caused by chaotic productive conditions. Unless a more detailed study of the variations in cost among the several plants is presented than can be set forth in a published report, great differences of opinion may arise as to the future of the dye industry in this country from the study of average cost figures alone.

In Table I, for example, the average costs of such well-established products as sulphur black, nigrosine and direct black are found to be increasing in recent periods; and from this one might conclude that lower costs are not to be expected from quantity production, whereas, as a matter of fact, the higher average is due to very high costs for one or two companies whose yields were low on account of various accidental circumstances. Furthermore, in Table II-A the costs for different producers are seen to vary by a large percentage from the average cost for all companies. In almost every case these variations are explainable by some accidental circumstance, which in the long run probably will be eliminated but which now affects the whole trend of cost to such an extent that conclusions based upon average figures are likely to be erroneous.

Another minor source of error is shown in Table IV, in which the charges for special items, such as depreciation, interest, and administrative expenses, are given. The charges for these items on the books of the reporting companies were accepted as the facts in the case and no attempt has been made in this report to introduce uniformity with respect to them. The purpose in showing them in a separate table is to indicate their influence upon the total unit cost for the industry as a whole.

In Tables V-A and V-B are compared domestic costs for the third quarter of 1919, with price quotations for various times and places. Some of the important points brought out by this table are, first, that present costs of American made product are from two to five times higher than the prewar price of dyes and intermediates laid down in this country from Germany; and, second, that the reparation prices, with the mark valued at par (practically the price at which the German syndicate offered dyes through Dr. Herty), are in most cases a little higher than the price of the same dyes in this country at the present time.

It should not be concluded from this latter statement, however, that the American producers can compete with foreign manufacturers in all parts of the industry, because in some classes of products such as vat and alizarin colors, which are not shown in these tables, but which are of fundamental importance to a well-rounded industry, the foreign producers yet have a competitive advantage born of long practice in complicated productive processes.

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