

U. S. DEPARTMENT OF COMMERCE

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BUREAU OF FOREIGN AND DOMESTIC COMMERCE

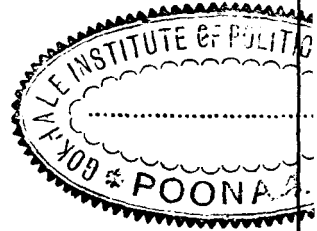
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GERMAN CHEMICAL DEVELOPMENTS  
IN 1931



Trade Information Bulletin No. 795

UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1932

## FOREWORD

Many German industrialists and economists realized in 1931 that during the past few years the construction of new plants to manufacture chemicals and chemical products had been promoted on a scale much too large for either German or world consumption and without consideration of the development of chemical industries in other industrial countries. The German chemical industry, however, was on the whole, better off than most other industries with the exception, perhaps, of the fertilizer branch.

It was estimated that the volume of production dropped about 11 per cent in 1931; unemployment advanced from 21.6 per cent in December, 1930, to 27.1 per cent in October, 1931. Wages were reduced to about the level of the 1928 average. Wholesale prices in general were downward, yet prices of numerous chemical products were maintained. Production of dyes, pharmaceuticals, and photographic chemicals held up rather well during the year.

German foreign trade in chemicals and allied products declined, in line with that of other countries; exports fell about 15 per cent, to a total of around \$254,000,000, in 1931. Gains, however, were recorded in some branches, especially in prepared medicines, to a less degree in certain industrial chemicals, and in coal-tar dyes. Total imports of chemicals and allied products amounted to \$73,100,000, a decline of 26 per cent.

Very little was done in the promotion of cartels and combines, although absorptions and mergers of German concerns continued, owing to financial difficulties experienced by the weaker concerns. Of outstanding importance was the termination of the international nitrogen agreement in the summer of 1931.

Germany has also lost ground in its export markets for potash, a commodity in which it formerly had a world monopoly, since now several European countries, as well as the United States, are able to furnish at least a part of their own requirements.

This publication, the sixth report on German chemical developments (similar reports having been issued annually since 1926), was prepared under the direction of the Chemical Division of the Bureau of Foreign and Domestic Commerce, as one of a series of reports submitted by American representatives abroad on the chemical industries of the major European producing countries. Other bulletins of the series have dealt with the chemical industry and trade of Czechoslovakia, France, Italy, Great Britain, Poland, Sweden, Norway and Denmark, Portugal, and Switzerland.

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APRIL, 1932.

# GERMAN CHEMICAL DEVELOPMENTS IN 1931

Consul General W. L. Lowrie, Frankfort-on-Main

The chemical industry in Germany is hampered by two outstanding international developments of recent times: First, the rapid expansion of the chemical industries of the principal producing countries, with increasing international competition, and second, the autarchic movement in various countries, accompanied by prohibitive tariffs and import restrictions.

Autarchy, a term popularized in European writing in recent times, denotes a condition of industrial self-sufficiency resulting in independence of a country with respect to foreign sources of supply. While this movement had its origin in Germany and had been carried to a high degree of accomplishment, many countries previously regarded as markets for German chemicals embarked upon the same course and not only made themselves independent in many lines but appeared as competitors on international markets. These developments evidently were overlooked or ignored while the German chemical industry was expanding and rationalizing after the war on a gigantic scale, calculated in many instances to supply the entire world.

German production capacity for nitrogen and potash is at present sufficient to supply all countries. Production of dyestuffs and pharmaceuticals is also adjusted to supply the largest part of the world requirements. Many special lines were developed with a view to being a practical world monopoly.

The cost of rationalization and expansion was heavy and involved the use of immense loans, for the most part at high interest rates. Amortization of these loans weighs heavily on the fixed expenses of production and is a constant danger to the solvency of the weaker concerns. The rapid growth of investment in the German industry during the period of its greatest expansion from 1926 to 1929 is indicated by the following figures relating to business corporations (Aktiengesellschaften) only, and by no means comprising all the chemical industry.

## INDEBTEDNESS OF GERMAN CHEMICAL CONCERNS, 1926-1929

[Millions of marks]

Period and number of companies covered	Own capital	Indebtedness	
		Long-term	Short-term
1926 (108 companies) .....	1,366.4	26.5	668.2
1927 (105 companies) .....	1,523.2	24.0	671.6
1928 (72 companies) .....	1,503.7	270.3	688.7
1928-29 <sup>1</sup> (94 companies) .....	1,727.1	289.9	787.2

<sup>1</sup> Nov. 1 to Oct. 31.

The present economic crisis brought out the injudiciousness of this industrial expansion. Overproduction, unemployment, fall of the purchasing power of populations, made worse by lower wages and increasing unemployment, followed in a vicious circle in most industrial countries of the world.

#### OUTSTANDING FEATURES OF 1931

The volume of German export trade dwindled steadily, and the domestic market exhibited a progressive weakness. Toward the end of 1931 a dumping scare developed, which called forth immediate governmental counter-actions in the countries which thought themselves jeopardized. The wave of protectionist movement which swept most industrial countries of Europe during the year is regarded as one of the worst in history. High tariffs were no longer regarded as sufficient protection, and embargoes and import restrictions were introduced as an additional safeguard. Competition in world chemical markets was more drastic than ever before.

The German Government inaugurated a series of tariff rate increases and import restrictions during the year. Among important measures enacted may be mentioned the imposition of high import duties on fertilizers, which was strengthened by a decree of the Minister of National Economy effective on August 18, 1931, containing a virtual prohibition of imports of the principal nitrogen and some mixed fertilizers, except under special permits. Higher rates of import duty were imposed on petroleum products, casein, charcoal, and a number of other important items of German import trade. On January 18, 1932, an emergency decree was issued authorizing the Government to impose higher rates of duty on products of those nations which have depreciated currencies, as well as those with which Germany has no treaty relations or which discriminate against German goods.

The German chemical industry did not exhibit the steady and uniform depression which had characterized the activity of other large industries during the crisis. In a complex industrial organization like the chemical industry there are always some lines operated profitably while others slump.

In its business report for the third quarter of 1931 the I. G. Farbenindustrie emphasized the lack of uniformity in business developments. As a matter of fact, the I. G. Farbenindustrie has been able to weather the storm of business depression fairly well. Business reports issued during the year indicated satisfactory sales of dyes, pharmaceuticals, and photographic chemicals; the market for rayon was relatively good, but low prices allowed a narrow margin of profit. In contrast to these results in the older branches of production, the division of nitrogen fertilizers stood the brunt of the world crisis in the chemical industry.

A report presented the end of April, 1931, revealed that the concern had 251,430,000 marks' worth of stocks of manufactured goods on hand, consisting mostly of ammonium sulphate, the output of the Merseburg plant. Drastic retrenchments were effected in the production of this plant, and, according to an announced policy, the I. G. decided to reduce gradually the production of ammonium sulphate and increase the production of ammonium-sulphate-nitrate.

Production of synthetic gasoline was continued at a steady rate but resulted in a loss. An official communique of the I. G. stated that gasoline prices made the operation of this branch unprofitable, and were the import duties on petroleum products removed, the I. G. could not see its way clear to continue this production at all.

The financial situation of the trust was improved by a series of successful operations. By purchasing its own stock on the depressed market the management succeeded in reducing the capital stock in private hands by 85,630,000 marks to 713,717,000 marks. This reduction enabled the company to pay, with less net profits, the same rate of dividend (12 per cent) as for the business year 1929. Liquid assets of the trust were reported at 160,000,000 marks. During the business year 1930 the concern paid off 12,440,000 marks of bank debts, thus acquitting itself of all obligations of this kind.

The number of employees reported on May 1, 1931, was 79,772, with a pay roll of 300,000,000 marks.

Outside the I. G. Farbenindustrie, bright spots were not altogether lacking among the general ebb of business activity in 1931. An important concern, the Metallgesellschaft A. G., reported satisfactory activity for the year ended September, 1931, stating that the outcome was not worse than in the preceding year and ascribing this relative success to the good showing made by its subsidiary, the Lurgi Gesellschaft, engaged in construction of chemical-plant equipment. The Gold und Silber Scheideanstalt also reported satisfactory business, and again credit was given to the chemical branches and subsidiaries of the company. This concern paid 10 per cent dividend for the year ended September 30, 1931—equal to that paid for the preceding year. The Permutit A. G. of Berlin, an important concern in the chemical-plant equipment line, intimated in its report issued in December, 1931, that it did just as good business as in 1930, and in some lines decidedly better than in that year.

While partial and individual successes were achieved, the general outcome of the year's activity in the chemical industry was decidedly unfavorable. The volume of production sank about 11 per cent. Unemployment advanced from 21.6 per cent in December, 1930, to 27.1 per cent in October, 1931. Wholesale prices of chemicals declined from an index of 125.5 in 1930 to 113.9 in December, 1931. Fertilizer prices declined during the same period from an index of 82.4 to 70.4; in both cases on the basis of 1913 as equivalent to 100. Substantial losses were suffered in foreign trade, the total value of chemical exports having declined from 1,182,941,000 marks in 1930 to 974,446,000 marks in 1931.

#### EMPLOYMENT

All through 1930 the chemical industry operated at a rate which compared favorably with most other German industries at that time, already seriously affected by the depression. Periodic business reports of the I. G. Farbenindustrie during 1930 reflected "favorable conditions when compared with the general economic depression." The year 1931 effaced that distinction, and the chemical industry became conspicuous for its retrenchment measures. The fertilizer division was hit the hardest. Oppau synthetic fertilizer works, Merseburg ammonia plant, important works of the potash industry, announced a series of retrenchments which put thousands of employees

out of work and reduced working time for entire units. Potassium sulphate works of the Bernterode company were closed entirely for an indefinite period. Some important divisions of the I. G. works were closed and the operation of others curtailed. Bankruptcies and insolvencies multiplied greatly during the year, resulting in elimination of numerous smaller works.

The number of unemployed advanced from 21.6 per cent at the end of 1930 to 27.1 per cent in October, 1931. The number of workers employed part time almost doubled during the year, and only 65.6 per cent of all registered workers were employed.

The following table shows the extent of unemployment during the year.

#### EMPLOYMENT IN THE GERMAN CHEMICAL INDUSTRY, IN 1931

[Per cent of all employees registered in the chemical group of labor unions]

Month	Fully un- employed	Employed part time		Em- ployed (includ- ing part- time workers in terms of fully em- ployed)
		Actually	In terms of fully unem- ployed	
December..... 1930.....	21.6	19.8	4.8	73.6
January..... 1931.....	21.8	21.2	5.2	73.0
February.....	22.4	20.6	4.9	72.7
March.....	23.2	22.2	5.2	71.6
April.....	22.9	22.8	4.9	72.2
May.....	22.4	21.2	3.9	73.7
June.....	21.7	20.8	3.9	74.4
July.....	22.9	22.4	4.2	72.9
August.....	24.0	28.7	6.2	69.8
September.....	25.9	34.4	7.2	66.9
October.....	27.1	35.4	7.2	65.6

#### BANKRUPTCIES AND INSOLVENCIES

The number of bankruptcies and insolvencies in the German chemical industry increased almost 100 per cent during 1931. Ninety-two bankruptcy proceedings were started in 1931, compared with 77 in 1930. The number of bankruptcies in which no proceedings were ruled because of lack of assets was 112 during the first 11 months of 1931, as compared with 38 for the whole year 1930. The number of insolvencies settled out of court was 71 in 1931, against 51 in 1930.

These figures reflect the more serious condition of the insolvent concerns in 1931 than in 1930, since the largest part of cases recorded in 1931 presented no assets out of which to defray the cost of proceedings.

The following table shows the number of bankruptcies and insolvencies in 1931 in comparison with those of the preceding year.

**BANKRUPTCIES AND INSOLVENCIES IN THE GERMAN CHEMICAL INDUSTRY IN 1930  
AND 1931**

Month and year	Bankruptcy proceedings started	Proceedings refused for lack of assets	Settlements out of court	Month and year	Bankruptcy proceedings started	Proceedings refused for lack of assets	Settlements out of court
January.....	7	8	9	August.....	5	3	2
February.....	12	16	3	September.....	8	11	8
March.....	6	11	4	October.....	7	11	4
April.....	9	8	9	November.....	5	13	4
May.....	6	12	2	December.....	10	(1)	7
June.....	11	7	2	Total, 1931.....	92	<sup>1</sup> 112	71
July.....	6	12	7	Total, 1930.....	77	38	51

<sup>1</sup> Not available.

<sup>2</sup> Total for 11 months.

**WAGES**

Wage reductions commenced only toward the end of 1930. The general wage index for all German industries reached the highest point, 107.4 (1928 = 100), in May, 1930, and remained on that level until December, 1930, when the first decline occurred, bringing it down to 107.3. During 1931 there was a steady downward movement of wages which brought the index figure down to 100.1 in November, the last figure available. It is estimated that in December, 1931, the level of wages declined under 100, or below the 1928 average. The emergency decree of December 8, 1931, which provided for a universal reduction of wages to the level of January 10, 1927, went into effect on January 1, 1932, bringing about a further substantial recession.

The action of wage reduction proceeded, on the whole, without disputes or strikes. This action was facilitated by the third emergency decree of September 30, 1931, which empowered the Government to change the duration of the existing wage-scale agreements without consent of the parties. In practice this meant cancellation of longer agreements, making it possible to effect immediate revisions. Most new wage agreements entered into during 1931 were for short periods, so as to allow for subsequent readjustments on short notice.

The figures of the Federal Statistical Office show only the movement of average union wage rates, but do not account for additional compensation and overtime rates, which are stated to have declined more radically than the net wage rates. Short-time work is likewise left out of consideration.

**AVERAGE HOURLY RATES**

Average hourly wage rates paid in the chemical industry on November 1, 1931, were 1.02 marks per hour for skilled workers, 0.82 mark for unskilled experienced workers, and 0.55 mark for unskilled female labor. The rates quoted are those paid to the older workers in each class (the schedules providing for graduated increases for length of time in employ).

**DEVELOPMENT OF HOURLY UNION-WAGE RATES IN THE GERMAN CHEMICAL INDUSTRY**

Date	Marks per hour	
	Skilled labor	Unskilled labor
Jan. 10, 1927.....	0.86	0.70
July 1, 1931.....	1.02	.82
Nov. 1, 1931.....	1.02	.82

As may be seen from the foregoing figures, the effect of the emergency decree in bringing the rates to the January 10, 1927, level should be considerable as compared with the status on November 1, 1931. It is equivalent to a 15 per cent decrease.

**PRICES**

The price movement was influenced by the economic crisis, which produced a uniform downward trend by international competition in the overdeveloped fields, such as nitrogen, and by the Government pressure aimed at a general reduction of prices which culminated toward the end of the year in an emergency decree (Notverordnung) intended to carry out a general 10 per cent price reduction. The index of wholesale prices of chemicals published by the Federal Statistical Office showed a decline from 121.4 for January, 1931, to 113.9 for December, 1931. Fertilizer prices declined from 82.3 for January to 70.4 for December, 1931.

**PRICE MOVEMENT IN 1931**

The following table shows the price movement during 1931 in comparison with past years.

**INDEX OF WHOLESALE PRICES OF CHEMICALS AND FERTILIZERS, 1927-1931**

(1913=100)

Period covered	Chemicals	Fertilizers	Index of industrial raw materials and semi-manufactures	Period covered	Chemicals	Fertilizers	Index of industrial raw materials and semi-manufactures
Annual average:				Monthly average, 1931—Continued.			
1927.....	124.2	83.3	131.9	May.....	118.8	77.2	103.4
1928.....	126.3	81.8	134.1	June.....	118.0	77.9	102.9
1929.....	126.8	84.5	131.9	July.....	117.7	73.2	103.1
1930.....	125.1	82.4	120.1	August.....	117.6	72.8	101.5
Monthly average, 1931:				September.....	117.4	73.6	100.1
January.....	121.4	82.3	107.5	October.....	116.8	74.0	99.4
February.....	120.5	83.1	106.4	November.....	115.6	72.1	99.3
March.....	119.8	82.7	106.2	December.....	113.9	70.4	96.5
April.....	119.6	80.1	104.9				

Prices of numerous chemical products were maintained or showed only slight declines. The products whose manufacture centers in large syndicalized industries showed a special firmness, doubtless



because of the rigidity of the price agreements entered into by the respective syndicates and the monopolistic status of many such industries. An outstanding feature in this respect is the firmness of prices of principal and secondary products of the potash industry.

The debacle in the metal markets was reflected in the downward trend of those chemicals the prices of which are largely determined by the constituent metals. An example was the steady fall of copper sulphate, from 41.50 marks per 100 kilos at the end of 1930 to 27.75 marks at the end of 1931. Lead and zinc pigments underwent a uniform price decline of roughly 20 per cent during the year. Lithopone, however, showed more resistance, having lost only 7 per cent.

Prices of alkalis were maintained, and some even recorded slight advances. The same observation applies to acids, except tartaric and citric, which suffered substantial declines.

#### PRICE QUOTATIONS OF LEADING CHEMICALS

The following price quotations covering four different dates in 1931 and the 1930 end-of-year figure, afford a ready comparison of price trends for the leading chemical staples. The quotations were recorded at the Hamburg chemical market and represent prices in marks, per 100 kilos, except where otherwise indicated.

#### PRICES OF LEADING CHEMICALS IN 1931

[In marks per 100 kilos, except those marked with an asterisk, which are quotations per kilo]

Item	Dec. 31, 1930	Mar. 31, 1931	June 30, 1931	Sept. 30, 1931	Dec. 31, 1931
<b>Acids:</b>					
Formic acid, 50 per cent. ....	66.00	66.00	66.00	65.75	65.00
Acetic acid, 80 per cent. ....	185.00	185.00	185.00	185.00	185.00
Oxalic acid. ....	64.00	64.00	63.50	63.50	61.50
Muriatic acid, 17-19 per cent. ....	4.00	4.00	4.00	4.00	4.50
Sulphuric acid, 60° Baumé. ....	7.20	7.20	7.20	7.20	7.20
*Tartaric acid, crystals. ....	2.35	2.30	2.20	2.10	1.85
Citric acid. ....	2.55	2.40	2.20	2.15	1.80
<b>Paint materials:</b>					
Litharge. ....	63.00-71.50	58.00-66.50	58.00-66.50	55.00-63.00	52.50-59.75
Red lead. ....	63.00-71.50	58.00-66.50	58.00-66.50	55.00-63.00	52.25-59.75
White lead in oil. ....	68.00-74.00	66.00-72.00	63.00-69.00	63.00-69.00	59.75-65.25
Zinc white (Red Seal). ....	57.50-64.50	52.00-59.00	47.00-54.00	46.00-54.00	42.00-47.00
Lithopone. ....	43.25	44.00	41.75	41.50	41.00
<b>Pharmaceuticals:</b>					
*Potassium bromide. ....	2.25	2.20	2.25	1.90	2.00
*Sodium bromide. ....	2.62	2.56	2.56	2.39	2.31
*Salicylic acid. ....	3.00	3.00	3.20	3.20	3.20
*Salol. ....	8.00	8.00	8.00	8.00	8.00
<b>Miscellaneous:</b>					
Caustic soda. ....	28.00	27.50	26.25	26.50	26.50
Caustic potash. ....	58.50	58.25	58.75	58.50	59.00
Potash alum. ....	17.50	17.50	17.50	17.50	16.75
Sodium hyposulphite, crystals. ....	16.00	16.00	17.00	17.00	17.00
*Benzoate of soda. ....	2.95	2.95	2.95	2.90	2.90
Epsom salt. ....	5.45	5.45	5.45	5.45	5.45
Borax. ....	28.00-33.00	28.00-34.00	28.00-33.00	29.00-34.00	28.00-34.00
Camphor, Japanese. ....	4.75	4.70	4.65	4.60	4.70
Barium chloride. ....	19.00	19.00	19.00	19.00	19.00
Chloride of lime (bleaching powder). ....	20.50	19.75	19.50	20.25	20.25
Calcium chloride. ....	8.50	8.50	8.50	8.50	8.50
Chlorate of potash. ....	50.50	54.00	54.50	54.50	55.00
Magnesium chloride. ....	9.00	9.00	9.00	9.00	9.00
Zinc chloride. ....	43.00	43.00	43.00	43.00	43.00
Chrome alum. ....	33.00	32.00	32.00	32.50	32.00
*Cream of tartar. ....	1.90	1.90	1.75	1.70	1.60
Ferrous sulphate. ....	5.50	3.50	3.50	3.50	4.50
Formaldehyde, 40 per cent. ....	73.50	72.00	72.00	72.00	73.00
Yellow prussiate of potash. ....	150.00	150.00	150.00	150.00	150.00
Glauber salts, crystals. ....	4.30	4.20	4.20	4.20	4.20
Ammonium carbonate. ....	46.50	46.00	46.00	46.00	46.50
*Potassium iodide. ....	36.00	36.00	35.00	34.00	34.00

## PRICES OF LEADING CHEMICALS IN 1931—Continued

[In marks per 100 kilos except those marked with an asterisk, which are quotations per kilo]

Item	Dec. 31, 1930	Mar. 31, 1931	June 30, 1931	Sept. 30, 1931	Dec. 31, 1931
Miscellaneous—Continued.					
Bichromate of potash.....	85.00	84.50	84.50	84.50	85.00
Caustic potash lye, 50 per cent.....	31.25	31.00	31.50	31.25	31.00
Potassium chlorate.....	50.50	54.00	54.50	54.50	55.00
Copper sulphate.....	41.50	41.00	37.00	33.00	27.75
Naphthalene, scale.....	28.50	26.50	26.00	26.50	26.25
Sodium bicarbonate.....	21.00	21.00	21.00	21.00	21.00
Caustic soda lye.....	13.50	13.50	10.50	10.50	11.50
Sodium nitrate.....	30.00	28.00	28.00	28.00	27.00
Sodium silicate.....	11.00	11.00	11.00	11.00	11.00
Potassium carbonate, 96-98 per cent.....	51.50	51.25	49.75	50.00	50.00
Ammonium chloride.....	33.75	33.50	33.50	33.75	34.00
Sodium sulphide, crystals.....	14.00	14.50	14.25	14.25	14.25
Aluminum sulphate, 14-15 per cent.....	11.50	11.75	11.25	11.50	13.50
Soda ash, calcined.....	14.00	14.00	14.00	14.00	13.75
*Vanillin.....	20.00	24.00	23.00	23.00	23.00

## FERTILIZER PRICES

## POTASH

German domestic prices for potash are fixed by a special board (Reichskalirat), subject to approval by Government authorities. The price schedule in force during 1931 had not been changed since 1926, despite the fact that farmers' organizations had exerted all their influence to have prices amended in favor of the consumer. The potash industry refused steadfastly to revise its prices and attempted to defend its stand in public statements. The price schedule fixed in 1926 was a sequel to several price advances, the last one being 18 per cent. This rate represented an advance of 8 to 21.8 per cent over pre-war prices and stood in marked contrast to the prices of other fertilizer materials, which were substantially below pre-war level.

The emergency decree (Notverordnung) of December 8, 1931, which provided for a universal price reduction of 10 per cent for all commodities manufactured in Germany, covered the fertilizer industry in common with the others. Price cuts were announced by various syndicates about the end of the year. The potash syndicate made public its new price schedule on December 23, 1931, effective January 1, 1932. The following table presents a comparison of potash prices in effect at the beginning of 1931 with those in effect on January 1, 1932, per kilo of  $K_2O$ .

## FERTILIZER PRICES, JANUARY 1, 1931 AND 1932

Item	Pfennigs per kilo of $K_2O$	
	Jan. 1, 1931	Jan. 1, 1932
Carnallite with not less than 9 per cent and under 12 per cent $K_2O$ content, ground.....	9.67	8.70
Crude salts with 12 to 15 per cent $K_2O$ , ground.....	10.83	9.75
Fertilizer salts:		
18 to 22 per cent.....	15.20	13.68
28 to 32 per cent.....	17.95	16.16
38 to 42 per cent.....	18.88	16.99
Potassium chloride:		
50 to 60 per cent.....	27.00	24.30
More than 60 per cent.....	29.00	26.10
Potassium sulphate of more than 42 per cent $K_2O$ content.....	31.25	28.13
Potassium magnesium sulphate.....	28.85	25.97

In contrast to the policy of the nitrogen syndicate, which delivers its products free of any transportation charge anywhere in Germany, the potash syndicate sells on an f. o. b. basis. As a result, potash prices are higher to farmers situated at longer distances from the centers of distribution. It is a much mooted point in Germany which plan is more advantageous to agriculture, regarded from a national point of view, the potash industry maintaining that the practice of the nitrogen syndicate compels farmers who are favorably situated with respect to transportation to pay for the others, as the price charged for nitrates doubtless includes the cost of transportation distributed equally among all purchasers.

At the end of 1930 the potash syndicate announced a new plan for the calculation of freight charges, which provided for a minimum charge for a 50-kilometer haul and a maximum charge for 270 kilometers. The effect of this plan was that all consignees situated within 50 kilometers of Sondershausen, the shipping point, had to pay a freight charge for 50 kilometers irrespective of the actual distance, whereas all those situated more than 270 kilometers from Sondershausen paid for only 270 kilometers. Distances between these two extremes were charged, in each particular case, the actual freight rates less 10 per cent reduction.

Early in 1931 the German railroad administration made considerable reductions in freight rates for artificial fertilizers intended for agricultural use within German territory. These reductions were at a uniform rate of 8 per cent for all fertilizers with the exception of lime, on which a 5 per cent reduction was made. The potash syndicate accorded the full benefit of these reductions to its customers.

During the summer months the potash syndicate customarily allows special discounts, ranging from 3 to 6 per cent, to early buyers.

The syndicate does not sell directly to consumers. The principal distributing agencies are farmers' cooperative societies, which handle about 40 per cent of the total sales, and large wholesale dealers. These agencies are allowed an elaborate system of discounts based on quantity, and an additional special discount is allowed to three large trading organizations. The rate of cash discounts granted in addition to the above varies according to the prevailing rate of interest.

#### NITROGEN FERTILIZER PRICES

In August, 1931, the nitrogen syndicate announced a downward revision of its fertilizer prices, ranging from 2 to 4 pfennigs per kilo of nitrogen. This step was taken in response to the increased tariff protection and import restrictions effected by the emergency decree of June 5, 1931. It was doubtless prompted also by the alarming accumulation of stocks and the decrease in fertilizer consumption during the preceding fertilizer year. Since nitrogen is sold on the basis of free delivery anywhere in Germany, the freight reduction of 8 per cent on February 1, 1931, was reflected in a uniform price reduction corresponding to the saving on freight charges. This reduction amounted, on the average, to 0.35 pfennig per kilo of nitrogen on all those fertilizers priced on nitrogen-content basis, and to 11 pfennig per 100 kilos on all grades of nitrophoska.

Another price cut was effected in December, 1931, in response to the emergency act calling for a universal 10 per cent price reduction.

Since, however, the emergency act provided for deductions on account of price decreases effected voluntarily during 1931, the December cuts were carried far enough only to bring the prices to the level required by the act.

The following comparison of nitrogen fertilizer prices illustrates the down trend prevailing since 1928.

#### GERMAN DOMESTIC PRICES OF NITROGEN FERTILIZERS, 1928-1932

[In marks per kilo of fixed nitrogen]

Item	February-June				1932	
	1928	1929	1930	1931	Old prices	Revised prices <sup>1</sup>
Ammonium sulphate:						
I (coarse).....	0.95	0.95	0.90	0.90	0.86	0.80
II (fine).....					.86	.76
Ammonium chloride.....	.88	.88	.86	.82	.76	.72
Ammonia chalk.....	.93	.93	.89	.84	.78	.74
Ammonium sulphate nitrate:						
Leuna saltpeter.....	.95	.95	.93	.93	.87	.82½
Montan saltpeter.....	.95	.95	.93	.90	.87	.82½
Ammonia chalk nitrate.....	.95	.95	.95	.95	.91	.86
Potassium ammonium nitrate.....	.95	.95	.93	.93	.91	.86
Urea.....	.95	.95	.95	.95	.95	.91
Calcium cyanamide.....	.88	.88	.86	.85	.81	.77
Calcium nitrate.....	1.13	1.13	1.07	1.07	1.05	.99
Sodium nitrate.....	1.23	1.23	1.17	1.17	1.15	1.09
Nitrophoska I.....	² 26.00	² 26.16	² 26.00	² 26.00	² 25.75	² 23.34
Nitrophoska II.....	² 24.50	² 24.66	² 24.50	² 24.50	² 24.25	² 21.98
Nitrophoska III.....	² 26.00	² 26.00	² 26.50	² 26.50	² 26.25	² 23.80

<sup>1</sup> March to June, 1932.

<sup>2</sup> Per 100 kilos bulk.

Nitrogen fertilizer prices relate to bulk shipments in carloads of at least 15 metric tons, free delivery in Germany. Occasionally 10-ton orders are offered at list prices for a limited time in order to stimulate small orders.

#### PHOSPHATE PRICES

Superphosphate prices were reduced repeatedly during the year, the last reduction having been effected in December, 1931. The following comparison of the prices last in effect in 1931 with those in force on January 1, 1931, shows the extent of the decline.

#### PRICES OF SUPERPHOSPHATES AND MIXTURES IN 1931

[Marks per 100 kilos in bulk, f. o. b. Hildesheim]

Item	Jan. 1, 1931	End of December, 1931
Superphosphate, 18 per cent.....	6.10	5.93
Ammonia superphosphate:		
9-9.....	11.27	10.61
5-10.....	8.41	8.02
Am-Su-Ka (ammonia-superphosphate-potash), 8-8-8.....	11.65	11.70

Rhenania phosphate is quoted per kilo of  $P_2O_5$  f. o. b. Brunsbüllekoog. The prices underwent the following change:

Rhenania phosphate	January, 1931	Dec. 31, 1931
23 to 25 per cent.....	Marks 0.35	Marks 0.32
25 to 28 per cent.....	.36½	.33
28 to 31 per cent.....	.38	.34

#### BASIC SLAG

Ground basic slag cost 0.32 mark per kilo of citrate soluble phosphoric acid, on January 1, 1931. A reduction of 0.25 mark was announced on March 26, 1931, and in November the price was further reduced to 22½ pfennigs. As these reductions had anticipated the requirements of the emergency act of December 8, 1931, no further reduction was made after the promulgation of the act.

Basic slag is sold on an f. o. b. basis, Aachen Rothe Erde. Various discounts and bonuses were offered at various periods during the year to stimulate early buying. At one time a discount of 67.50 marks per 15 tons was offered on purchases within a limited period.

#### PRODUCTION AND CONSUMPTION OF CHEMICALS

Data on the total German production of chemicals are not usually published or available. Regular reports are published on the production of coal and lignite distillation industries, on tar distillates, potash, salt, alcohol, and acetic acid. Special reports were published in 1931 on the soap industry and the paint and varnish industry, both for 1928. All other figures relative to production or consumption of chemicals in Germany are trade estimates or indirect approximations based on foreign-trade figures or indexes.

The total value of German chemical production is estimated to have declined about 11 per cent in 1931 compared with 1930. There was a general decline in consumption caused by contraction in the purchasing power of the population resulting from the serious unemployment and business depression. Even consumption of medicines and drugs shared in the general decline; the Association of German Prescription Druggists estimated the decline at around 20 per cent.

There is offered herewith a résumé of the information relative to production and consumption in those branches of the German chemical industry for which data became available during the year under review, whether relating to that year or representing the latest information available.

#### COAL DISTILLATION INDUSTRY

The German coke industry started on a downward trend about the middle of 1929, and production and sales have since declined steadily. The production of coke decreased from 39,400,000 tons in 1929 to 32,700,000 in 1930, and an estimated figure of 22,500,000 tons for 1931.

The following are figures of German coke production for the last five quarterly periods.

	Metric tons
1930:	
Third quarter.....	7,871,000
Fourth quarter.....	7,094,000
1931:	
First quarter.....	6,370,000
Second quarter.....	5,602,000
Third quarter.....	5,592,000

That stocks continued to accumulate, despite this material decrease in production, is indicative of an unparalleled recession in consumption. The stocks of cokeries increased from 1,140,000 tons at the end of 1929 to 5,570,000 tons at the end of 1930. The figure for 1931 is not available, but it may be safely assumed that it greatly exceeds the figure for the end of 1930.

A heavy decline in both the domestic consumption and exports contributed to this condition. The following figures of domestic and export sales of coke are illustrative of the contraction in consumption.

#### SALES OF COKE IN GERMANY, 1928-1930

[In metric tons]

Year	Domestic	Export
1928.....	25,061,000	8,865,000
1929.....	28,809,000	10,653,000
1930.....	20,302,000	7,971,000

The recession in the consumption of coke in Germany is traceable to the retrenchments in blast-furnace activity. Exports declined chiefly because of the cessation of reparation shipments to France and Belgium.

Production was reduced for the most part by extinguishing ovens of old construction, so that the rate of production per oven increased steadily.

The production of other products of coal distillation declined at the same rate as that of coke, except that the average production of coke per ton of coal declined slightly and the yield of tar increased slightly.

The following tabulation shows the production of coke and the principal by-products for the years 1927 to 1930.

#### GERMAN PRODUCTION OF COKE AND BY-PRODUCTS, 1927-1930

[In thousands of metric tons]

Item	1927	1928	1929	1930
Coke.....	33,242	34,775	39,421	32,700
Tar.....	1,187	1,240	1,425	1,209
Benzol and homologues.....	307	333	386	336
Ammonia compounds.....	458	468	532	456
Gas for sale.....	1,596	1,553	1,670	1,786

<sup>1</sup> Millions of cubic meters.

The number of employees decreased from 26,622 in 1927 to 21,451 in 1930. The number of active plants declined from 160 with 17,255 ovens in 1927 to 140 with 13,785 ovens in 1930.

#### ACETIC ACID

The latest figures available on the production of acetic acid are for the fiscal year 1929-30, and these reveal a sharp decline incidental to the first year of business depression. In absence of more recent data, these figures at least give a clue to the present situation, which is, of course, more aggravated in comparison.

#### GERMAN PRODUCTION OF ACETIC ACID, 1928-29 AND 1929-30

Item	1928-29	1929-30
Total number of plants.....	17	15
Plants in operation during the fiscal year.....	12	10
Production, in terms of anhydride:	<i>Metric tons</i>	<i>Metric tons</i>
Taxable (for consumption).....	4,952	4,337
Industrial, denatured.....	4	25
Industrial, not denatured.....	30,624	23,686

#### SULPHURIC ACID

Sulphuric acid production increased from 1,555,000 tons in 1928 to 1,703,500 tons in 1929. The production of 1929 was obtained from 1,194,700 tons of pyrites, 222,000 tons of zinc blende, and 234,200 tons of other raw materials. No further production figures are available.

A notable development in 1931 as compared with 1930 was a heavy increase in German imports of sulphuric acid (89,024 metric tons in 1930 and 113,411 metric tons in 1931). In contrast to these heavy imports, exports declined from 78,712 metric tons in 1930 to 32,162 metric tons in 1931. In other words, 73,937 tons more of sulphuric acid were required to supplement the domestic production in 1931 than in 1930.

#### SODIUM CHLORIDE

Production of rock salt for 1930 was reported at 2,246,000 tons, which was a slight recession from the production of 2,540,000 tons in 1929. There are 11 establishments in Germany producing rock salt alone, and 11 others producing both potash and salt. The production by potash companies showed a tendency to neglect the salt production, whereas the companies producing pure salt gradually increased their production, so that in 1930 they accounted for 89 per cent of the total production.

Production of boiled salt from brine amounted in 1930 to 496,000 tons, against 509,000 tons in 1929, besides 396,000 cubic meters brine disposed of as such.

Salt springs furnished in 1930 a total of 4,480,000 cubic meters brine with a salt content of 628,000 tons used for industrial purposes, and 360,000 cubic meters brine with 19,000 tons of salt content used for baths.

## CELLULOSE

The German cellulose industry underwent a rapid expansion in postwar years. The production curve rose almost uninterruptedly from 1919 (when it had sunk to the lowest point since 1902) till 1929, when it reached an absolute high. The business depression affected cellulose production only slightly in 1930, but in 1931 the output was reduced 30 per cent by virtue of an international agreement between European producers.

The German production of cellulose in 1929 was the highest figure ever recorded. There were produced in that year 1,097,259 tons of sulphite cellulose and 41,275 tons of soda cellulose. In 1930 the production declined to 1,095,116 tons of sulphite and 32,666 tons of soda cellulose. In 1931, according to the terms of the agreement referred to, the production declined to about 766,000 tons sulphite and 29,000 tons of soda cellulose.

The consumption of raw materials is estimated for the sulphite cellulose industry, on the basis of 1930 production, as follows: 2,200,000 tons of spruce wood, 90 per cent dry; 110,000 tons of sulphur; and 130,000 tons of lime. The sulphur used is in the form of pyrites, of which there is an abundant supply in Germany. Practically all cellulose plants have pyrite roasters to produce their own sulphur dioxide, and the latest equipment permits the use of pyrite residues from flotation processes.

## ALCOHOL

Germany, with its immense crop of potatoes, which in abundant years amounts to close to 50,000,000 tons, has a large surplus to be converted industrially. Although the per capita consumption for food is probably greater than in any other country, it is far insufficient to absorb all the supply. An appreciable part is used for fodder. The production of potato starch, sirup, flakes, and similar products consumes another portion of the total, but the most important use of the surplus is for distillation of alcohol, the production of which averages 2,000,000 hectoliters a year. This industry is controlled by the German alcohol monopoly, which takes the entire output of the distilleries at a fixed price and assigns production quotas, in terms of per cent of production capacity, to each distillery. These quotas change from year to year to permit complete utilization of the estimated potato surplus.

While alcohol is also produced from grain, molasses, fruit, cellulose, waste lyes, as well as synthetically from calcium carbide, potatoes account for 70 per cent of the total production. In the fiscal year 1929-30, the use of potatoes for alcohol amounted to 1,601,992 tons. Agricultural distilleries attached to large farming properties account for almost 90 per cent of the total production; the remainder is produced by industrial distilleries from vegetable raw materials or from industrial wastes. A small amount is produced synthetically from calcium carbide.

The German production of alcohol from 1927-28 to 1929-30 is shown by the following table. Production in 1930-31 was 2,562,286 hectoliters; detailed data of this production are not available, except the amount from sulphite lyes and carbide, which was 324,743 hectoliters.



GERMAN PRODUCTION OF ALCOHOL DISTRIBUTED BY THE MONOPOLY, 1927-28  
TO 1929-30

Raw material	1927-28	1928-29	1929-30
Potatoes:	<i>Hectoliters</i>	<i>Hectoliters</i>	<i>Hectoliters</i>
Agricultural distilleries .....	1,707,752	2,217,212	1,945,464
Industrial distilleries .....	587	990	1,198
Grain:			
Agricultural distilleries .....	307,669	183,863	158,051
Industrial distilleries .....	76,487	88,363	76,749
Other raw materials: Industrial distilleries only .....	2,811	2,141	1,799
Molasses .....	404,238	396,143	326,058
Other nonstarchy materials and fruit .....	51,584	49,656	28,917
Sulphite lyes and carbide .....	255,285	304,749	343,376
Total .....	2,806,413	3,243,117	2,881,612

In addition to the production delivered to the monopoly, there is a small production for private use operated under permits, but the amount of such production is not known.

The growing production of alcohol from sulphite cellulose waste lyes deserves particular attention, since this industry (started in 1916) lays a well-founded claim to an adequate share of the market. The following figures for the fiscal years 1916-17 to 1928-29 illustrate the rapid development of this by-product industry:

	Hectoliters		Hectoliters
1916-17 .....	6,765	1923-24 .....	170,387
1917-18 .....	41,088	1924-25 .....	200,000
1918-19 .....	32,078	1925-26 .....	202,344
1919-20 .....	17,453	1926-27 .....	253,894
1920-21 .....	50,955	1927-28 .....	248,723
1921-22 .....	91,897	1928-29 .....	294,905
1922-23 .....	134,397		

Approximately 369,659 tons (36,965,444 hectoliters) of sulphite waste liquor were used for the production of alcohol in 1929-30. There are 17 plants operating this side line, but the entire present production utilizes only about 35 per cent of the supply of suitable waste liquor.

In recent years the alcohol monopoly was confronted with a serious accumulation of unsold stocks. The consumption for beverage purposes decreased from 1,857,295 hectoliters before the war to 331,363 hectoliters in 1930-31. The industrial use showed no appreciable expansion; in fact, it began to dwindle from 1929-30. The total domestic consumption decreased from 3,595,707 hectoliters in 1912-13 to 2,101,276 hectoliters in 1929-30. As a result, the unsold stocks attained a formidable figure of 1,578,010 hectoliters on October 1, 1930. For the fiscal year 1930-31 production quotas were reduced to 70 per cent, but owing to the pressure of farmers' organizations were subsequently raised (for potato users only) to 80 per cent, or the same rate as in the preceding fiscal year. The result of this concession was that the production was not adequately reduced, having declined only from 2,387,189 hectoliters in 1929-30 to 2,112,881 hectoliters in 1930-31. As the consumption continued to contract, the stocks increased to 2,008,904 hectoliters on October 1, 1931, equal to almost the entire annual production.

Since August 1, 1930, manufacturers and distributors of gasoline in Germany have been compelled to purchase from the monopoly an

amount of alcohol equal to 2½ per cent of their gasoline sales. This ratio was subsequently increased to 3½ per cent, and on October 1, 1931, to 6 per cent. As a result of this artificial expansion in consumption, outlet was created for 508,136 hectoliters of alcohol, or almost 25 per cent of the entire production.

It appears, however, that even at this rate the enormous surplus of alcohol can not be reabsorbed by the usual factors of consumption. The consumption of all commodities developed a sharp downward trend toward the end of 1931, and the outlook is that there will be less alcohol consumed for all purposes, including motor fuel, in 1932 than in 1931. Furthermore, it is estimated that in the forthcoming crop year the farmers will have a large surplus of potatoes to be converted into alcohol, and a 100 per cent quota will have to be awarded to distilleries. In order to make room for the new production, the monopoly must, before the autumn of 1932, exhaust at least 50 per cent of the stocks now on hand. It is planned, therefore, to increase the rate of admixture to motor fuels to 10 or 12½ per cent in the near future. An even more comprehensive plan is considered in this connection, which will effect a large measure of independence for Germany with respect to motor-fuel supply. This plan, which is receiving the earnest support of powerful chemical interests, envisages a uniform engine fuel based on the growing domestic production of petroleum, the synthetic gasoline produced by the I. G., benzol, methanol, and alcohol. A Government decree is expected to prescribe a standard mixture to be a combination of these ingredients.

The price policy of the monopoly is said to be largely responsible for the present alcohol difficulties. Beverage alcohol is sold at 600 marks per hectoliter, or at a net profit of some 1,100 per cent. At the same price, pure alcohol is supplied for medicinal and cosmetic uses, for the manufacture of essences and essential oils. Under special conditions, however, manufacturers may obtain alcohol at 300 marks per hectoliter. The price of completely denatured alcohol for household and industrial uses has been reduced recently from 50 to 45 marks per hectoliter. Incompletely denatured alcohol has likewise been reduced from 45 to 40 marks per hectoliter. The product intended to be fermented into vinegar is sold at 85 marks. Alcohol for automotive purposes is sold at 70 marks per hectoliter. The lowest price of 28 marks per hectoliter is charged for alcohol intended to be exported. The relative importance of each use appears from the following table.

SALES OF ALCOHOL, 1929-30 AND 1930-31

Price class	1929-30	1930-31	Price class	1929-30	1930-31
Regular price:	<i>Hectoliters</i>	<i>Hectoliters</i>		<i>Hectoliters</i>	<i>Hectoliters</i>
Beverage purposes.....	356,457	331,363	Automotive.....	235,135	508,136
Medicinal and cosmetic.	31,910	27,866	Vinegar.....	142,480	134,529
Special price, medicinal and			Export.....	30,816	4,904
cosmetic.....	37,405	31,508	Total.....	2,038,110	2,018,703
Completely denatured.....	736,310	603,029			
Incompletely denatured.....	467,597	377,368			

## FERTILIZERS

## DECLINE IN CONSUMPTION

German consumption of fertilizers, which showed the first signs of decline during the fertilizer year 1929-30, receded appreciably in 1930-31, the decrease being 17 per cent for nitrogen, 17 per cent for phosphates, and 10 per cent for potash.

Available data cover the fertilizer year ended April 30, 1931, for all fertilizers with the exception of nitrogen, for which the year closed on June 30, 1931. The following table shows the development of German consumption for the three principal classes of fertilizers during the last six years in comparison with pre-war consumption.

GERMAN FERTILIZER CONSUMPTION SINCE 1913-14

Fertilizer years	Thousands of metric tons			Fertilizer years	Thousands of metric tons		
	N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O		N	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
1913-14.....	185	555	490	1928-29.....	430	553	783
1925-26.....	330	380	609	1929-30.....	415	548	776
1926-27.....	400	485	717	1930-31.....	345	451	700
1927-28.....	390	508	733				

The 1930-31 figure for nitrogen in the foregoing table does not include Chile saltpeter, which was included in the figure for previous years. No data are available on the consumption of Chile saltpeter in the fertilizer year ended June 30, 1931. Taking the trade estimate of 10,000 tons nitrogen as representing the consumption of Chile saltpeter in 1929-30, a deduction of this amount brings the nitrogen consumption for that year down to 405,000 tons, still high above the figure for 1930-31.

In the nitrogen group an important relative increase is reported in the consumption of calcium cyanamide. While the agricultural crisis was necessarily reflected in lessened consumption of this fertilizer the decrease was only from 92,000 tons in 1929-30 to 83,000 tons in 1930-31, or about 10 per cent, which is a relatively good showing when contrasted with the drop in the total German consumption of nitrogen fertilizers. As a result, the share of calcium cyanamide in the nitrogen consumption by agriculture increased from 22.2 per cent in 1929-30 to 24.4 per cent in 1930-31.

Figures recently made public show the steady gains of calcium cyanamide since 1924, the year which marked the spectacular expansion in synthetic ammonia production.

GERMAN CONSUMPTION OF NITROGEN FERTILIZERS SINCE 1913-14

Fertilizer year	Total synthetic nitrogen (tons of N)	Calcium cyanamide (tons of N)	Calcium cyanamide (per cent of total)
1913-14.....	210,000	9,089	4.3
1918-19.....	115,000	33,732	29.3
1920-21.....	212,000	43,764	20.6
1924-25.....	334,126	52,493	15.7
1926-27.....	392,983	88,343	22.5
1928-29.....	409,871	91,373	22.3
1929-30.....	415,000	92,000	22.3
1930-31.....	340,000	83,000	24.4

## NITROGEN PRODUCTION

The world production of nitrogen increased from 770,000 tons before the war to 1,250,000 tons in 1925 and 2,180,000 tons in 1930. After 1928 consumption began to lag, and in 1930 40 per cent of the world production was piled up in stocks. In August, 1931, German stocks of nitrogen amounted to over 300,000 tons. At that time it was estimated that world stocks of nitrogen were sufficient to cover world demand for an entire year. Still more spectacular was the expansion in the production capacity for nitrogen, which rose to 4,000,000 tons in 1931, of which 30 per cent was the share of Germany, 15 per cent that of the United States, 13 per cent of Chile, and from 2 to 7 per cent each for France, Japan, United Kingdom, Belgium, Russia, Norway, Poland, Netherlands, and Italy. Germany alone possesses sufficient equipment to supply the whole world with nitrogen, at the present rate of consumption. As it is, the German nitrogen industry is active at 20 to 30 per cent of capacity.

In 1926 the German coal industry embarked upon nitrogen production with employment of coke-oven gas as a source of hydrogen for the ammonia synthesis. This movement was launched on a large scale, over 100,000,000 marks having been invested in new equipment. When it is considered that the air nitrogen production was developed highly at that time, the new wave of expansion was viewed justly by some German observers as foolhardy. A similar development was in process in many other countries. France, Italy, Belgium, and Poland have increased their production capacity for nitrogen five to fourteen times since 1925.

An international understanding to reduce production and eliminate price competition was arrived at in 1929, when the international nitrogen agreement was concluded with the participation of Germany, England, and the Chilean industries. In August, 1930, this agreement was superseded by the Convention Européenne de l'Industrie de l'Azote, with all important European producers participating and Chile cooperating under a special contract. The object of the syndicate was retrenchment of production, accompanied by preservation of prices. The entire European production was limited to a maximum of 1,100,000 tons. A compensation bank was established which paid subsidies to all those producers who voluntarily reduced their production.

The break in nitrogen negotiations was followed by an immediate announcement of prohibitive duties on nitrogen fertilizers in Germany in retaliation for similar measures which other nations had taken or were likely to take. Since imports of ammonium sulphate were duty free under the special treaties with France and Belgium, the benefit of which was extended to all those nations having a most-favored-nation stipulation, this fertilizer could be debarred only by direct import restrictions. This step was taken on August 18, by way of a ministerial decree, and was extended to include other nitrates as follows: "Ammonium nitrate, sodium nitrate, including Chile saltpeter, ammonium chloride, ammonium sulphate, calcium nitrate, urea, and all nitrogenous fertilizers not specially provided for; phosphorous fertilizers treated with acid (superphosphates) mixed with nitrogen carriers."

All such fertilizers could be imported under permits issued by the Government, should the latter deem it desirable to grant them.

Plans are being considered for reorganization of the German nitrogen syndicate along lines similar to the potash industry. It is stated that syndicalization came too early, and had the nitrogen producers been left alone to fight for their existence, less efficient works would have been eliminated; resulting in a more favorable condition with regard to the cost of production. As it is, the nitrogen industry may be reformed by purchasing and shutting down inefficient works in Germany and competitive in other countries. This object appears to have been in mind of the founders of the Internationale Gesellschaft fuer Stickstoffindustrie A. G., in Basel, Switzerland.

The total production capacity of the German nitrogen industry has undergone, since 1914, a rapid development, illustrated by the following figures:

GERMAN PRODUCTION CAPACITY FOR NITROGEN (IN TONS N)

Item	1914	1918	1930
Calcium cyanamide.....	10,000	100,000	130,000
Synthetic ammonia (Haber-Bosch).....	7,000	200,000	800,000
Coke-oven ammonia.....	100,000	100,000	100,000
Synthetic ammonia.....			170,000
Total.....	117,000	400,000	1,200,000

The actual production of calcium cyanamide has been at all times nearer the capacity than was the case with other nitrogen carriers, and the production figures show a steady expansion.

GERMAN NITROGEN PRODUCTION AND THE SHARE OF THE PRINCIPAL BRANCHES, 1913-1930

Year	Total production (tons N)	Per cent of total production		
		By-product ammonia	Synthetic ammonia	Calcium cyanamide
1913.....	119,650	91	1	8
1917.....	162,470	35	43	22
1921.....	293,500	26	57	17
1925.....	511,000	16	71	13
1927.....	663,000	14	73	13
1928.....	775,000	13	75	12
1930.....	680,000	15	69	16

<sup>1</sup> Estimated.

POTASH PRODUCTION

The most important unofficial source of information on potash, the Gebrueder Damman Bank of Hannover, discusses in its annual report the causes of the serious decline in both domestic and export sales of potash during 1931.

The contraction in German consumption of potash was 15 per cent as compared with the year before. The contraction in value was even more pronounced, since German farmers not only used less potash but purchased cheaper grades for the sake of economy. The decrease in the world consumption of potash is traced to the low prices of agricultural products, especially cotton, which has made

expenditure for fertilizers unprofitable. The total sales of the potash syndicate declined in 1931 to 963,819 tons  $K_2O$  from 1,356,725 tons in 1930, and stood in marked contrast to the peak sales of 1,420,000 tons in 1928. As between that record year and the 1931 sales there was a decline of 32 per cent, whereas compared with 1930 the recession was almost 30 per cent.

The newly developed petroleum production from wells sunk from the bottom of potash mines compensated in part for the depressed potash business. Practically the only concern which benefited from this production during 1931 was Burbach, whose Volkenroda well brought a production of 300 tons a day valued at 23,000 marks. Other developments have not yet progressed to the point of paying on the investment.

Efforts to organize the petroleum interests of the potash industry into a syndicate parallel to those of potash by-products organized in 1930 have not brought any results.

Much discussion was devoted to the matter of subordinating the production of brine salt to the rock salt syndicate. This movement likewise failed to bring any concrete results.

The mixed-fertilizer problem progressed slightly toward solution, inasmuch as an agreement was reached whereby the sales of potassium nitrate manufactured by the Wintershall concern in Sondershausen were taken over by a special organization representing joint interests of the potash industry. Further expansion of mixed-fertilizer production on the part of the potash industry in the direction of complete fertilizers does not appear to be probable.

The potash industry anticipated a revival in business in the spring season of 1932 as a result of the 10 per cent price reduction effected pursuant to the emergency decree of December 8, 1931, and the reduction of freight charges. The 10 per cent price cut was made possible by the wage decreases and lower prices of coal effected simultaneously by the decree.

The following tabulation of potash sales for the last eight years in comparison with 1913 affords a gage of the present conditions.

	Thousands of tons $K_2O$		Thousands of tons $K_2O$
1913	1, 110	1928	1, 420
1924	840	1929	1, 401
1925	1, 230	1930	1, 357
1926	1, 100	1931	963
1927	1, 240		

The trend of business toward the end of the year was not encouraging, especially as affected the forthcoming spring fertilizer season, since the December sales figure, which usually marks the commencement of spring buying, this year showed a further decline—from 38,522 tons for November to 37,248 tons for December, 1931. This unusual weakness of the market may have been due to some extent to the abstinence of farmers who awaited the announcement of price reductions on potash pursuant to the emergency decree of December 12, 1931.

The potash syndicate sales, by months, quoted below, illustrate the progressive decrease in sales during 1931.

## POTASH SYNDICATE SALES, BY MONTHS, 1929-1931

[In metric tons K<sub>2</sub>O]

Month	1929	1930	1931	Month	1929	1930	1931
January.....	164, 773	156, 015	116, 047	August.....	95, 420	98, 745	64, 206
February.....	144, 695	202, 723	154, 647	September.....	123, 481	127, 644	88, 223
March.....	232, 828	187, 611	179, 121	October.....	79, 152	71, 675	53, 273
April.....	112, 549	79, 757	63, 574	November.....	84, 664	54, 872	38, 522
May.....	77, 293	77, 178	57, 535	December.....	99, 583	80, 699	37, 248
June.....	97, 768	95, 947	53, 314				
July.....	89, 201	93, 859	58, 106	Total.....	1, 401, 407	1, 356, 725	963, 819

More detailed information on potash production is available for the year 1930, the latest date covered by the German Statistical Office.

The number of active works producing potash and rock salts decreased from 64 in 1929 to 62 in 1930. The decrease in the number of employees was from 25,174 in 1929 to 22,196 in 1930.

Production of potash salts and by-products was carried on by 51 works, of which 11 produced rock salt in addition to potash, and 11 produced rock salt only. The number of shafts in operation decreased from 60 in 1929 to 55 in 1930.

The entire mine production of potash salts amounted in 1930 to 11,960,000 tons against 13,320,000 tons in 1929, a decline of 10 per cent. The following tabulation shows the total production of potash in comparison with that of carnallite salts.

## GERMAN MINE PRODUCTION OF CRUDE POTASH SALTS, 1924-1930

Year	Crude salts (thousands of tons)		Carnallite salts (per cent of total production)	
	Actual mine output	K <sub>2</sub> O content	By bulk	By K <sub>2</sub> O content
1924.....	8, 101		35. 2	
1926.....	9, 408	1, 263	19. 8	14. 4
1928.....	12, 489	1, 691	16. 5	11. 9
1929.....	13, 316	2, 318	17. 4	12. 5
1930.....	11, 962	1, 609	15. 6	11. 1

Over 80 per cent of the crude salts produced were chemically treated to produce potassium chloride and other pure salts; the remainder was placed on the market in crude form.

The total production in 1930 of marketable salts was 4,530,000 tons, with K<sub>2</sub>O content of 1,380,000 tons. The total of marketable potash by-products was 458,000 tons. The production of the several kinds of salts was as follows:

## GERMAN PRODUCTION OF POTASH SALTS IN 1930

Potash salts	Thousands of tons	
	Bulk	K <sub>2</sub> O content
Carnallite and crude salts <sup>1</sup> .....	1, 680	231
Manure salts.....	2, 059	734
Potassium chloride.....	497	283
Potassium sulphate.....	230	115
Potassium-magnesium sulphate.....	66	18

<sup>1</sup> Crude salts are those with 12 to 15 per cent K<sub>2</sub>O.

## PHOSPHATES

A notable feature is the heavy fall in consumption of phosphorous fertilizers—that is, superphosphates, basic slag, and Rhénania phosphate. It is stated that this class of fertilizers has generally been in neglect in postwar times. During 1931 German manufacturers effected substantial price cuts and freight rebates, which apparently failed to stimulate business.

*Superphosphate.*—German production of superphosphate has been published only to 1929. The amounts produced were as follows:

	Thousands of metric tons
1913.....	1, 863
1925.....	692
1926.....	696
1927.....	739
1928.....	792
1929.....	843

*Basic slag.*—Basic slag production, for which the latest data available cover the year 1929, was as follows:

	Thousands of metric tons
1913.....	2, 280
1925.....	1, 303
1926.....	1, 397
1927.....	1, 742
1928.....	1, 639
1929.....	1, 886

## PAINTS AND VARNISHES

The consumption of paints, varnishes, and other coating materials used in construction was affected by a 25 per cent decrease in the volume of new construction in 1931. The total production of paints and varnishes was valued at 165,800,000 marks in 1928.

The industry is represented by 478 establishments employing 6,479 workers, at an annual expenditure of 15,800,000 marks, and consumes raw materials valued at 77,500,000 marks, including oils, 22,000,000 marks; pigments, 16,786,000 marks; resins, 10,622,000 marks; and solvents, 18,000,000 marks.

## SOAP INDUSTRY

The soap industry of Germany represents one of the important divisions of the national chemical industry. It turned out products valued at 396,603,000 marks, consumed 182,000,000 marks' worth of raw materials, and employed 12,853 workers in 1928, according to a recent statistical publication.

## GERMAN PRODUCTION OF SOAPS IN 1928

Product	Metric tons	Thousands of marks
Ordinary hard soaps, cake, flake, and powder.....	276, 809	253, 849
Toilet, glycerin, and medicated soaps.....	37, 564	67, 029
Soft soap.....	103, 115	50, 328
Turkey red oil and similar soaps.....	8, 102	6, 012
Spent lye, in terms of 80 per cent glycerin.....	13, 487	8, 869
Other products (scrubbing powder, liquid industrial soaps).....	17, 994	9, 985
<b>Total.....</b>	<b>457, 071</b>	<b>396, 072</b>



A later estimate places the value of German soap and detergent production at 400,000,000 marks.

An outstanding feature is the great expansion in the manufacture and use of soap flakes and powder in recent years at the expense of grain soaps. The production of soap powders has increased 300 per cent since pre-war years. Another important development is the rapid rise in importance of oxygen-containing detergents, the annual production of which is valued at 130,000,000 marks. The consumption of toilet soaps has increased greatly owing to improvement in hygienic conditions and the general standard of living.

The German soap industry in 1928 consumed 50,000 metric tons of tallow valued at 40,400,000 marks, 50,500 metric tons of palm-kernel oil valued at 39,200,000 marks, and 74,500,000 marks' worth of other oils and fats. The consumption of alkalies is valued at 20,387,000 marks, and that of perfume materials at 5,473,000 marks. Almost 2,000,000 marks represents the value of the rosin consumed.

#### PERFUMES AND COSMETICS

The Reichstag Committee of Inquiry has recently given out figures relating to the production of perfumes and cosmetics in Germany. According to these data the production of cosmetics represents an annual value of 160,000,000 marks and that of perfumes 15,000,000 marks.

The German cosmetics industry is stated to be aggressive in foreign trade and to be making headway in numerous markets. Its sales-promotion effort may be gaged by the fact that it expends 20,000,000 marks annually for advertising, or 12 per cent of the total value of its production.

#### FOREIGN TRADE IN CHEMICALS

Germany had in 1931 the highest favorable trade balance in the history of the country. This balance amounted to 2,478,000,000 marks (\$589,800,000) without reparation deliveries and 3,878,000,000 marks (\$923,000,000) including gold and silver and reparation deliveries in kind. This outstanding result was achieved in the midst of the worst business depression in the memory of the present generation. Yet this great excess of exports over imports occurred in the face of an absolute contraction in both the volume and value of exports, and was possible only because the imports declined to the lowest level noted since 1903, if the war and inflation are eliminated.

The total value of German imports in 1931 was 6,727,000,000 marks, a 35 per cent decline from 1930. Exports were valued at 9,598,600,000 marks, as compared with 12,035,600,000 marks in 1930 (including 392,700,000 marks for reparations deliveries in kind in 1931 and 707,300,000 marks in 1930). While the decline in value amounted to 2,437,000,000 marks, or 20 per cent, the decrease in volume was only about 10 per cent.

Chemicals contributed nearly 800,000,000 marks to the favorable foreign-trade balance, metals and metal goods 1,500,000,000 marks, and machinery 1,700,000,000 marks. The chemical industry was, therefore, the third in importance in the active German foreign trade.

#### EXPORTS OF CHEMICAL PRODUCTS

German exports of chemicals, pharmaceuticals, and dyes during 1931 underwent a decline of 18 per cent by value and 20 per cent by

volume as compared with the preceding year. There are no indications, therefore, that the volume of exports was sustained by price sacrifices.

The following official statistics present a summary of German exports of chemicals by major divisions as adopted by the German Statistical Office.

GERMAN EXPORTS OF CHEMICALS, PHARMACEUTICALS, DYES, AND FERTILIZERS,  
1930 AND 1931

Classification	1930		1931	
	Metric tons	Thousands of marks	Metric tons	Thousands of marks
Chemical elements, acids, and other industrial chemicals	1,984,055	278,065	1,658,602	238,567
Pigments, dyes, and paint materials	169,700	291,077	165,566	259,378
Varnishes, lacquers, and putties	10,970	21,817	9,985	17,019
Ether, alcohols not elsewhere specified or included, essential oils, artificial perfumes, and cosmetics	22,692	50,515	24,241	45,170
Artificial fertilizers	2,813,371	348,486	2,106,501	236,281
Explosives, ammunition, and matches	9,260	24,206	6,635	18,585
Chemical and pharmaceutical products not specially provided for	48,483	168,775	42,836	159,446
Total	5,058,531	1,182,941	4,014,366	974,446

It may be observed that the grouping in the foregoing table omits several important classes of chemical products, notably crude coal-tar products, plastics, gums, resins, and waxes (which amounted to 336,133 tons valued at 131,072,000 marks in 1930 and 261,581 tons valued at 105,174,000 marks in 1931), and includes inks, crayons, and ammunition. Allowing for these readjustments, exports of chemicals and allied products from Germany in 1931 probably declined about 15 per cent, to 1,070,000 marks (\$254,000,000).

Of the groups scheduled, the only one to record an improvement in quantities shipped was the class embracing ethers, alcohols, perfumes, and cosmetics, which gained 7 per cent in quantity exported, although value was off 15 per cent. Five individual items advanced in quantity shipped abroad as follows: Ethyl ether, ethyl chloride, and ethyl ester, from 297 tons (1,006,000 marks) in 1930 to 448 tons (1,071,000 marks) in 1931; methanol (refined), acetone (refined), formaldehyde solution, from 9,357 tons (7,460,000 marks) to 13,222 tons (8,591,000 marks); acetaldehyde, para and metaldehyde, from 140 (190,000 marks) to 190 tons (236,000 marks); terpineol, vanillin, anethol, and similar synthetic perfumes, from 921 tons (8,653,000 marks) to 924 tons (7,514,000 marks); and dentifrices, perfumes, and cosmetics, from 1,419 tons (7,329,000 marks) to 1,431 tons (7,350,000 marks).

INDUSTRIAL CHEMICALS

The industrial chemical group showed a comparatively good trade although the total value fell 14 per cent from 1930. The tendency for the majority of items was downward, yet there were many increases in the exports.

## GERMAN EXPORTS OF SPECIFIED INDUSTRIAL CHEMICALS, 1930 AND 1931

Item	1930		1931	
	Tons	Thou- sands of marks	Tons	Thou- sands of marks
Ammonium carbonate.....	2, 420	1, 106	2, 624	1, 064
Caustic soda.....	13, 230	3, 640	14, 682	4, 094
Calcium chloride, bleaching powder, hypochloride, sodium perborate, hydrogen peroxide, and other bleaches.....	28, 080	10, 367	33, 030	10, 986
Potassium chloride and perchlorate.....	12, 192	4, 893	12, 445	5, 020
Copper sulphate.....	8, 324	3, 675	8, 527	2, 967
Ammonium chloride, sal ammoniac.....	21, 633	5, 409	22, 799	5, 592
Sodium chromate.....	2, 913	1, 693	3, 611	1, 917
Potassium chromate, chromium oxide and hydroxide.....	3, 273	2, 935	3, 455	2, 924
Chromic acid and salts.....	1, 872	1, 496	1, 964	1, 497
Manganic acid and potassium manganate.....	620	559	946	828
Potassium and sodium cyanides.....	3, 652	4, 943	5, 019	6, 137
Lead acetate.....	1, 238	906	1, 329	823
Tartars, sodium tartrate.....	389	713	434	695
Zinc salts, zinc chloride.....	1, 680	861	3, 007	1, 207
Formic acid and salts.....	5, 202	3, 189	5, 346	2, 740
Hexamethylenetetramine.....	134	478	202	714
Nitrites.....	2, 305	858	2, 739	961
Oxalic acid and oxalates.....	3, 637	2, 304	4, 094	2, 541
Tartaric acid.....	3, 176	7, 985	3, 786	7, 461

## PHARMACEUTICALS

German exports of pharmaceuticals registered gains in 1931 which stand out conspicuously against the background of tumbling foreign-trade values in all lines. This success, which is not relative but absolute, and which has been attained in the face of the shrinking capacity of export markets, is an interesting development, suggesting that a large volume of competitive trade must have been crowded out from these markets.

German exports of pharmaceuticals are shown under two heads—prepared and not prepared. The latter class is of little relative importance; the bulk of the pharmaceutical trade is comprised of prepared medicines, which account for a value of 84,421,000 marks. This group includes all kinds of proprietary medicines.

## GERMAN EXPORTS OF PREPARED MEDICINES TO LEADING COUNTRIES, 1930 AND 1931

Destination	1930		1931	
	Metric tons	Thou- sands of marks	Metric tons	Thou- sands of marks
Belgium.....	61	1, 758	56	1, 562
Denmark.....	92	1, 743	102	1, 811
Poland.....	79	2, 557	74	2, 326
Greece.....	54	1, 166	56	1, 262
Great Britain.....	113	2, 079	168	3, 161
Italy.....	134	4, 167	135	3, 792
Yugoslavia.....	67	1, 804	64	1, 670
Netherlands.....	174	2, 854	223	3, 641
Austria.....	234	3, 744	264	4, 247
Rumania.....	73	2, 398	84	2, 850
Sweden.....	126	1, 833	164	2, 573
Switzerland.....	190	2, 891	186	2, 999
Spain.....	124	4, 106	132	4, 368
Czechoslovakia.....	153	3, 746	229	5, 455
Hungary.....	60	1, 671	62	1, 583

GERMAN EXPORTS OF PREPARED MEDICINES TO LEADING COUNTRIES, 1930 AND 1931—Continued

Item	1930		1931	
	Metric tons	Thousands of marks	Metric tons	Thousands of marks
Egypt.....	58	1,300	55	875
British India.....	103	2,005	121	2,566
China.....	93	2,191	118	2,895
Japan.....	126	3,473	196	5,252
Netherland Indies.....	100	3,024	104	2,554
United States.....	75	1,571	80	1,708
Argentina.....	115	2,965	105	2,914
Brazil.....	101	2,151	75	1,495
Chile.....	55	1,666	33	909
Colombia.....	48	1,160	65	1,377
Mexico.....	66	2,024	58	1,749
Other countries.....	805	16,781	857	16,827
Total.....	3,479	78,828	3,866	84,421

Exports to most countries show moderate increases, which can only mean a general powerful sales effort on the part of the German pharmaceutical industry. (In Germany the consumption of drugs and medicines declined 20 per cent, according to trade estimates.) While individual increases were not considerable, some countries registered more than usual fluctuations in demand. Czechoslovakia, the highest on the list, represented an increase of almost 50 per cent; Great Britain, 52 per cent; Sweden, 40 per cent. Japan increased its imports of German pharmaceuticals more than 50 per cent, and China imported 30 per cent more than the year before; considerable increases were also noted for the Netherlands, Austria, Rumania, Spain, British India, and the United States. On the other hand, Poland, Yugoslavia, Egypt, Brazil, Chile, and Mexico, all showed declines. A combined figure for all of Central and South America showed a decline from 14,104,000 marks in 1930 to 12,250,000 marks in 1931.

EXPORTS OF DYES

German exports of coal-tar and other synthetic organic dyes were relatively well maintained in 1931; the largest group, that of coal-tar dyes not specially provided for, showed a gain both in volume and in value. On the other hand, exports of alizarin dyes and indigo declined appreciably.

GERMAN EXPORTS OF SYNTHETIC ORGANIC DYES, 1930 AND 1931

Designation	1930		1931	
	Metric tons	Thousands of marks	Metric tons	Thousands of marks
Anilin and other coal-tar dyes n. e. s.; sulphur dyes.....	27,405	132,237	32,276	143,526
Alizarin red.....	1,155	1,977	1,304	1,991
Alizarin dyes from anthracene.....	2,486	32,076	929	10,978
Indigo, natural and artificial.....	10,439	24,480	9,211	18,686
Total.....	41,485	190,770	43,720	175,181

## EXPORTS OF FERTILIZERS

The next table shows the exports of fertilizers in 1930 and 1931. There was a marked falling off in all the nitrogen fertilizers with the exception of ammonium sulphate, which increased 43 per cent in quantity but fell 14 per cent in value.

## GERMAN EXPORTS OF FERTILIZERS, 1930 AND 1931

Item	1930		1931	
	Metric tons	Thou- sands of marks	Metric tons	Thou- sands of marks
Potash, crude salts, natural; Stassfurt salts .....	995, 157	60, 226	540, 878	30, 790
Potassium sulphate .....	482, 396	73, 226	355, 277	50, 837
Ammonium nitrate, not in cartridges; nitrate of lead .....	9, 712	3, 486	7, 262	2, 233
Sodium nitrate .....	65, 196	12, 337	51, 895	8, 412
Potassium nitrate .....	26, 000	8, 904	36, 247	12, 028
Ammonium sulphate .....	463, 683	86, 489	664, 930	74, 640
Calcium cyanamide .....	6, 353	962	379	70
Salts of phosphoric acid not specially provided for, such as disodium, phosphate, ammonium phosphate .....	36, 475	13, 973	23, 890	8, 471
Guano, artificial; animal manure .....	16, 895	1, 431	5, 386	234
Guano, natural .....	22	6	42	9
Bone dust, bone meal, bones coarsely ground .....	32, 431	3, 208	25, 882	2, 104
Ground basic slag .....	295, 097	12, 748	173, 031	6, 623
Superphosphates, mixtures of superphosphates with other substances .....	74, 972	5, 254	51, 341	2, 740
Nitrogenous fertilizers not specially provided for .....	308, 982	66, 236	170, 011	37, 090
Total .....	2, 813, 371	348, 486	2, 106, 501	236, 281

## IMPORTS OF CHEMICALS

German imports of chemicals amounted in 1931 to a total value of 210,715,000 marks, compared with a value of 974,446,000 marks for the corresponding exports. The imports represented, therefore, about one-fifth the value of exports, and the difference contributed 763,731,000 marks to Germany's favorable balance of trade.

Imports in 1931 represented a value of 48,322,000 marks, or about 19 per cent less than that in 1930, when they amounted to 259,037,000 marks.

## GERMAN IMPORTS OF CHEMICALS, PHARMACEUTICALS AND DYES, 1930 AND 1931

Item	1930		1931	
	Metric tons	Thou- sands of marks	Metric tons	Thou- sands of marks
Chemical elements, acids and other compounds of chemical elements not specially provided for .....	275, 718	57, 798	284, 460	52, 380
Pigments, dyes, and paint materials .....	45, 556	29, 687	41, 841	24, 848
Varnishes, lacquers, and putties .....	1, 371	2, 066	915	1, 170
Ether, alcohols not elsewhere specified or included, essential oils, artificial oils, artificial scents, perfumes, and cosmetics .....	28, 256	34, 235	28, 245	26, 137
Artificial fertilizers .....	1, 421, 659	81, 942	1, 375, 550	67, 053
Explosives, ammunition, and matches .....	2, 009	2, 413	1, 917	1, 975
Chemical and pharmaceutical products not specially provided for .....	60, 868	50, 896	62, 969	37, 152
Total .....	1, 835, 437	259, 037	1, 795, 897	210, 715

Readjusting the imports, however, to include the same chemicals as were included in exports, total imports of chemicals and allied products amounted to 307,100,000 marks (\$73,100,000), 26 per cent less than in 1931. Imports recorded a much larger value decline than exports.

There were no particularly outstanding changes in the import trade, which generally was downward, although a few commodities were imported in larger amounts. Around \$10,500,000 worth of chemicals and allied products were received from the United States, a figure somewhat smaller than in 1930.

#### TRADE WITH THE UNITED STATES

In analyzing German imports of chemicals from the United States a feature is that the items of chief importance are those representing raw materials or semimanufactured products. Contrary to prevailing impressions, German chemical exports to the United States have not declined as compared with pre-war time. There have been a few changes in types of chemicals imported into the United States from Germany during the past two or three years as compared with those received from that country in pre-war times, but the totals for the post-war and pre-war years average approximately the same.

German imports of chemicals from the United States include several important raw materials not available locally and procurable exclusively, or to the best advantage, in the United States. They include turpentine and rosin, benzol, sulphur, phosphate rock, borates, and carbon black. The volume of this trade is, on the whole, steady and its development in recent times has been satisfactory.

#### PARAFFIN AND PETROLEUM JELLY

Under a miscellaneous heading comprising "Paraffin ointment, petroleum jelly and ointment, lanolin and lanolin compounds," Germany imports products valued at more than a million marks a year. The United States supplies a substantial part of these imports, a large portion of which doubtless represents petroleum jelly. These imports have shown a downward trend since 1928, as will be seen in the following table.

GERMAN IMPORTS OF PARAFFIN AND PETROLEUM JELLY, LANOLIN, AND LANOLIN COMPOUNDS, 1926-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
1926.....	2,074	1,289	1,875	(1)
1927.....	2,818	1,676	2,614	(1)
1928.....	4,039	2,336	3,676	(1)
1929.....	3,345	1,694	2,925	(1)
1930.....	3,004	1,241	2,710	1,092
1931.....	2,845	1,188	2,671	1,107

<sup>1</sup> Not given.

## BENZOL

The use of benzol for engine fuel in addition to its extensive use in industry has produced a shortage of this commodity, despite the large volume of domestic output. German production of benzol follows the ups and downs of the markets for coke, ammonia, tar, and other products of coal distillation and may not be adjusted to the changing trends of the benzol market alone. In 1931 the output was reduced to about 220,000 metric tons, from a production of 327,000 tons in 1930.

The United States furnishes about 50 per cent of German foreign supply; the other important origins are the Saar district, Poland, and the Netherlands.

## GERMAN IMPORTS OF BENZOL AND HOMOLOGUES, 1925-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
1925.....	43, 518	18, 025	(1)	(1)
1926.....	64, 074	27, 449	13, 791	(1)
1927.....	130, 901	48, 788	53, 638	(1)
1928.....	162, 843	51, 747	46, 245	(1)
1929.....	165, 076	59, 349	61, 585	(1)
1930.....	169, 802	58, 192	87, 094	28, 600
1931.....	138, 864	32, 714	59, 489	14, 045

<sup>1</sup> Not given.

## TURPENTINE

Under the heading "Turpentine, pine needle oil, rosin oil," Germany imported in 1931, 22,325 tons, valued at 11,311,000 marks. The share of the United States in these imports was 11,556 tons, valued at 6,456,000 marks. France was for a long time next in importance to the United States as a source of supply for turpentine, and Spain, Greece, and Sweden also furnished appreciable amounts. The share of the United States grew until 1930, both absolutely and proportionately.

Notable features of the 1931 trade are the increase in total imports and the greater participation of Soviet Russia, which country became the second most important source (after the United States) in 1931.

## GERMAN IMPORTS OF TURPENTINE OIL, PINE-NEEDLE OIL, AND ROSIN OIL 1926-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
1926.....	16, 108	16, 306	6, 981	(1)
1927.....	22, 646	20, 564	13, 184	(1)
1928.....	25, 744	18, 667	15, 330	(1)
1929.....	27, 924	18, 990	18, 197	(1)
1930.....	21, 930	13, 055	13, 814	8, 948
1931.....	22, 325	11, 311	11, 556	6, 456

Not given.

Prior to 1925 imports from Russia were negligible and in 1925 only 341 tons came from that country. In 1927 Russia supplied 584 tons; in 1929, 892 tons; in 1930, 1,606 tons; and in 1931, 2,363 tons.

## ROSIN

The United States is the chief source of supply for rosin. In contrast to the increase in imports of turpentine in 1931, rosin declined from 62,349 tons (value 20,339,000 marks) in 1930 to 51,941 tons (value 11,785,000 marks) in 1931; the United States furnished 45,172 tons (14,153,000 marks) and 36,228 tons (7,651,000 marks), respectively. France, the source second in importance, supplied 10,180 tons (2,663,000 marks) in 1931; Spain, 3,763 tons (1,003,000 marks); and Portugal, 1,145 tons (268,000 marks).

## SULPHUR

The United States and Italy are practically the only two sources of German sulphur imports. The United States furnishes approximately 90 per cent of the total. The share of the United States was steady until 1931, but showed in that year a slight contraction, accompanied by a corresponding expansion in imports from Italy.

## GERMAN IMPORTS OF SULPHUR, 1926-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
1926.....	73,979	8,068	65,817	(1)
1927.....	93,557	10,094	86,827	(1)
1928.....	104,860	12,261	96,854	(1)
1929.....	120,434	13,282	114,521	(1)
1930.....	82,355	9,053	76,470	8,306
1931.....	78,154	8,353	56,991	6,131

<sup>1</sup> Not given.

## PHOSPHATE ROCK

The United States is the chief source of imports of phosphate rock, and the bulk of the remaining requirements of German industry are supplied by northern Africa.

## GERMAN IMPORTS OF PHOSPHATE MATERIALS, 1926-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
1926.....	474,500	13,714	136,639	(1)
1927.....	910,094	25,389	271,403	(1)
1928.....	794,155	24,497	268,695	(1)
1929.....	909,574	28,181	331,132	(1)
1930.....	834,413	26,508	344,397	11,460
1931.....	616,409	17,990	324,513	9,784

<sup>1</sup> Not given.



## BORAX AND CALCIUM BORATE

The United States supplies the bulk of Germany's imports of borax and calcium borate, as will be seen in the next tables. Germany produces a small amount of boric acid from Stassfurt salts; but the domestic manufacture is insufficient to supply the large demand for both boric acid and borax, and an increasing quantity has been imported.

## GERMAN IMPORTS OF CALCIUM BORATE AND OTHER BORON MINERALS, 1926-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
<b>Calcium borate:</b>				
1926.....	15,206	3,409	2,055	(1)
1927.....	18,363	3,431	2,082	(1)
1928.....	17,863	3,392	967	(1)
1929.....	20,727	3,080	12,000	(1)
1930.....	22,178	2,846	18,954	2,443
1931.....	19,159	2,439	16,460	2,109
<b>Boric acid and borax:</b>				
1926.....	2,034	1,131	814	(1)
1927.....	5,290	2,440	3,472	(1)
1928.....	7,677	2,381	6,841	(1)
1929.....	9,465	2,388	8,499	(1)
1930.....	8,703	1,965	7,963	1,737
1931.....	7,830	1,585	7,166	1,381

<sup>1</sup> Not given.

## CARBON BLACK

Imports of carbon black, which represents the purest form of carbon and which is indispensable for special industrial uses, originate exclusively in the United States, even though German statistics record other minor sources. The small amounts procured from other countries are doubtless all transshipments. The tariff group containing carbon black is designated as "Lampblack, printers' black, engravers' black, dry, not prepared." This item represents practically all carbon black. The trade in carbon black is steadily growing in importance, and in recent years attained a value of over \$1,000,000. The economic crisis of the last two years has hardly affected it.

Carbon black is used in making printers' and engravers' inks (for which purpose 840 metric tons of American carbon black was consumed in Germany in 1928); in the preparation of paints and varnishes; as an important hardening and toughening agent in the preparation of rubber, especially for automobile tires; and for a great many special uses.

There is no domestic production of carbon black in Germany, owing to the absence of natural gas; the entire requirements are covered by imports.

## GERMAN IMPORTS OF CARBON BLACK, 1926-1931

Year	Total		From the United States	
	Metric tons	Value in thousands of marks	Metric tons	Value in thousands of marks
1926.....	2,068	2,085	1,950	(1)
1927.....	4,025	4,145	3,765	(1)
1928.....	5,643	5,449	5,448	(1)
1929.....	5,767	5,521	5,609	(1)
1930.....	5,813	4,499	5,718	4,410
1931.....	5,758	3,284	5,661	3,216

<sup>1</sup>Not given.

## TECHNICAL AND SCIENTIFIC PROGRESS

The Deutsche Chemische Gesellschaft receives subsidies from the industry to the amount of 100,000 marks a year. The most important State institutions of chemical research are the Kaiser Wilhelm Institut and the Chemisch-Technische Reichsanstalt. These institutions are also financed in part by contributions from the industry. An important part of the research in the province of coal chemistry is carried on by the Coal Research Institute of Muehlheim-Ruhr, supported by the coal-mine operators of the district.

The most important work is done by manufacturers themselves. The cost of research is a regular item in cost estimation, and the price of the finished product often includes as much as 20 per cent allowance for research work. While large concerns like the dye trust spend much larger sums for research and experimentation than smaller establishments, practically every manufacturer in Germany allots substantial funds for this activity.

## IMPORTANT DEVELOPMENTS IN 1931

While greater positive results were obtained during 1931 by the improvement of existing processes rather than by the development of new chemicals, nevertheless, several new synthetic resins were placed on the market during the year, some of which attracted widespread interest. Among the outstanding new products in this line may be mentioned the Trolitul resin, produced by the Rheinisch-Westfaelische Sprengstoffwerke A. G.; Pollopas, a molded product, used in the manufacture of nonbreakable tableware, which was placed on the market in large quantities.

Two new protective coatings for iron tubing were developed and adopted by the Mannesmanns Roehrenwerke A. G., called Herolith and Tornesit.

Intensive research in rustproofing processes and materials was in evidence throughout the year and the general interest was indicated by a convention of all the German societies and institutions interested in rustproofing held in Berlin in November, 1931.

The most notable development was the so-called Atrament process, commercialized on a large scale during the year by the I. G. Farbenindustrie. This process consists in phosphatizing the surface of iron objects by immersion in a solution of salts at boiling temperature without the use of pressure or electric current.

Hydroquinine was synthesized for the first time. The production of rhenium was placed on a commercial basis, the price of pure metal being reduced to 14 marks per gram. Further technical progress was achieved in the rayon industry in the development of new varieties of yarn.

The use of coal as a fertilizer attracted considerable attention, but as yet has attained no practical importance.

A fertilizer consisting of powdered lignite and blood was placed on the market, but there are no indications of its having been adopted by agriculture to any extent.

A mixed fertilizer appeared on the market during the year under the new name "Scheibler's Kalkamon Phosphate." The product is manufactured by the Chemische Fabrik Kalk G. m. b. H., of Koeln Kalk. This fertilizer is compounded from lime, ammonia, and phosphate. Two grades are manufactured; Grade I contains 7 per cent nitrogen and 17 per cent phosphoric acid, and Grade II has 12 per cent nitrogen and 12 per cent phosphoric acid. The new fertilizer was distributed by the ordinary channels of fertilizer trade and prices were reduced during the year.

Considerable progress was made in the practical application of a freezing process in treatment of coke-oven gas for recovery of benzol and other products. The actual production of benzol by this process has not been published, but its importance is indicated by the fact that 180,000 tons of methane and 23,000 tons of ethylene and homologues were obtained as by-products.

The gas is compressed only at a moderate pressure and allowed to expand, a part of the energy consumed in compression being recovered. By this process, gas with full naphthalene content may be treated at 45° C. initial temperature. The yield of naphthalene and benzol, both of high purity, is stated to be quantitative. The uncondensed gas is dried immediately after the process by suitable apparatus. The crude benzol obtained is frozen, again resulting in separation of a fraction which may be marketed as pure benzol without further treatment, and another fraction containing all the toluol.

#### SYNTHETIC GASOLINE PROCESS IMPROVED

The production of synthetic gasoline, which had been carried on by the I. G. at a steady rate of 100,000 tons a year, was regarded generally as a commercial failure until new catalysts were developed in the latter half of 1931. These possessed remarkable activity and resistance to the so-called "catalyst poisoning," and by their use it was found possible to double the annual production of gasoline with the existing equipment of the I. G. hydrogenation works at Merseburg, without important additional investments. According to a recent statement of the I. G., the production may even be raised to 350,000 tons a year. This success, however, probably will not lead to an immediate increase in production, since at the end of the year the I. G. still reported unfavorable market conditions for the disposal of its gasoline output, due chiefly to the low prices for petroleum gasoline, accompanied by keen competition of the several foreign producers on the German market.

## PITCH-COKE PROCESS DEVELOPED

An important step forward was reported in connection with the efforts carried on for a number of years to replace imported petroleum coke by an analogous product of German manufacture. Owing to the invention of a new type of furnace, the pitch remaining as residue in distillation of coal tar has been carbonized to produce coke of high purity which is thought to offer a satisfactory substitute for the imported petroleum coke. Manufacture on a small scale was commenced during the year. The yield is stated to be as much as 68 per cent of the original pitch, and the by-products a viscous oil and a hard crystalline substance.

## ELECTRIC PRECIPITATION PROCESS

While not a distinctly new invention, the electrofilter appliances for purification of industrial gases manufactured under the patents of Lurgi Gesellschaft of Frankfort on the Main and of the Siemens company attained great industrial importance during the year. The number of units installed increased to 2,593, handling some 50,000,000 cubic meters of gases an hour and separating 400 tons solid matter an hour, some of which represents valuable by-products.

## COMBINES AND AMALGAMATIONS

The dissolution of the international nitrogen syndicate in the summer of 1931 was an event of such overshadowing importance that it impressed its mark upon the whole trend of international trade relations. Progress of international cartelization was virtually arrested, although some headway was made in the efforts which have been made for a number of years to attract the British industry to the international dyestuffs agreement. Cablegrams received in March, 1932, confirmed the report that an agreement affecting the European dye market had been concluded between the British Imperial Chemical Industries (Ltd.) and the Continental dyemakers, primarily the I. G.

The outlook at the end of 1931, even though brightened somewhat by the reported understanding between the international dyestuffs syndicate and the British industry, remained decidedly unfavorable to international industrial pacts.

A distinct position was occupied by the potash industry, which was proof to all those dissociative trends that formed the undertow of the general industrial sentiment. It continued to consolidate its international ties, principally with the French.

The commercialization of the I. G. hydrogenation patents was broadened in scope by establishment of the International Patent Co., with headquarters in Vaduz, Liechtenstein. The new combine operates in all countries other than the United States and Germany. It represents a pool of interests including the Royal Dutch Shell and the Imperial Chemical Industries, in addition to the German I. G. and the Standard I. G. The two last-named companies cover the German and American markets, respectively.

The insolvent Italian chemical concern Acna, of Milan, was taken over by the I. G. Farbenindustrie and the Italian Montecatini concern. A new corporation was founded with a capital stock of 60,000,000 lire, of which the I. G. took 29,000,000 lire and the Monte-

catini 31,000,000 lire. Following this transaction the Montecatini acquired a 49 per cent interest in the large I. G. subsidiary in Italy, the Societa Chimica Lombarda A. E. Bianchi & Co. These relationships put an end to the competition between the I. G. and Montecatini in Italy.

#### CONCENTRATION WITHIN THE GERMAN CHEMICAL INDUSTRY

Among important mergers and new foundations of especial importance are the following:

The Ruhrchemie A. G. established, jointly with the I. G. Farbenindustrie, the Chemische Fabrik Holten G. m. b. H., with a capital stock of 1,000,000 marks. The new corporation has for an object the utilization of waste gases of nitrogen plants to produce a certain ethylene product used principally as lacquer solvent. It is estimated that at the present rate of activity in the nitrogen industry the Holten concern may attain a production valued at 1,500,000 marks annually.

The last independent wood-distillation concern, the Verein fuer Chemische Industrie A. G. of Frankfort-on-Main, was absorbed by the Deutsche Gold und Silber Scheideanstalt, which had absorbed previously the other wood-distillation concern, the Holzverkohlungs Industrie of Constance. Thus the precious metals concern referred to has obtained control of the entire German wood-distillation industry.

Considerable concentration movement occurred during the year in the explosive division. In May, 1931, six explosives concerns controlled by the I. G. merged into a corporation with a capital stock of 19,400,000 marks. The merger resulted in simplification and unity of management and more efficient distribution of manufacturing activity, which includes, besides explosives, such important lines as cellulose and synthetic plastics.

The Westfaelisch-Anhaltische Sprengstoff Konzern absorbed the H. A. Meyer & Riemann Chemische Werke A. G. in Hannover-Linden, a 500,000-mark corporation.

The expansion of large German breweries has of late invaded the chemical field. The Brennerei und Presshefefabrik G. m. b. H. of Tornesch, Holstein, which brought out recently two new rust-proofing materials known as Herolith and Tornesit, formed, jointly with the Schultheiss-Patzenhofer Brauerei A. G., of Berlin, a new corporation to engage in the manufacture of glucose from sawdust. The new organization is called Deutsche Holzverzuckerungs und Chemische Fabrik A. G. of Tornesch, with a capital stock of 500,000 marks.