

Survey of Sodium Formate and Formic Acid in China

The Third Edition

April 2023

Researched & Prepared by:

Kcomber Inc.

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Contents

Executive summary	1
Methodology	2
1 Overview of sodium formate and formic acid industries in China	4
1.1 Brief introduction to sodium formate and formic acid.....	4
1.2 Current sodium formate and formic acid industries	5
1.3 Government policies on sodium formate and formic acid industries.....	5
2 Sodium formate industry in China, 2022	7
2.1 Producer	7
2.2 Production	10
2.3 Price	12
2.4 Consumption	12
2.5 Forecast, 2023–2027.....	13
3 Formic acid industry in China, 2022	15
3.1 Producer	15
3.2 Production	15
3.3 Price	17
3.4 Import and export analysis	18
3.5 Consumption	21
3.6 Forecast, 2023–2027.....	21
4 Profiles of major sodium formate and formic acid producers in China	23
4.1 Luxi Chemical Group Co., Ltd.	23
4.2 Shandong Acid Technology Co., Ltd.....	23
4.3 Chongqing Chuandong Chemical (Group) Co., Ltd.....	24
4.4 BASF-YPC Co., Ltd.....	25
4.5 Hebei Pengfa Chemical Co., Ltd.	25
4.6 Shijiazhuang Taihe Chemical Co., Ltd.....	25
4.7 Hengyang Yishun Chemical Co., Ltd.....	26
4.8 Liaoning Fuyuan Chemical Co., Ltd.....	26
4.9 Zouping Fenlian Biotech Co., Ltd.	26
4.10 Hubei Yihua Chemical Industry Co., Ltd.....	27
4.11 Chifeng Ruiyang Chemical Co., Ltd.....	27
4.12 Shandong Fufeng Perstorp Chemical Co., Ltd.	28
4.13 Guizhou Kaiyang Qingli Tianmeng Chemical Co., Ltd.....	28
4.14 Qianjiang Fuyang Chemical Co., Ltd.....	29

4.15 Puyang Pengxin Chemical Co., Ltd.	29
4.16 Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company	30
4.17 Jiangsu Baichuan High-Tech New Materials Co., Ltd.	30
4.18 Binzhou Xinke Aode Technology Co., Ltd.	31
4.19 Yunnan Yuntianhua Co., Ltd.	31
4.20 Puyang Yong'an Chemical Co., Ltd.	31
4.21 Shijiazhuang Shuangyan Chemical Co., Ltd.	32
4.22 Shandong XZY Chemical Co., Ltd.	32
4.23 Ningxia Ningshun New Material Technology Co., Ltd.	33
4.24 Anhui Jinhe Industrial Co., Ltd.	33
5 Sodium formate producers taking synthesis method in China	34

LIST OF TABLES

Table 1.1-1 National Standard on Formic Acid for Industrial Use GB/T 2093–2011
Table 2.1-1 List of sodium formate producers in China, as of March 2023
Table 2.2-1 Capacity and output of sodium formate in China, 2022
Table 2.4-1 Application fields of sodium formate in China
Table 3.1-1 List of formic acid producers in China, as of April 2023
Table 3.2-1 Capacity and output of formic acid in China, 2021–2022
Table 3.4-1 Annual exports of formic acid from China, 2018–2022
Table 3.4-2 Top 20 export destinations of China's formic acid, 2022
Table 3.4-3 Origins of China's imported formic acid, 2022
Table 3.5-1 Application fields of formic acid in China
Table 4.1-1 Capacity and output of sodium formate and formic acid in Luxi Chemical, 2021–2022
Table 4.2-1 Capacity and output of formic acid in Shandong Acid, 2021–2022
Table 4.3-1 Capacity and output of sodium formate and formic acid in Chongqing Chuandong, 2021–2022
Table 4.4-1 Capacity and output of formic acid in BASF-YPC, 2021–2022
Table 4.5-1 Capacity and output of formic acid in Hebei Pengfa, 2021–2022
Table 4.6-1 Capacity and output of formic acid in Shijiazhuang Taihe, 2021–2022
Table 4.7-1 Capacity and output of formic acid in Hengyang Yishun, 2021–2022
Table 4.8-1 Capacity and output of formic acid in Liaoning Fuyuan, 2021–2022
Table 4.9-1 Capacity and output of formic acid in Zouping Fenlian, 2021–2022
Table 4.10-1 Capacity and output of sodium formate in Hubei Yihua, 2021–2022
Table 4.11-1 Capacity and output of sodium formate in Chifeng Ruiyang, 2021–2022
Table 4.12-1 Capacity and output of sodium formate in Fufeng Perstorp, 2021–2022
Table 4.13-1 Capacity and output of sodium formate in Qingli Tianmeng, 2021–2022
Table 4.14-1 Capacity and output of sodium formate in Qianjiang Fuyang, 2021–2022
Table 4.15-1 Capacity and output of sodium formate in Puyang Pengxin, 2021–2022
Table 4.16-1 Capacity and output of sodium formate in Jiuyuan Sea Level, 2021–2022
Table 4.17-1 Capacity and output of sodium formate in Jiangsu Baichuan, 2021–2022
Table 4.18-1 Capacity and output of sodium formate in Xinke Aode, 2021–2022

Table 4.19-1 Capacity and output of sodium formate in Yunnan Yuntianhua, 2021–2022
Table 4.20-1 Capacity and output of sodium formate in Puyang Yong'an, 2021–2022
Table 4.21-1 Capacity and output of sodium formate in Shijiazhuang Shuangyan, 2021–2022
Table 4.22-1 Capacity and output of sodium formate in Shandong XZY, 2021–2022
Table 4.23-1 Capacity and output of sodium formate in Ningxia Ningshun, 2021–2022
Table 4.24-1 Capacity and output of sodium formate in Anhui Jinhe, 2021–2022
Table 5-1 List of sodium formate producers taking synthesis method in China

LIST OF FIGURES

Figure 1.1-1 Molecular structure of sodium formate
Figure 1.1-2 Molecular structure of formic acid
Figure 2.2-1 Capacity distribution of sodium formate in China, 2022
Figure 2.2-2 Output distribution of sodium formate in China, 2022
Figure 2.3-1 Monthly ex-works price of sodium formate in China, 2022
Figure 2.4-1 Apparent consumption of sodium formate in China, 2022, tonne
Figure 2.5-1 Forecast on China's sodium formate capacity and output, 2023–2027
Figure 3.2-1 Capacity distribution of formic acid in China, 2022
Figure 3.2-2 Output distribution of formic acid in China, 2022
Figure 3.3-1 Monthly ex-works price of industrial grade formic acid in China, 2022
Figure 3.4-1 Monthly exports of formic acid from China, 2021–2022
Figure 3.4-2 Distribution of exports of formic acid from China by destination, 2022
Figure 3.5-1 Apparent consumption of formic acid in China, 2022, tonne
Figure 3.6-1 Forecast on China's formic acid capacity and output, 2023–2027

Executive summary

China's sodium formate and formic acid industries were under structural reform in 2017 and 2018. In March 2023, the Ministry of Emergency Management issued the *Planning Scheme for Safety Production of Hazardous Chemicals during the 14th Five-Year Plan Period (2021–2025)*. The development of those two industries now faces more and more regulatory restraints.

As of the end of 2022, there were 21 active sodium formate producers and 10 active formic acid producers in China. Among the 21 active sodium formate producers, two of them also produce formic acid. Luxi Chemical Group Co., Ltd. is the top producer of both sodium formate and formic acid in China, possessing 100,000 t/a of capacity for sodium formate and 400,000 t/a for formic acid.

China's sodium formate and formic acid production capacity in 2022 has significantly increased compared to that in a few years ago. It is mainly due to the Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company. (Jiuyuan Sea level)'s 100,000 t/a sodium formate capacity being put into production and Luxi Chemical Group Co., Ltd. (Luxi Chemical)'s 200,000 t/a formic acid capacity being put into production.

Sodium formate output was mainly contributed by producers in Shandong Province, Inner Mongolia Autonomous Region, and Anhui Province; the output from Shandong Province and Inner Mongolia Autonomous Region took up about 69% of China's total output in 2022. Formic acid output was mainly contributed by producers in Shandong Province, Jiangsu Province and Chongqing Municipality; the output from Shandong Province and Jiangsu Province accounted for about 90% of China's total output in 2022.

The ex-works price of sodium formate averaged USD446/t in 2022, decreasing by 8% from USD489/t in 2021. The price of sodium formate was fluctuating in 2021, mainly due to supply-side adjustments and impact from the COVID-19 pandemic. The annual average ex-works price of formic acid was USD706/t in 2022, increasing by 17.56% from USD600/t in 2021. The surge in formic acid price was mainly due to the increase in raw material costs.

The export volume of formic acid from China increased from 191,648 tonnes in 2020 to 224,529 tonnes in 2022; the annual average export price of formic acid increased from USD334/t in 2020 to USD800/t in 2022.

The apparent consumption of sodium formate and formic acid in 2022 was 364,000 tonnes and 248,233 tonnes, respectively.

Methodology

• Research scope and targets

Survey of sodium formate and formic acid in China (the third edition), finished in April 2023, is CCM's report on China's sodium formate and formic acid industries. This report covers production and market information of both industries as well as forecasts for the coming five years in China.

Region scope: China

Time scope: primarily 2022 unless otherwise stated

• Methodology and sources

Desk research

This includes access to published magazines, journals, government, industry and Customs statistics, association seminars as well as information from the Internet. A lot of work has gone into the compilation and analysis of the obtained information. When necessary, information has been checked with sodium formate and formic acid industries participants and specialists regarding to sodium formate and formic acid production, industrial data, production method, market price, industrial development trend, downstream industry applications and policies. Data collected and compiled are variously sourced from:

- CCM's database
- Published articles from periodicals, magazines, journals and third-party database
- Statistics from governments and international institutes
- Customs statistics
- Comments from industrial experts on various platforms
- Information from the Internet

Telephone interview targets

- Key producers
- Key end users
- Key traders
- Key raw material suppliers
- Industrial associations
- Industrial experts

Data compilation and cross-check

Data obtained from various sources have been combined and cross-checked to ensure that this report is as accurate and methodologically sound as possible.

• Units and abbreviations

kg: kilogram

tonne: equals to metric tonne in this report

t/a: tonne per year, tonne per annual

w: molecular weight

CNY: currency code, China Yuan

RMB: Ren Min Bi, name of Chinese currency

USD: currency code, United States Dollar

CAGR: compound annual growth rate

COD: chemical oxygen demand

VOC: volatile organic compounds

EIA: environmental impact assessment

DMF: dimethyl formamide

NEO: neopentyl glycol

TMP: trimethylolpropane

Table USD/CNY exchange rate, Jan. 2021–April 2023

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
2021	6.5408	6.4623	6.4754	6.5584	6.4895	6.3572	6.4709	6.466	6.6800	6.4604	6.4192	6.3693	6.4791
2022	6.3794	6.358	6.3014	6.3509	6.5672	6.6651	6.6863	6.7467	6.8821	7.0992	7.2081	7.1225	6.6972
2023	6.9475	6.7492	6.9400	6.8805	-	-	-	-	-	-	-	-	-

Source: The People's Bank of China

1 Overview of sodium formate and formic acid industries in China

1.1 Brief introduction to sodium formate and formic acid

Sodium formate is the sodium salt of formic acid. Its chemical formula is HCOONa. Sodium formate is a major raw material in sodium hyposulfite, oxalic acid, and formic acid production. In China, it is also widely used in tanning, printing and dyeing, chemical, and oil drilling industries, etc. Currently, there is no effective quality standard on sodium formate in China.

Features of sodium formate

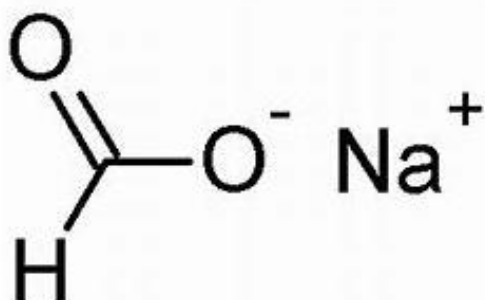
Pros:

- Non-toxicity and biodegradability make sodium formate an environmental friendly de-icing agent

Cons:

- High hygroscopicity makes the product easy to cake or deliquesce in moist and hot weather

Figure 1.1-1 Molecular structure of sodium formate



Source: CCM

Formic acid is the simplest carboxylic acid. The chemical formula is HCOOH or HCO₂H. Formic acid is widely used in tanning, pharmaceutical, pesticide, printing and dyeing, agricultural, chemical, and food industries in China. The currently effective national quality standard on formic acid for industrial use in China is GB/T 2093–2011. There is no specific quality standard on food-grade or pharmaceutical-grade formic acid.

Features of formic acid

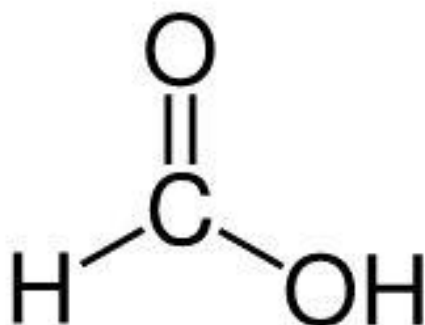
Pros:

- Environmental friendly intermediate in chemical and tanning industries which reduces the COD in waste water and VOC in waste gas
- Could be a safe reagent for renewable energy storage

Cons:

- Strict requirements are imposed on transportation, due to its flammability
- Highly corrosive at high concentrations, which is harmful to humans and animals

Figure 1.1-2 Molecular structure of formic acid



Source: CCM

Table 1.1-1 National Standard on Formic Acid for Industrial Use GB/T 2093–2011

Item	Index								
	94%			90%			85%		
	Premium	First-rate	Qualified	Premium	First-rate	Qualified	Premium	First-rate	Qualified
Formic acid, w/% ≥	94			90			85		
Chromaticity /Hazen ≤	10		20	10		20	10	20	30
Diluting test (sample:aqueous solution=1:3)	Not turbid		Qualified	Not turbid		Qualified	Not turbid	Qualified	
Chloride (Cl), w/% ≤	0.0005	0.001	0.002	0.0005	0.002		0.002	0.004	0.006
Sulphate salt (SO ₄), w/% ≤	0.0005	0.001	0.005	0.0005	0.001	0.005	0.001	0.002	0.02
Iron (Fe), w/% ≤	0.0001	0.0004	0.0006	0.0001	0.0004	0.0006	0.0001	0.0004	0.0006
Residue, w/% ≤	0.006	0.015	0.02	0.006	0.015	0.02	0.006	0.02	0.06

Source: GB/T 2093–2011, Standardization Administration of the People's Republic of China, State Administration for Market Regulation

1.2 Current sodium formate and formic acid industries

Both sodium formate and formic acid industries in China have been under structural reform since 2015 when the Chinese government issued the new *Environmental Protection Law*. Moreover, in June 2022, the Emergency Management Department issued a new plan involving safety production of hazardous chemicals. In recent years, with the production capacity of some large sodium formate and formic acid producers putting into operation, China's sodium formate and formic acid production capacity in 2022 has significantly increased compared to that in a few years ago.

However, it is possible that due to the impact of the COVID-19 pandemic and the big production capacity being put into operation, some small producers were confronted with greater challenges. Some sodium formate or formic acid producers stopped production and have not yet resumed production. Also, with the increase in production capacity, the export volume of formic acid has also begun to recover, increasing from 191,648 tonnes in 2020 to 224,529 tonnes in 2022. On the other hand, the output of sodium formate increased from 396,200 tonnes in 2020 to 467,400 tonnes in 2022.

As of April 2022, there were 10 active formic acid producers and 21 active sodium formate producers in China, with capacities of 698,900 t/a and 746,200 t/a respectively.

1.3 Government policies on sodium formate and formic acid industries

Since 2015, Chinese authorities have been tightening the environmental regulation. In Jan. 2015, the new *Environmental Protection Law* officially came into effect. The *Environmental Protection Tax Law* was passed by National People's Congress in Dec. 2016 and was brought into effect on 1 Jan., 2018, which indicates that Chinese laws concerning environmental protection are becoming increasingly comprehensive.

In June 2022, the General Offices of the CPC Central Committee and the State Council jointly issued the Opinion on Comprehensively Strengthening the Safety Production of Hazardous Chemicals. In March 2023, the Ministry of Emergency Management issued the *Planning Scheme for Safety Production of Hazardous Chemicals during the 14th Five-Year Plan Period (2021–2025)*. The issuance of those two documents is for the purposes of regulating hazardous chemical production as well as construction of relevant capacities, and enhancing prevention of and control over safety risks in the production, which has a close bearing on sodium formate and formic acid industries.

1. Control on emissions: The quota on emission volume of waste gas, waste water and solid waste for

enterprises is stipulated by governments at provincial or municipal level. The EIA approval for enterprises' new construction projects will be suspended if the involved enterprises fail to fulfil the total emission quota or achieve the environmental quality target. During 2016–2017, the limitation on total emission forced some sodium formate and formic acid producers to suspend or stop their production to achieve the assigned environmental quality targets.

2. Supervisions and inspections from environmental protection departments: Multiple on-site inspections on enterprises that discharge pollutants will be carried out each year. Environmental protection departments may seal up and detain the facilities and equipment of enterprises in violation of environmental laws and regulations. Sodium formate and formic acid producers having failed to meet the requirements in random inspections were ordered to suspend production and make rectification. Some producers were forced to exit the market because the cost of rectification was too high.

3. Rectification of industrial parks: In 2017, environmental inspections were initiated on industrial parks in several provinces. Industrial parks that could not meet the national standards were ordered to rectify, while the rest were under supervisions. Meanwhile, chemical manufacturers located near the central urban area were urged to re-settle in industrial parks. In 2018, it was announced that more environmental inspections on industrial parks would be initiated in Shandong, Jiangsu, Hubei, Hebei and Sichuan provinces. Therefore, some sodium formate and formic acid producers are expected to face more difficult challenges and government's orders to rectify environmental irregularities.

4. Environmental protection tax levied on emission equivalent quantity and value: The *Environmental Protection Tax Law* was brought into effect on 1 Jan., 2018, which replaced the previous pollutant charge fee system, levying tax on air pollutants, water pollutants, solid waste and noise according to their equivalent quantity and value. The collection of the Environmental Protection Tax will help force outmoded capacities to exit the market. For sodium formate and formic acid industries, the Environmental Protection Tax is to increase production costs and may force some producers to stop production. However, it will facilitate the industrial concentration, and transformation as well as improvement of the industries in the long term.

5. Strengthening the safety production of hazardous chemicals: The plans issued by Chinese authorities in 2022 and 2023 point out that the supervision on enterprises having obtained Safety Production License will be enhanced; the major hazards will be located in a rigorous manner; the control measures for key dangerous production processes used in chemical production will be put in place; identification and control of risks in chemical enterprises using hazardous chemicals in their production will be carried out. It is also mentioned that the industry transfer will be stepped up; preventative measures for safety risks of old and outdated production plants will be put in place and the risks will be under control; the thorough improvement of chemical parks' quality and intensive upgrading of chemical parks will be conducted; targeted rectification will be carried out in light of enterprises' classifications; the special rectification campaign against illegal and non-conforming private chemical workshops will be launched; a development layout that is safe in nature and features high industry entry threshold, standardised industrial setup, and advanced technologies will be established. Therefore, hazardous chemicals like formic acid, will be more stringently regulated in the future, which is expected to have an impact on formic acid producers' production and management.

2 Sodium formate industry in China, 2022

2.1 Producer

The commercial production of sodium formate in China first started in the late 1950s, adopting synthesis method which pressurized carbon monoxide and sodium hydroxide into sodium formate. Among 23 producers in the table below, 26.09% of them produce sodium formate through synthesis, while the rest produce sodium formate as a by-product.

Two out of 21 currently active sodium formate producers also produce formic acid.

Table 2.1-1 List of sodium formate producers in China, as of March 2023

No.	Producer	Abbreviation	Location	Status, as of March 2023	Capacity 2022, t/a	Production method	Produce formic acid?	Type of sodium formate producer	Percentage of sodium formate for selling to market
1	Luxi Chemical Group Co., Ltd.	Luxi Chemical	Shandong Province	Active	100,000	Reaction of carbon monoxide and sodium hydroxide	Yes	B	/
2	Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company	Jiuyuan Sea Level	Inner Mongolia Autonomous Region	Active	100,000	Reaction of carbon monoxide and sodium hydroxide	No	B	/
3	Qianjiang Fuyang Chemical Co., Ltd.	Qianjiang Fuyang	Hubei Province	Active	90,000	Reaction of carbon monoxide and sodium hydroxide	No	B	/
4	Jiangsu Baichuan High-Tech New Materials Co., Ltd.	Jiangsu Baichuan	Jiangsu Province; Ningxia Hui Autonomous Region	Active	59,000	By-product of TMP	No	B	/
5	Hubei Yihua Chemical Industry Co., Ltd.	Hubei Yihua	Inner Mongolia Autonomous Region	Active	46,000	By-product of pentaerythritol	No	B	/
6	Shandong Fufeng Perstorp Chemical Co., Ltd.	Fufeng Perstorp	Shandong Province	Active	44,000	By-product of NPG and TMP	No	C	33%
7	Anhui Shenjian New Materials Co., Ltd.	Anhui Shenjian	Anhui Province	Active	32,000	By-product of NPG	No	B	/
8	Chongqing Chuandong Chemical (Group) Co., Ltd.	Chongqing Chuandong	Guangxi Zhuang Autonomous Region	Active	30,000	Reaction of carbon monoxide and sodium hydroxide	Yes	A	/
9	Chifeng Ruiyang Chemical Co., Ltd.	Chifeng Ruiyang	Inner Mongolia Autonomous Region	Active	30,000	By-product of pentaerythritol	No	B	/
10	Shandong Jiu'an Chemical Industry Co., Ltd.	Shandong Jiu'an	Shandong Province	Active	21,300	By-product of NPG	No	A	/
11	Guizhou Kaiyang Qingli Tianmeng Chemical Co., Ltd.	Qingli Tianmeng	Guizhou Province	Active	20,000	Reaction of carbon monoxide and sodium hydroxide	No	B	/
12	Binzhou Xinke Aode Technology Co., Ltd.	Xinke Aode	Shandong Province	Active	20,000	By-product of NPG	No	C	75%
13	Shandong XZY Chemical Co.,	Shandong XZY	Shandong Province	Active	18,000	By-product of	No	B	/

	Ltd.					pentaerythritol			
14	Zhanhua Yukai New Material Technology Co., Ltd.	Zhanhua Yukai	Shandong Province	Active	15,000	By-product of NPG	No	A	/
15	Dongying Shuntong Chemical (Group) Co., Ltd.	Dongying Shuntong	Shandong Province	Active	15,000	Reaction of carbon monoxide and sodium hydroxide	No	C	8%
16	Ningxia Ningshun New Material Technology Co., Ltd.	Ningxia Ningshun	Ningxia Hui Autonomous Region	Active	14,300	By-product of pentaerythritol	No	B	/
17	Puyang Pengxin Chemical Co., Ltd.	Puyang Pengxin	Henan Province	Active	13,000	By-product of pentaerythritol	No	B	/
18	Anhui Jinhe Industrial Co., Ltd.	Anhui Jinhe	Anhui Province	Active	13,000	By-product of pentaerythritol	No	C	90%
19	Yunnan Yuntianhua Co., Ltd.	Yunnan Yuntianhua	Yunnan Province	Active	7,100	By-product of pentaerythritol	No	B	/
20	Puyang Yong'an Chemical Co., Ltd.	Puyang Yong'an	Henan Province	Active	5,000	By-product of pentaerythritol	No	B	/
21	Shijiazhuang Shuangyan Chemical Co., Ltd.	Shijiazhuang Shuangyan	Hebei Province	Active	6,200	By-product of pentaerythritol	No	B	/
22	Bazhou Shengfang United Chemical Co., Ltd.	Bazhou Shengfang	Hebei Province	Idle	9,000	By-product of pentaerythritol	No	B	/
23	Xinhua Pharmaceutical (Shouguang) Co., Ltd.	Xinhua Pharmaceutical	Shandong Province	Idle	7,800	By-product of NPG	No	B	/
Total					715,700				

Note:

1. NPG=Neopentyl glycol

2. TMP=Trimethylolpropane

3.

Type A: 100% of the sodium formate for captive production to produce formic acid;

Type B: 100% of the sodium formate supplies to the market;

Type C: part for captive production and another part selling to the market.

Source: CCM

2.2 Production

In 2022, the output of sodium formate produced in China was 467,400 tonnes, and production capacity for sodium formate in China totalled 715,700 t/a. Shandong Province was the largest production base of sodium formate in China, with seven active producers and 241,100 t/a of capacity built within.

In 2022, Luxi Chemical Co., Ltd. (Luxi Chemical), based in Shandong Province, and Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company (Jiuyuan Sea Level), based in Inner Mongolia Autonomous Region, are the largest producers of sodium formate in China, which each deliver 100,000 t/a of capacity; while Qianjiang Fuyang Chemical Group Co., Ltd. (Fuyang Chemical) comes in third with capacity of 90,000 t/a.

Ningxia Baichuan Technology Co., Ltd. (Ningxia Baichuan), a subsidiary of Jiangsu Baichuan High-Tech New Materials Co., Ltd. (Jiangsu Baichuan), completed the construction of "first-phase 50,000 t/a trimethylolpropane and 2,000 t/a cyclic trimethylolpropane formal project" in 2022. The project includes 35,000 t/a of capacity for sodium formate as by-product. The project was put into trial operation in Jan. 2022 and passed the post-completion environmental protection acceptance inspection in Nov. 2022.

Anhui Shenjian New Materials Co., Ltd. (Anhui Shenjian)'s 40,000 t/a neopentyl glycol project, which includes 32,000 t/a of production capacity for sodium formate, passed the post-completion environmental protection acceptance inspection in 2021.

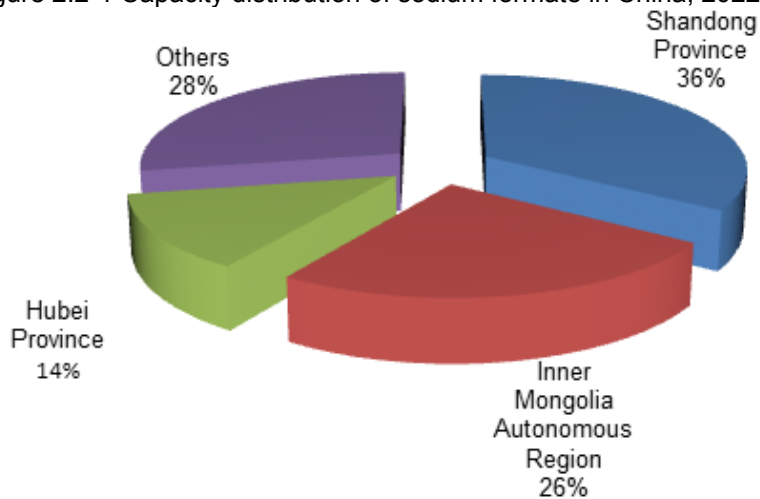
Table 2.2-1 Capacity and output of sodium formate in China, 2022

No.	Producer	Capacity, t/a		Output, tonne	
		2022	2021	2022	2021
1	Luxi Chemical Group Co., Ltd.	100,000	100,000	100,000	109,000
2	Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company	100,000	100,000	45,000	40,000
3	Qianjiang Fuyang Chemical Co., Ltd.	90,000	90,000	10,000	20,000
4	Jiangsu Baichuan High-Tech New Materials Co., Ltd.	59,000	24,000	47,000	24,000
5	Hubei Yihua Chemical Industry Co., Ltd.	46,000	46,000	40,000	38,000
6	Shandong Fufeng Perstorp Chemical Co., Ltd.	44,000	44,000	37,000	36,000
7	Anhui Shenjian New Materials Co., Ltd.	32,000	32,000	20,000	20,000
8	Chongqing Chuandong Chemical (Group) Co., Ltd.	30,000	30,000	20,000	20,000
9	Chifeng Ruiyang Chemical Co., Ltd.	30,000	30,000	30,000	30,000
10	Shandong Jiu'an Chemical Industry Co., Ltd.	21,300	21,300	17,500	15,000
11	Guizhou Kaiyang Qingli Tianmeng Chemical Co., Ltd.	20,000	20,000	16,000	16,000
12	Binzhou Xinke Aode Technology Co., Ltd.	20,000	20,000	18,000	18,000
13	Shandong XZY Chemical Co., Ltd.	18,000	18,000	6,600	2,500
14	Zhanhua Yukai New Material Technology Co., Ltd.	15,000	15,000	8,000	10,500
15	Dongying Shuntong Chemical (Group) Co., Ltd.	15,000	15,000	6,000	6,000

16	Ningxia Ningshun New Material Technology Co., Ltd.	14,300	14,300	5,000	1,500
17	Puyang Pengxin Chemical Co., Ltd.	13,000	13,000	12,300	12,100
18	Anhui Jinhe Industrial Co., Ltd.	13,000	13,000	12,300	12,400
19	Yunnan Yuntianhua Co., Ltd.	7,100	7,100	9,200	9,300
20	Puyang Yong'an Chemical Co., Ltd.	5,000	5,000	3,500	3,700
21	Shijiazhuang Shuangyan Chemical Co., Ltd.	6,200	6,200	4,000	4,200
22	Bazhou Shengfang United Chemical Co., Ltd.	9,000	9,000	0	1,400
23	Xinhua Pharmaceutical (Shouguang) Co., Ltd.	7,800	7,800	0	0
Total		715,700	680,700	467,400	449,600

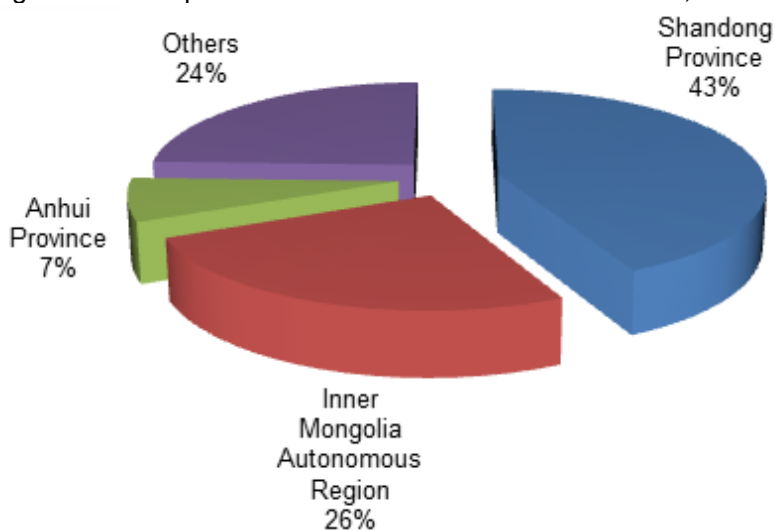
Source: CCM

Figure 2.2-1 Capacity distribution of sodium formate in China, 2022



Source: CCM

Figure 2.2-2 Output distribution of sodium formate in China, 2022



Source: CCM

2.3 Price

The ex-works price of sodium formate averaged USD446/t in 2022, decreasing by 8% from USD489/t in 2021.

In 2022, the price of sodium formate was fluctuating, mainly due to supply-side adjustments and impact from the COVID-19 pandemic.

In the first quarter, prices were falling

During early Jan.–early Feb., main sodium formate manufacturers were not under maintenance, the inventory was relatively sufficient, and most downstream purchases were prompted by rigid demand; consequently, the price of sodium formate declined. In Feb., sodium formate manufacturers delivered decreased output, due to low production workload during the Spring Festival holiday.

In the second quarter, prices started with a rise and then showed downward trajectory

From the end of March to the beginning of April, several major producers in Shandong Province were carrying out overhaul, which led to a decrease in market supply and therefore bolstered price of sodium formate in April. However, from May to July, due to the adverse effects from the pandemic, the operation rates of manufacturers decreased and downstream demand weakened; resultantly, the price of sodium formate started falling in May.

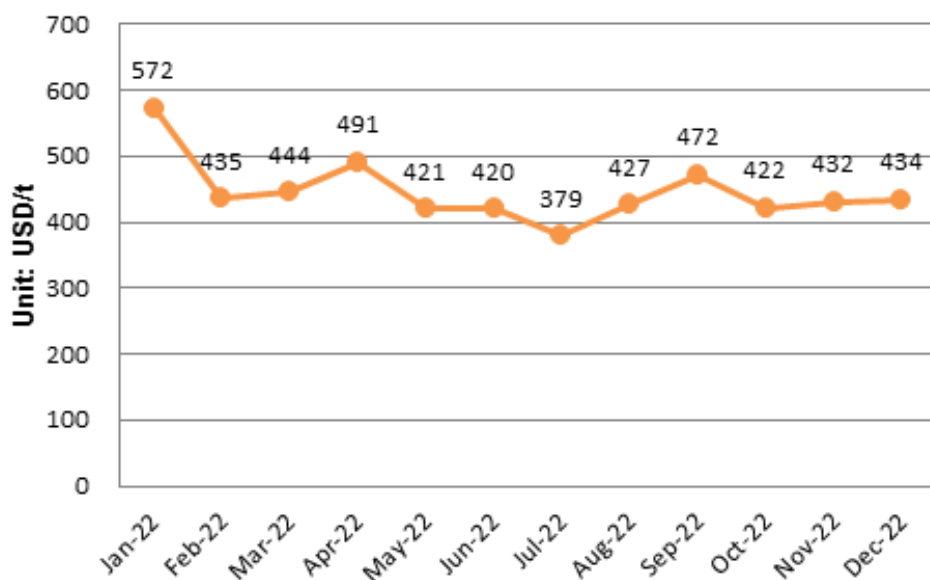
In the third quarter, prices rose steadily

With the gradual reduction of negative impact from the pandemic, sodium formate manufacturers were generally optimistic about the future market, downstream customers were strongly willing to purchase, which resulted in sharp rises of prices in Aug. and Sept. However, sodium formate prices declined in Oct., as the market returned to rationality.

In the fourth quarter, prices climbed slightly

Having returned to the point near production costs, the price of sodium formate leveled off in Q4 2022. However, producers see improved prospects for the sodium formate market, as pandemic-control measures were removed.

Figure 2.3-1 Monthly ex-works price of sodium formate in China, 2022



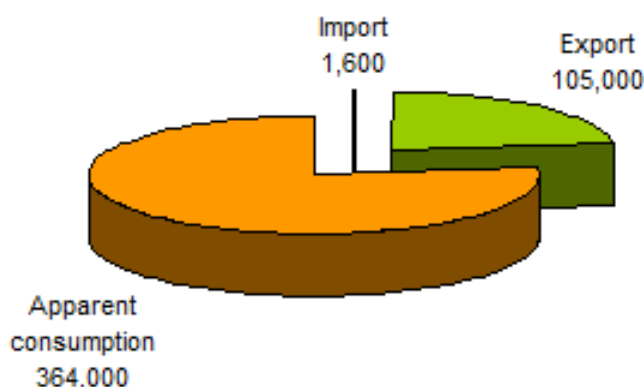
Source: CCM

2.4 Consumption

The apparent consumption of sodium formate in China was about 364,000 tonnes in 2022.

Sodium formate is widely used in mining, dyeing, chemical, logistic, oil drilling and papermaking industries in China. Most of the sodium formate in China was consumed as raw material in formic acid, oxalic acid and sodium hydrosulfite production.

Figure 2.4-1 Apparent consumption of sodium formate in China, 2022, tonne



Source: CCM

Table 2.4-1 Application fields of sodium formate in China

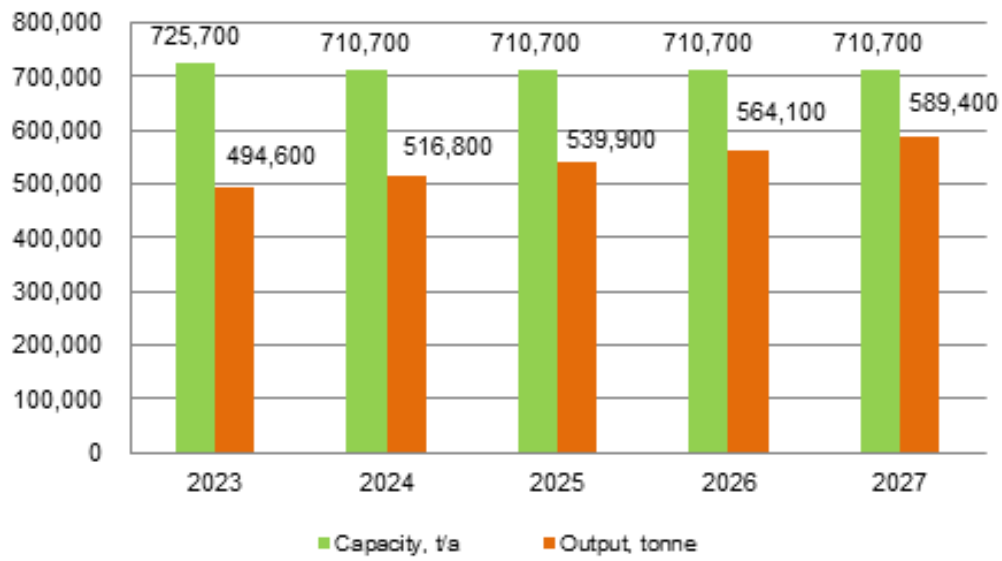
Downstream industry	Application
Mining	Used as metal precipitator
Dyeing	Used as bleacher, reducing agent, dye leveller, matting agent, light stabilizer, solvent
Chemical	Used as raw material in formic acid, oxalic acid, and sodium hydrosulfite production Used as runway de-icing agent Extractant Raw materials of some pesticides and pharmaceuticals Additive for adhesive Plasticizer
Logistic	Used as phase-change material in cold chain
Oil drilling	Used as stabilizing acid, component of heat transfer oil
Papermaking	Used as bleacher
Industrial	Used as additive for concrete
Food	Used as preservative

Source: CCM

2.5 Forecast, 2023–2027

In 2022, the status of two sodium formate-involved projects, which have not been put into operation, was updated. Anhui Guanhua New Material Technology Co., Ltd. (Anhui Guanhua)'s 10,000 t/a sodium formate project (Phase I) has been accepted and is expected to be put into production in 2023. In 2022, Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company's "co-production project of 15,000 t/a calcium formate and 85,000 t/a sodium formate" completed the environmental impact approval procedures and is expected to be put into operation in 2024.

Figure 2.5-1 Forecast on China's sodium formate capacity and output, 2023–2027



Source: CCM

3 Formic acid industry in China, 2022

3.1 Producer

The commercial production of formic acid in China first started in 1989, adopting the acidification of sodium formate method. Currently, there are three main formic acid production methods in China, namely hydrogenation of carbon monoxide, hydrolyzation of methyl formate and acidification of sodium formate.

As of April 2023, there were 10 active formic acid producers in China. In 2018, Shandong Acid Technology Co., Ltd. (Shandong Acid)'s 200,000 t/a formic acid production line was put into operation. In 2018–2020, some producers began to stop their formic acid production lines, such as Binzhou Xinke Aode Technology Co., Ltd., Guangrao Juze Chemical Co., Ltd. and Zibo Ruibao Chemical Co., Ltd., primarily because Luxi Chemical Group Co., Ltd.'s formic acid capacity increased to 400,000 t/a as its new production line with 200,000 t/a capacity was built in 2019.

Table 3.1-1 List of formic acid producers in China, as of April 2023

No.	Company	Abbreviation	Location	Status, as of April 2023	Capacity 2022, t/a	Production method
1	Luxi Chemical Group Co., Ltd.	Luxi Chemical	Shandong Province	Active	400,000	Hydrolyzation of methyl formate, hydrogenation of carbon monoxide
2	Shandong Acid Technology Co., Ltd.	Shandong Acid	Shandong Province	Active	200,000	Hydrolyzation of methyl formate, hydrogenation of carbon monoxide
3	Chongqing Chuandong Chemical (Group) Co., Ltd.	Chongqing Chuandong	Chongqing Municipality, Guizhou Province, Guangxi Zhuang Autonomous Region	Active	60,000	Acidification of sodium formate
4	BASF-YPC Co., Ltd.	BASF-YPC	Jiangsu Province	Active	50,000	Hydrolyzation of methyl formate
5	Hebei Pengfa Chemical Co., Ltd.	Hebei Pengfa	Hebei Province	Active	15,000	Purchase formic acid to produce formic acid with different concentrations
6	Hengyang Yishun Chemical Industry Co., Ltd.	Hengyang Yishun	Hunan Province	Active	10,000	Acidification of sodium formate
7	Shijiazhuang Taihe Chemical Co., Ltd.	Shijiazhuang Taihe	Hebei Province	Active	4,000	Acidification of sodium formate
8	Liaoning Fuyuan Chemical Co., Ltd.	Liaoning Fuyuan	Liaoning Province	Active	3,000	Acidification of sodium formate
9	Zouping Fenlian Biotech Co., Ltd.	Zouping Fenlian	Shandong Province	Active	3,000	Acidification of sodium formate
10	Jinzhou Welfare Chemical Co., Ltd.	Jinzhou Welfare	Hebei Province	Active	1,200	Acidification of sodium formate
Total					746,200	/

Source: CCM

3.2 Production

China's output of formic acid decreased from 510,000 tonnes in 2021 to 472,00 tonnes in 2022. The output drop was because the largest formic acid producer in China—Luxi Chemical Group Co., Ltd. (Luxi Chemical) only produced 280,000 tonnes of formic acid in 2022 as it temporarily suspended production to overhaul equipment, a figure down more than 20% compared to the previous year.

Shandong Province was the largest production base of formic acid in China with three active producers totalling a capacity of 603,000 t/a. In 2018, Shandong Acid Technology Co., Ltd. (Shandong Acid)'s 200,000

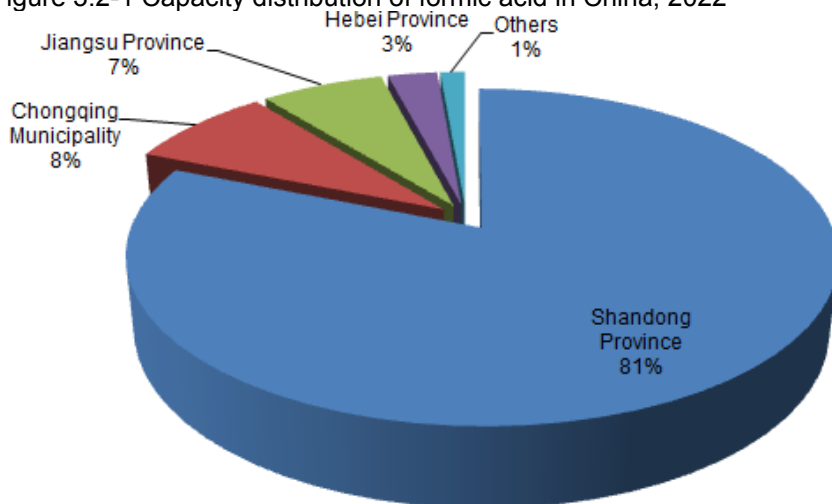
t/a capacity was put into production.

Table 3.2-1 Capacity and output of formic acid in China, 2021–2022

Producer	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Luxi Chemical Group Co., Ltd.	400,000	400,000	280,000	361,300
Shandong Acid Technology Co., Ltd.	200,000	200,000	100,000	80,000
Chongqing Chuandong Chemical (Group) Co., Ltd.	60,000	60,000	30,000	15,000
BASF-YPC Co., Ltd.	50,000	50,000	41,000	40,000
Hebei Pengfa Chemical Co., Ltd.	15,000	15,000	13,000	5,000
Hengyang Yishun Chemical Industry Co., Ltd.	10,000	10,000	3,500	3,500
Shijiazhuang Taihe Chemical Co., Ltd.	4,000	4,000	2,000	2,000
Liaoning Fuyuan Chemical Co., Ltd.	3,000	3,000	1,200	1,200
Zouping Fenlian Biotech Co., Ltd.	3,000	3,000	1,200	1,200
Jinzhou Welfare Chemical Co., Ltd.	1,200	1,200	800	800
Total	746,200	746,200	472,700	510,000

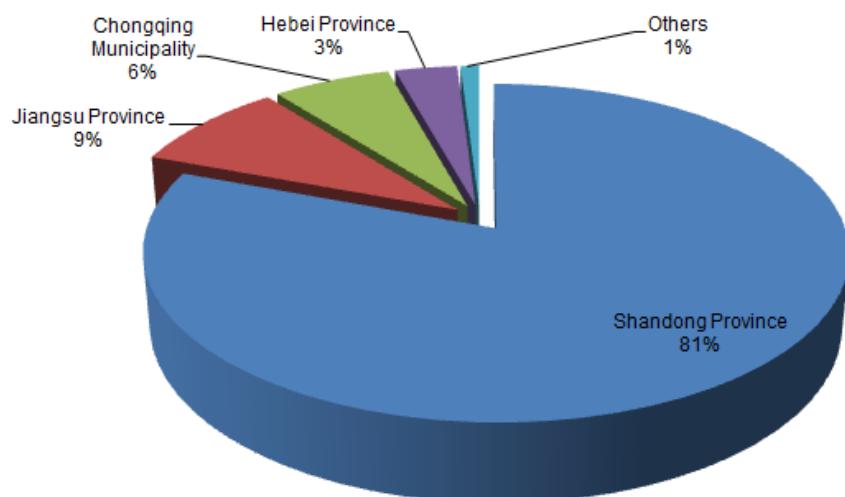
Source: CCM

Figure 3.2-1 Capacity distribution of formic acid in China, 2022



Source: CCM

Figure 3.2-2 Output distribution of formic acid in China, 2022



Source: CCM

3.3 Price

The annual average ex-works price of formic acid was USD706/t in 2022, increasing by 17.56% from USD600/t in 2021. The surge in formic acid price was mainly due to the increase in raw material costs. The price fluctuations in 2022 can mainly divide into three phases.

Increased significantly

In Jan., the average price of formic acid rose to USD703/t as formic acid was in tight supply in mid-Jan. and the production costs increased in late-Jan. In Feb., the formic acid price continued to go up due to the high raw materials prices and growing downstream demand. In March, the high production costs, reduced supply as a major producer temporarily suspended production to overhaul equipment and increased purchase from downstream sectors further propped up the formic acid price. As the market conditions carried into the next month and there were increased export orders, the average price of formic acid in April surged 113% from Jan, hitting the peak of USD1,496/t.

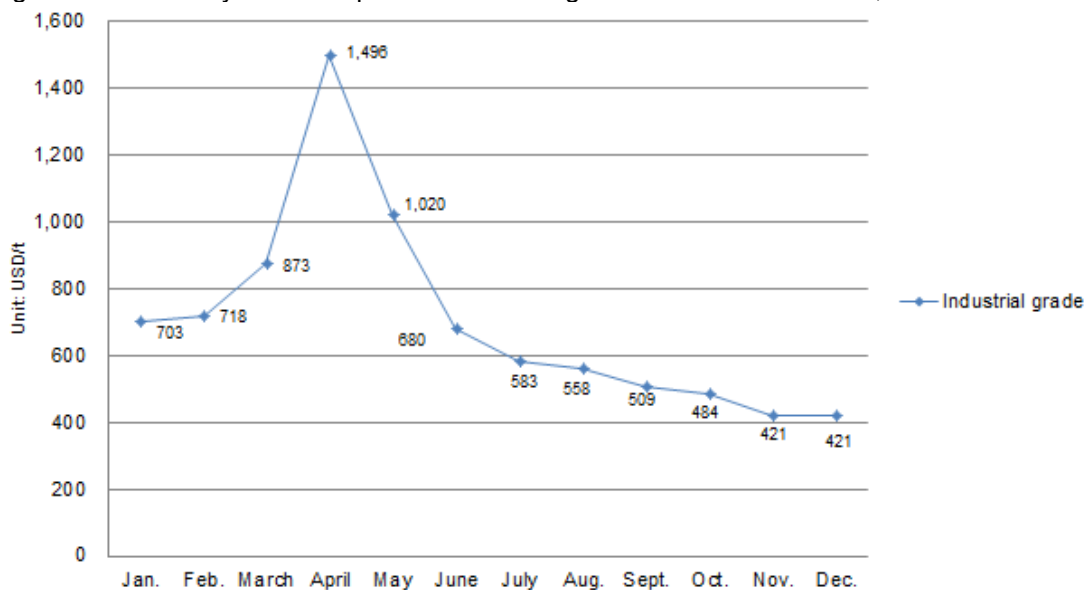
Fell sharply

In May–Aug., reduced costs, weak domestic demand and sufficient supply as major producers resumed production caused a significant drop in the formic acid price. In Sept.–Oct., producers were under normal production and they sought to boost sales due to the build-up in inventories and insipid demand, resulting in a further decline in prices.

Gradually stabilized

Producers halted production at the end of the year for equipment maintenance, leading to a reduction in supply. After several months of sharp ups and downs, the price of formic acid gradually stabilized with the decrease in supply.

Figure 3.3-1 Monthly ex-works price of industrial grade formic acid in China, 2022



Source: CCM

3.4 Import and export analysis

-Exports

The export volume of formic acid from China increased from 191,648 tonnes in 2020 to 224,529 tonnes in 2022, and the annual average export price increased from USD334/t in 2020 to USD800/t in 2022.

In H1 2022, the export price of formic acid had been on the rise, primarily due to the increased demand from downstream sectors and the reduced supply as producers temporarily suspended production for equipment maintenance. But as the supply gradually returned to the normal level, the export price had been falling in H2 after the peak of USD1,078/t it reached in June.

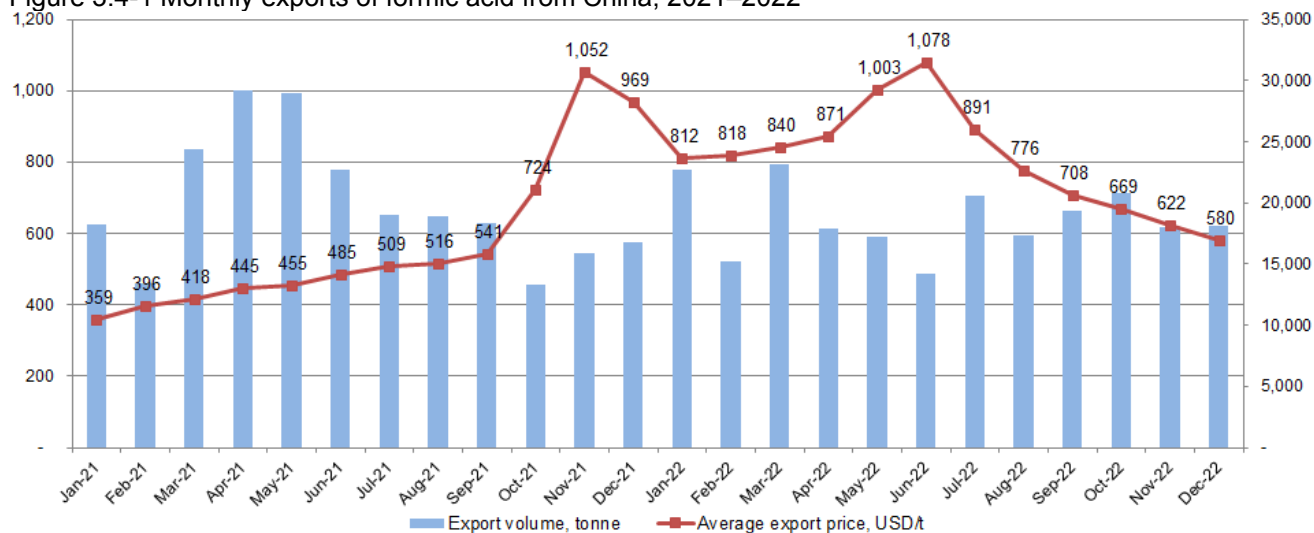
In terms of export destinations, China exported formic acid to 85 countries and regions in 2022. Turkiye, India, Vietnam, the Netherlands and Brazil were the top five destinations of China's formic acid exports by volume.

Table 3.4-1 Annual exports of formic acid from China, 2018–2022

Year	Export volume, tonne	Average export price, USD/t
2018	176,876	791
2019	210,169	427
2020	191,648	334
2021	239,117	549
2022	224,529	800

Source: China Customs, CCM

Figure 3.4-1 Monthly exports of formic acid from China, 2021–2022



Source: China Customs, CCM

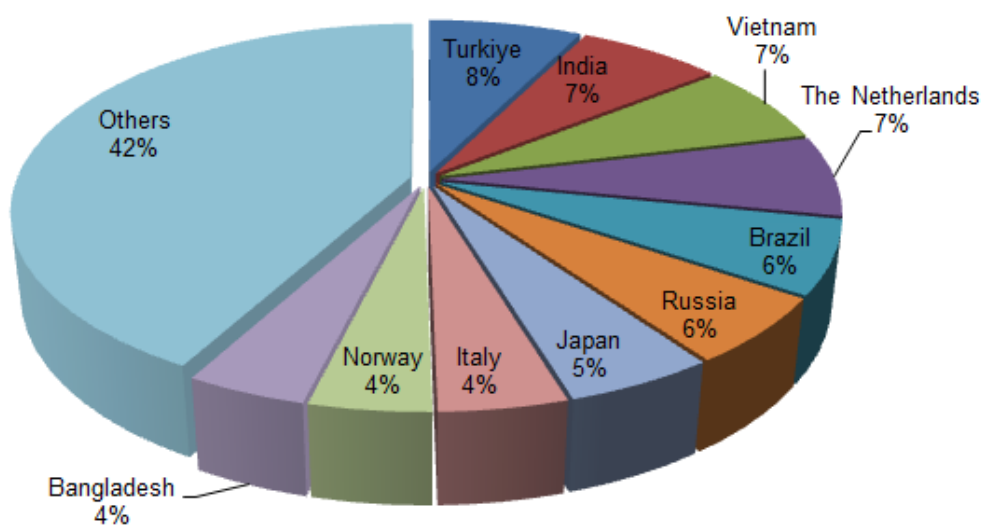
Table 3.4-2 Top 20 export destinations of China's formic acid, 2022

No.	Region	Export volume, tonne	Export value, USD	Price, USD/t
1	Turkiye	16,649	12,549,609	754
2	India	15,576	12,812,205	823
3	Vietnam	15,486	13,100,078	846
4	The Netherlands	15,467	9,596,216	620
5	Brazil	14,176	12,361,414	872
6	Russia	12,874	9,992,173	776
7	Japan	11,522	10,733,666	932
8	Italy	9,855	6,947,010	705
9	Norway	9,356	6,002,463	642
10	Bangladesh	9,275	7,691,651	829
11	Thailand	7,568	6,946,276	918
12	South Korea	7,446	6,201,732	833
13	Pakistan	6,408	4,681,768	731
14	Belgium	6,074	4,270,508	703
15	Spanish	6,040	4,066,404	673
16	Malaysia	5,885	4,927,493	837
17	Argentina	5,309	4,570,410	861

18	Taiwan, China	4,054	3,742,627	923
19	Saudi Arabia	3,902	3,108,944	797
20	Indonesia	3,773	3,513,865	931
	Others	37,834	31,794,443	840
	Total	224,529	179,610,955	800

Source: China Customs, CCM

Figure 3.4-2 Distribution of exports of formic acid from China by destination, 2022



Source: China Customs, CCM

-Imports

China imports a small amount of formic acid every year, with the volume of 17 tonnes in 2021 and 63 tonnes in 2022, and the key import origin was France in 2022.

Table 3.4-3 Origins of China's imported formic acid, 2022

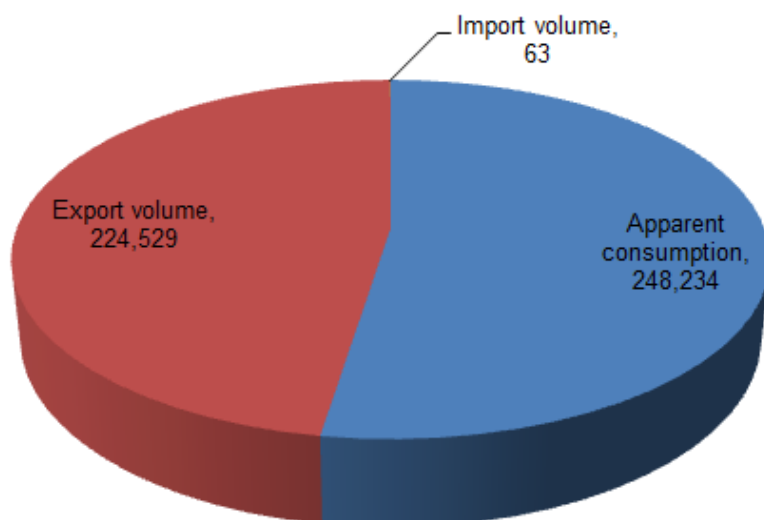
No.	Origin	Import volume, tonne	Import value, USD	Price, USD/t
1	France	34	92,034	2,726
2	Finland	19	222,505	11,960
3	Germany	4	113,120	26,325
4	Japan	2	36,382	15,319
5	The US	2	395,849	229,212
	Others	2	358,892	200,723
	Total	63	1,218,782	19,485

Source: China Customs, CCM

3.5 Consumption

China's apparent consumption of formic acid in 2022 was 248,233 tonnes. In China, formic acid is widely used in chemical, pharmaceutical, pesticide, tanning and rubber industries, etc.

Figure 3.5-1 Apparent consumption of formic acid in China, 2022, tonne



Source: CCM

Table 3.5-1 Application fields of formic acid in China

Downstream industry	Application
Chemical	Used as a raw material in the production of formate, polyols and DMF, etc.
Pharmaceutical	Used as an intermediate in acridine, formamide and formiate production
Pesticide	Used as a raw material in the production of tricyclazole, tradimefon, dicofol and triazophos, etc.
Rubber	Used as a coagulant
Tanning	Used as a tanning agent
Others	- Used as a preservative and antibacterial agent in feed - Used as a bleacher in printing and dyeing - Used as a stainless steel cleaner - Used as a metal reducing agent

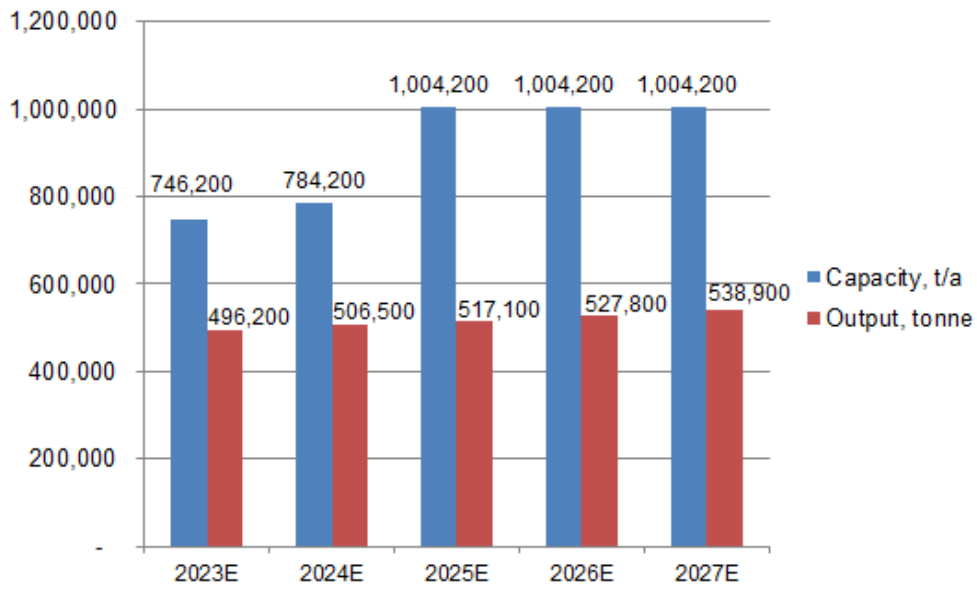
Source: CCM

3.6 Forecast, 2023–2027

China's formic acid capacity is expected to see significant growth in 2024–2025. Ningjin Taida Chemical Technology Co., Ltd. (Ningjin Taida)'s project with a 20,000 t/a formic acid capacity may enter the production phase in 2024; According to Luxi Chemical Group Co., Ltd. (Luxi Chemical)'s 2021 annual report, Luxi Chemical proposed a new 200,000 t/a formic acid expansion project, which underwent the environmental impact report publication process in Oct. 2022 and is expected to be put into production in 2025; Wuhan Liande Chemicals Co., Ltd. (Wuhan Liande) plans to bring on a 20,000 t/a formic acid capacity in 2025. Therefore, China's formic acid capacity may surge to 1,004,200 t/a by the end of 2025.

Given the current domestic and overseas supply and demand, the formic acid market has the potential to grow. There is rising demand for formic acid used as a new food additive, and as formic acid is a basic organic chemical raw material, demand from downstream sectors may continue to increase with the recovery of the domestic economy.

Figure 3.6-1 Forecast on China's formic acid capacity and output, 2023–2027



Source: CCM

4 Profiles of major sodium formate and formic acid producers in China

4.1 Luxi Chemical Group Co., Ltd.

Address: Chemical New Material Industrial Park, High-tech Industrial Development Zone, Liaocheng City, Shandong Province 252211, P. R. China

Tel: +86-400-700-0830

Website: <http://www.luxichemical.com/>

Luxi Chemical Group Co., Ltd. (Luxi Chemical), a large-scale state-owned enterprise, was established in 1979. Luxi Chemical specializes in the production of nitrogenous fertilizers, phosphorus-based compound fertilizers, fine chemicals, etc.

As of Dec. 2021, Luxi Chemical has 13 subsidiaries and 12,414 members of staff, which include 2,769 technicians. It went public on the Shenzhen Stock Exchange in 1998 (stock code: 000830).

Major products of Luxi Chemical include caprolactam (400,000 t/a), polyol (750,000 t/a), chloromethane (220,000 t/a), formic acid (400,000 t/a), sodium formate (100,000 t/a) and Nylon 6 (400,000 t/a), etc. The company produces formic acid through hydrolysis of methyl formate. With carbon monoxide, methanol, and liquid nitrogen as major raw materials, carbonyl synthesis is carried out to produce methyl formate. Methyl formate then undergoes hydrolysis in the production process of formic acid.

Luxi Chemical's previous 200,000 t/a formic acid expansion project, which was proposed in 2017, has been completed and put into operation since 2019. According to its annual report for 2021 results, Luxi Chemical proposed a new 200,000 t/a formic acid expansion project, of which construction may be completed in 2025.

Table 4.1-1 Capacity and output of sodium formate and formic acid in Luxi Chemical, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	100,000	100,000	100,000	109,000
Formic acid	400,000	400,000	280,000	361,300

Source: CCM

4.2 Shandong Acid Technology Co., Ltd.

Address: Shiheng Town, Feicheng City, Tai'an City, Shandong Province 271612, P. R. China

Tel: +86-538-3696088; +86-538-3696588

E-mail: bangs@sdacid.com, huarx@sdacid.com

Website: <http://www.sdacid.com/>

Shandong Acid Technology Co., Ltd. (Shandong Acid), established in July 2016 with a registered capital of RMB1 billion, is a joint venture between Shiheng Special Steel Group Co., Ltd. (Shiheng Special Steel) and Feicheng City Construction Investment Co., Ltd.

Shandong Acid utilizes gas from the steel production line as raw material to produce 200,000 t/a formic acid, 300,000 t/a methyl formate, 50,000 t/a oxalic acid, 30,000 t/a calcium formate, and 10,000 t/a potassium formate. The 200,000 t/a formic acid production line was put into operation in 2018. As for production process of this line, converter gas, sourced from Shiheng Special Steel, is purified as well as separated, for the purpose of acquiring high-concentration carbon monoxide, a gas used as a raw material in formic acid production; formic acid is then produced through hydrolysis of methyl formate.

Table 4.2-1 Capacity and output of formic acid in Shandong Acid, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	200,000	200,000	100,000	80,000

Source: CCM

4.3 Chongqing Chuandong Chemical (Group) Co., Ltd.

Address: No. 70 Danzishi New Street, Nan'an District, Chongqing Municipality 400061, P. R. China

Tel: +86-23-62513268; +86-23-62513108

Fax: +86-23-62513105

E-mail: cxh@cd1958.com

Website: <https://www.cd1958.com/>

Founded in 1979, Chongqing Chuandong Chemical (Group) Co., Ltd. (Chongqing Chuandong) has 13 subsidiaries and 4 production bases in Chongqing Municipality, Guizhou Province and Guangxi Zhuang Autonomous Region.

With over 2,000 employees and 600 engineering technicians, it is engaged in the production and sale over 1,000 products.

The company's main products include:

- Yellow phosphorus and phosphorus chemicals (phosphorus oxychloride, phosphorus trichloride, phosphoric acid)
- Phosphate (disodium hydrogen phosphate, trisodium phosphate, sodium tripolyphosphate, sodium hexametaphosphate, sodium pyrophosphate, sodium dihydrogen phosphate)
- Formic acids and formates (sodium formate, calcium formate, potassium formate, magnesium formate)

Three production bases are involved in formic acid and sodium formate production.

- Chongqing Wansheng Chuandong Chemical Co., Ltd.: 20,000 t/a formic acid;
- Guizhou Fuquan Chuandong Chemical Co., Ltd.: 20,000 t/a formic acid;
- Guangxi Liucheng Chuandong Phosphorus Chemical Co., Ltd.: 20,000 t/a formic acid and 30,000 t/a sodium formate.

The company's production process for two products:

- Formic acid:
 - First route: The reaction between sodium formate and phosphoric acid takes place. In this way, formic acid and sodium dihydrogen phosphate are produced.
 - Second route (co-production of formic acid and phosphates): Sodium formate is first acidified by super phosphoric acid. The resulting material from the first step is then added into distilling still and undergoes distillation, eventually becoming formic acid. The by-products yielded from the distillation step is made into solution for further production of phosphates.
- Sodium formate: The reaction between carbon monoxide and sodium hydroxide takes place. In this way, sodium formate is produced.

Table 4.3-1 Capacity and output of sodium formate and formic acid in Chongqing Chuandong, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	30,000	30,000	20,000	20,000
Formic acid	60,000	60,000	30,000	15,000

Source: CCM

4.4 BASF-YPC Co., Ltd.

Address: No. 8 Xinghua East Road, Luhe District, Nanjing City, Jiangsu Province 210048, P. R. China
Tel: +86-25-58569966; +86-25-57770888
Fax: +86-25-58569811
Website: <https://www.basf-ypc.com.cn/>

BASF-YPC Co., Ltd. (BASF-YPC), a 50:50 joint venture between BASF SE and China Petrochemical Corporation (Sinopec), is regarded as an exemplary Sino-German cooperation. Located close to the Yangtze River in Luhe District of Nanjing City, the company abuts the Nanjing Chemical Industry Park.

Currently, BASF-YPC has 69,000 t/a of production capacity for propionic acid, 30,000 t/a for propionaldehyde, 75,000 t/a for ethanolamine, 35,000 t/a for vinylamine, 150,000 t/a for refined ethylene oxide, etc. It is one of the earliest formic acid producers in China, adopting hydrolysis of methyl formate.

Table 4.4-1 Capacity and output of formic acid in BASF-YPC, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	50,000	50,000	41,000	40,000

Source: CCM

4.5 Hebei Pengfa Chemical Co., Ltd.

Address: Lingang Economic & Technological Development Zone, Cangzhou City, Hebei Province 061104, P.R. China
Tel: +86-317-5811078; +86-317-5811698
Email: admin@hhpfchem.com
Website: <http://www.pfhgc.com/>

Hebei Pengfa Chemical Co., Ltd. (Hebei Pengfa) was established on Oct. 27, 2016, with a registered capital of RMB80 million. Major products of Hebei Pengfa include formic acid (15,000 t/a), acetic acid (15,000 t/a), calcium formate (10,000 t/a), sodium acetate (13,000 t/a) and potassium formate (1,000 t/a), etc. It mainly uses recovered formic acid (85%) to produce other specifications (94%) of formic acid.

The company has also established cooperation relationships with enterprises in the fields of pharmaceuticals, chemicals, sewage treatment, agriculture, animal husbandry, etc.

Table 4.5-1 Capacity and output of formic acid in Hebei Pengfa, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	15,000	15,000	13,000	5,000

Source: CCM

4.6 Shijiazhuang Taihe Chemical Co., Ltd.

Address: Douyu Industrial Zone, Shijiazhuang City, Hebei Province 051430, P. R. China
Tel: +86-311-87047555; +86-311-87046555; +86-13832172995
Fax: +86-311-87047666
Email: carol.liu@taihechemical.com
Website: <http://www.taihechemical.com/>

Shijiazhuang Taihe Chemical Co., Ltd. (Shijiazhuang Taihe) was established in 2003 with a registered capital of RMB3.5 million. Shijiazhuang Taihe mainly produces formic acid (4,000 t/a) and anhydrous sodium sulfate.

With regard to the company's production process, after reaction between sodium formate and sulfuric acid

takes place, formic acid is produced and sodium sulfate is produced as a by-product. The solid-liquid separation of formic acid and sodium sulfate through suction filtration machine is then carried out. At the end, rectification tank is used to improve purity of formic acid.

Table 4.6-1 Capacity and output of formic acid in Shijiazhuang Taihe, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	4,000	4,000	2,000	2,000

Source: CCM

4.7 Hengyang Yishun Chemical Co., Ltd.

Address: No. 16 Jinyuan Road, Songmu Economic Development Zone, Shigu District, Hengyang City, Hunan Province 421005, P. R. China
Tel: +86-734-8297668; +86-734-8997608

Hengyang Yishun Chemical Co., Ltd. (Hengyang Yishun) was established in 2014 with a registered capital of RMB15 million. Its products include 10,000 t/a formic acid and 500 t/a neopentyl glycol.

Table 4.7-1 Capacity and output of formic acid in Hengyang Yishun, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	10,000	10,000	3,500	3,500

Source: CCM

4.8 Liaoning Fuyuan Chemical Co., Ltd.

Address: Dadian Railway Station East, Caozhuang Industrial Park, Xingcheng City, Liaoning Province 125107, P. R. China
Tel: +86-18340518333
Fax: +86-429-5693999
E-mail: Infyhg@163.com
Website: <http://www.infyhg.com/>

Liaoning Fuyuan Chemical Co., Ltd. (Liaoning Fuyuan) was established in 2003 with a registered capital of RMB5 million. The company mainly engages in the production of formic acid and calcium formate, and has been granted the rights of self-managed import and export.

Table 4.8-1 Capacity and output of formic acid in Liaoning Fuyuan, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	3,000	3,000	1,200	1,200

Source: CCM

4.9 Zouping Fenlian Biotech Co., Ltd.

Address: Jiuhu Industrial Park, Zouping County, Binzhou City, Shandong Province 256211, P. R. China
Tel: +86-543-4719777; +86-13406231112
Fax: +86-543-4719777
E-mail: sales1@fenlianchem.com
Website: <http://www.fenlianchem.com/>

Zouping Fenlian Biotech Co., Ltd. (Zouping Fenlian) was established in 2007, with a registered capital of RMB6 million. It has developed the ability to produce 85% industrial-grade formic acid (capacity: 3,000 t/a), industrial and feed-grade calcium formate (capacity: 4,200 t/a), neopentyl glycol (capacity: 130 t/a) and sodium sulfate (capacity: 4,500 t/a).

The company mainly uses sodium formate and concentrated sulfuric acid as raw materials to produce formic acid and by-product sodium sulfate, through acidification and separation steps

Table 4.9-1 Capacity and output of formic acid in Zouping Fenlian, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Formic acid	3,000	3,000	1,200	1,200

Source: CCM

4.10 Hubei Yihua Chemical Industry Co., Ltd.

Address: No. 339 Xiaoting Road, Yichang City, Hubei Province 443000, P. R. China

Tel: +86-717-6535679

E-mail: 2008694@qq.com

Website: <http://www.hbyh.cn/>

Hubei Yihua Chemical Industry Co., Ltd. (Hubei Yihua) was founded in 1977. In 1996, it got listed on the Shenzhen Stock Exchange with the stock code of 000422.

In 2022, Hubei Yihua's operating revenue totalled USD3.02 billion (RMB20.80 billion) and its net profit for 2022 was USD313.44 million (RMB2.16 billion).

Hubei Yihua is mainly engaged in the production and sale of fertilizers and chemicals. It has 2,600,000 t/a of production capacity for urea, 1,400,000 t/a for diammonium phosphate, 840,000 t/a for polyvinyl chloride, 1,880,000 t/a for caustic soda, and 70,000 t/a for pentaerythritol, as of the end of 2022.

Hubei Yihua has two factories producing pentaerythritol and sodium formate, which are respectively located in Yidu City of Hubei Province and Wuhai City of Inner Mongolia Autonomous Region (Inner Mongolia Yihua Chemical Industry Co., Ltd.).

Table 4.10-1 Capacity and output of sodium formate in Hubei Yihua, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	46,000	46,000	40,000	38,000

Source: CCM

4.11 Chifeng Ruiyang Chemical Co., Ltd.

Address: Yuanbaoshan Industrial Park, Chifeng High-tech Industrial Development Zone, Yuanbaoshan District, Chifeng City, Inner Mongolia Autonomous Region 024000, P. R. China

Tel: +86-476-5999156; +86-476-5999183

E-mail: ruiyanghuagong@sina.com

Website: <http://www.nmruiyangchemical.com/>

Chifeng Ruiyang Chemical Co., Ltd. (Chifeng Ruiyang), established in 2005, is a wholly-owned subsidiary of Guizhou Zhongyida Co., Ltd.

At present, the company possesses production capacity of 43,000 t/a for monopentaerythritol, 10,000 t/a for trimethylol propane, 60,000 t/a for edible alcohol, 240,000 t/a for formaldehyde, 24,000 t/a for acetaldehyde and 30,000 t/a for sodium formate.

Table 4.11-1 Capacity and output of sodium formate in Chifeng Ruiyang, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	30,000	30,000	30,000	30,000

Source: CCM

4.12 Shandong Fufeng Perstorp Chemical Co., Ltd.

Address: No. 76 Yixi North Road, Fine Chemical Industrial Park, Qilu Chemical Industrial Zone, Linzi District, Zibo City, Shandong Province 255400, P. R. China
 Tel: +86-533-7965208
 E-mail: liu.changgen@perstorp.com

With a registered capital of RMB172 million, Shandong Fufeng Perstorp Chemical Co., Ltd. (Fufeng Perstorp) is a joint venture founded by Sweden-based Perstorp AB and Shandong Fufeng Hongjin Investment Co., Ltd. in Nov. 2005. It is mainly engaged in the production and sale of sodium formate (44,000 t/a), crude methanol, neopentyl glycol (45,000 t/a), and trimethylol propane (10,000 t/a). In Fufeng Perstorp's production process of neopentyl glycol, sodium formate is produced as a by-product.

Table 4.12-1 Capacity and output of sodium formate in Fufeng Perstorp, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	44,000	44,000	37,000	36,000

Source: CCM

4.13 Guizhou Kaiyang Qingli Tianmeng Chemical Co., Ltd.

Address: Liangshuijin Village, Shuangliu Town, Kaiyang County, Guiyang City, Guizhou Province 550301, P. R. China
 Tel: +86-020-87692022; +86-020-87623033
 Website: <http://www.qitmchem.com/>
 Email: sda@sundiachem.com

Established in June 2005, Guizhou Kaiyang Qingli Tianmeng Chemical Co., Ltd. (Qingli Tianmeng) is a joint venture between Guizhou Qingli Group Co., Ltd. and Shifang Sundia Chemical Industry Co., Ltd. Qingli Tianmeng employs over 300 people. It has a wide product mix, including yellow phosphorus (17,000 t/a), perphosphoric acid (50,000 t/a), sodium formate (20,000 t/a), sodium tripolyphosphate (50,000 t/a) and sodium hexametaphosphate (10,000 t/a). The company uses reaction of carbon monoxide that is sourced from waste gas of yellow phosphorus production and sodium hydroxide to produce sodium formate.

Table 4.13-1 Capacity and output of sodium formate in Qingli Tianmeng, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	20,000	20,000	16,000	16,000

Source: CCM

4.14 Qianjiang Fuyang Chemical Co., Ltd.

Address: Jiangnan Salt Chemical Industrial Park, Qianjiang City, Hubei Province 433100, P. R. China

Tel: +86-728-6703688

E-mail: fuyangsale@163.com

Qianjiang Fuyang Chemical Co., Ltd. (Qianjiang Fuyang), established in 2010, has a registered capital of RMB130 million. The company mainly produces sodium formate. With an investment of USD38.48 million (RMB245 million), the first phase of its 90,000 t/a sodium formate automatic production lines had been built in an area of 13.33 ha (200 mu) and was put into operation in Nov. 2012. Qianjiang Jinhan Chemical Technology Co., Ltd. is the largest shareholder, who takes 74% stake in Qianjiang Fuyang.

Its main products include sodium formate and liquid ammonia. It takes carbon monoxide and sodium hydroxide as raw material to produce sodium formate.

It was revealed in Feb. 2022 that Qianjiang Fuyang planned to initiate a technical renovation project for some production devices of its existing 90,000 t/a sodium formate plant, which features renovating and upgrading over 20 (sets of) production devices involving dewatering, crystallization, centrifugation, drying, and packaging in the production process. Upon completion of project construction, Qianjiang Fuyang will have 40,000 t/a of production capacity for potassium diformate.

Table 4.14-1 Capacity and output of sodium formate in Qianjiang Fuyang, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	90,000	90,000	10,000	20,000

Source: CCM

4.15 Puyang Pengxin Chemical Co., Ltd.

Address: West of Shengli Road, Puyang City, Henan Province 457000, P. R. China

Tel.: +86-393-8950030; +86-393-8699581

Fax: +86-393-4626555

E-mail: pengxinchemical@outlook.com

Website: <http://www.pyspx.com/>

Puyang Pengxin Chemical Co., Ltd. (Puyang Pengxin), was established in 2002 and covers an area of 77,700 m². The company has total assets of RMB150 million and employs over 180 people.

Puyang Pengxin's key products include 20,000 t/a pentaerythritol, 1,000 t/a dipentaerythritol, 100,000 t/a formaldehyde, and 13,000 t/a sodium formate.

Puyang Pengxin has been certificated by ISO 9001 Quality Management System and ISO 14001 Environmental Management System.

Table 4.15-1 Capacity and output of sodium formate in Puyang Pengxin, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	13,000	13,000	12,300	12,100

Source: CCM

4.16 Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company

Address: Jiuyuan Industrial Park, Jiuyuan District, Baotou City, Inner Mongolia Autonomous Region 014000, P. R. China
Tel.: +86-472-2897001

Baotou Sea Level Macromolecule Industry Co., Ltd. Jiuyuan Branch Company (Jiuyuan Sea Level) covers an area of 400,000 m². Jiuyuan Sea Level's production factory started to be built in 2009 and was put into operation at the end of 2010. The company currently has 400,000 t/a of production capacity for PVC, 320,000 t/a for caustic soda, and 100,000 t/a for sodium formate.

Jiuyuan Sea Level is a member of the conglomerate East Hope Group Co., Ltd. (East Hope Group). As one of the first batch of 44 enterprises incorporated in the list of "Private Enterprise Headquarters in Shanghai Municipality", East Hope Group has over 300 subsidiaries located in China, Vietnam, Indonesia, Singapore, Cambodia, etc. The number of employees working under East Hope Group exceeds 30,000.

In 2022, Jiuyuan Sea Level's "co-production project of 15,000 t/a calcium formate and 85,000 t/a sodium formate" completed the environmental impact approval procedures. After project construction is completed, the company will possess the production capacities that are mentioned in project name.

Table 4.16-1 Capacity and output of sodium formate in Jiuyuan Sea Level, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	100,000	100,000	45,000	40,000

Source: CCM

4.17 Jiangsu Baichuan High-Tech New Materials Co., Ltd.

Address: No. 55, Jianshe Road, Yunting Street, Jiangyin City, Jiangsu Province 214422 P. R. China
Tel: +86-510-86015188; +86-510-81629979
Fax: +86-510-56013255; +86-510-86017255
Email: bcchem@bcchem.com
Website: <http://www.bcchem.com/>

Jiangsu Baichuan High-Tech New Materials Co., Ltd. (Jiangsu Baichuan) is a high-tech enterprise specializing in the production of fine chemical products, listed on the Shenzhen Stock Exchange with stock code of 002455. Jiangsu Baichuan has three production bases, whose production capacities are excerpted as follows:

- Rugao Baichuan Chemical Materials Co., Ltd.: 20,000 t/a TMP and 12,000 t/a sodium formate (Capacity has been active since 2012.)
- Nantong Baichuan New Materials Co., Ltd.: 20,000 t/a TMP and 12,000 t/a sodium formate (Capacity has been active since 2012.)
- Ningxia Baichuan Technology Co., Ltd.: The construction of its "first-phase 50,000 t/a trimethylolpropane and 2,000 t/a cyclic trimethylolpropane formal project" was completed in 2022. This project delivers 50,000 t/a of capacity for TMP and produces 35,000 t/a of sodium formate as by-product. It was put into trial operation in Jan. 2022 and passed the post-completion environmental protection acceptance inspection in Nov. 2022.

Table 4.17-1 Capacity and output of sodium formate in Jiangsu Baichuan, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	59,000	24,000	47,000	24,000

Source: CCM

4.18 Binzhou Xinke Aode Technology Co., Ltd.

Address: Boxing Industrial Park, Boxing County, Binzhou City, Shandong Province 256506, P. R. China
Tel: +86-543-2869123
Fax: +86-543-2869111
Website: <http://bzxad.com/>

Binzhou Xinke Aode Technology Co., Ltd. (Xinke Aode) is a private company that was founded in 2007. It now has more than 150 members of staff and has developed a diversified product portfolio. The company's capacities for neopentyl glycol, sodium formate, and formaldehyde total 30,000 t/a, 20,000 t/a, and 50,000 t/a respectively. In the process of producing neopentyl glycol, the company produces sodium formate as a by-product.

Table 4.18-1 Capacity and output of sodium formate in Xinke Aode, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	20,000	20,000	18,000	18,000

Source: CCM

4.19 Yunnan Yuntianhua Co., Ltd.

Address: No. 1417 Dianchi Road, Xishan District, Kunming City, Yunnan Province 650228, P. R. China
Tel.: +86-4008601912; +86-871-64327067
Fax: +86-871-64327155
Website: <http://www.yyth.com.cn/>

Yunnan Yuntianhua Co., Ltd. (Yunnan Yuntianhua) was established in 1997 on the basis of the former Yunnan Natural Gas Plant, which was built in 1974 and started production in 1977. In July 1997, Yunnan Yuntianhua got listed on the Shanghai Stock Exchange (stock code: 600096). By the end of 2021, Yunnan Yuntianhua had total assets of more than USD8.2 billion (RMB53.1 billion) and 11,360 employees. The company mainly engages in the production and sale of fertilizers, fine chemicals, phosphorus chemicals, and fiber glass new materials. Yunnan Yuntianhua has over 40 subsidiaries.

Yunnan Yuntianhua has maintained pentaerythritol capacity at 10,000 t/a since 2009 and its annual output of pentaerythritol has exceeded 10,000 tonnes since 2014. Even in 2017 when environmental protection inspections became more stringent, it maintained relatively uninterrupted production thanks to its advanced environmental protection mechanism. What's more, Yunnan Yuntianhua has reduced the production of low-grade pentaerythritol in recent years and shifted to producing more 98% pentaerythritol and 99% pentaerythritol to meet market demand.

Table 4.19-1 Capacity and output of sodium formate in Yunnan Yuntianhua, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	7,100	7,100	9,200	9,300

Source: CCM

4.20 Puyang Yong'an Chemical Co., Ltd.

Address: West Huanghe Road, High-Tech Development Zone, Puyang City, Henan Province 457000, P. R. China
Tel.: +86-393-4624398; +86-393-4624489; +86-13080107125
Fax: +86-393-4624496; +86-393-4624296
E-mail: pyyongan@pyinfo.net; yongan@pyyongan.com
Person to contact: Mr. Lei
Website: <http://www.pyyongan.com/>

Puyang Yong'an Chemical Co., Ltd. (Puyang Yong'an) engages in the production and sale of pentaerythritol and formates. Puyang Yong'an uses self-developed the calcium method to produce pentaerythritol. It started commercial production of pentaerythritol in Nov. 2004. Its production capacity includes 10,000 t/a monopentaerythritol, 2,000 t/a dipentaerythritol, 500 t/a tripentaerythritol, 5,000 t/a calcium formate, and 5,000 t/a sodium formate.

Table 4.20-1 Capacity and output of sodium formate in Puyang Yong'an, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	5,000	5,000	3,500	3,700

Source: CCM

4.21 Shijiazhuang Shuangyan Chemical Co., Ltd.

Address: Jinzhou Economic Development Zone, Shijiazhuang City, Hebei Province 052260, P. R. China
 Tel.: +86-311-83160328; +86-15933601073
 Fax: +86-311-84455221
 Person to contact: Mr. Chen

Shijiazhuang Shuangyan Chemical Co., Ltd. (Shijiazhuang Shuangyan), established in 2013, is an enterprise that produces chemical raw materials. As of March 2023, Shijiazhuang Shuangyan mainly produces 10,000 t/a pentaerythritol, 6,200 t/a sodium formate, etc., which are widely used in chemical industries such as coating and painting.

Table 4.21-1 Capacity and output of sodium formate in Shijiazhuang Shuangyan, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	6,200	6,200	4,000	4,200

Source: CCM

4.22 Shandong XZY Chemical Co., Ltd.

Address: Caoxian Chemical Industry Park, Pulianji Town, Caoxian County, Heze City, Shandong Province 274400, P. R. China
 Tel.: +86-19805301988
 Person to contact: Mr. Zhang

Shandong XZY Chemical Co., Ltd. (Shandong XZY) is a private enterprise founded in Feb. 2019. It covers an area of 113,680 m². The company engages in production and sale of chemical products, decorative paper and environmental-friendly resin glue.

Shandong XZY started commercial production of pentaerythritol in Nov. 2021. Its capacity includes 30,000 t/a 95% monopentaerythritol, 1,000 t/a 85% dipentaerythritol and 18,000 t/a sodium formate.

Table 4.22-1 Capacity and output of sodium formate in Shandong XZY, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	18,000	18,000	6,600	2,500

Source: CCM

4.23 Ningxia Ningshun New Material Technology Co., Ltd.

Address: Ningdong Chemical New Material Park, Yinchuan City, Ningxia Hui Autonomous Region 750000, P. R. China

Tel.: +86-15129501279

Person to contact: Mr. Wu

Established in Dec. 2018, Ningxia Ningshun New Material Technology Co., Ltd. (Ningxia Ningshun) is a private enterprise. Its main businesses cover the production of formaldehyde, polyols and their downstream products.

Ningxia Ningshun currently has 20,000 t/a of production capacity for pentaerythritol, 1,000 t/a for dipentaerythritol, 200,000 t/a for formaldehyde, and 14,300 t/a for sodium formate.

Table 4.23-1 Capacity and output of sodium formate in Ningxia Ningshun, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	14,300	14,300	5,000	1,500

Source: CCM

4.24 Anhui Jinhe Industrial Co., Ltd.

Address: No. 127 East Street, Lai'an County, Chuzhou City, Anhui Province 239200, P. R. China

Tel.: +86-550-5624224; +86-550-5619090; +86-18805503066; +86-13956316220

Fax: +86-550-5628694

E-mail: sales-overseas@ajhchem.com

Person to contact: Mr. Zhu, Mr. Chen

Website: <http://www.jinheshiye.com/>

Anhui Jinhe Industrial Co., Ltd. (Anhui Jinhe), founded in Dec. 2006, was listed on the Shenzhen Stock Exchange in July 2011 (stock code: 002597).

- Main products

1) Food additives

- Acesulfame-K
- Sucralose
- Methyl maltol & Ethyl maltol

2) Chemicals

- Formaldehyde
- Liquid ammonia
- Ammonium bicarbonate
- Nitric acid
- Pentaerythritol
- Sulfuric acid and others

Anhui Jinhe started the commercial production of pentaerythritol in Aug. 2008. It has 20,000 t/a production capacity for pentaerythritol and mainly produces 95% monopentaerythritol and 13,000 t/a of by-product sodium formate.

Table 4.24-1 Capacity and output of sodium formate in Anhui Jinhe, 2021–2022

Product	Capacity, t/a		Output, tonne	
	2022	2021	2022	2021
Sodium formate	13,000	13,000	12,300	12,400

Source: CCM

5 Sodium formate producers taking synthesis method in China

In 2022, only six of 21 active producers in China take synthesis method to produce sodium formate. Those six producers' sodium formate capacity totalled 355,000 t/a and their sodium formate output amounted to 197,000 tonnes in 2022, accounting for 49.6% and 42.2% respectively of China's total capacity and total output.

Table 5-1 List of sodium formate producers taking synthesis method in China

Producer	Capacity, t/a			Output, tonne	
	2022	2021	2020	2022	2021
Luxi Chemical	100,000	100,000	100,000	100,000	109,000
Jiuyuan Sea Level	100,000	100,000	0	45,000	40,000
Qianjiang Fuyang	90,000	90,000	90,000	10,000	20,000
Chongqing Chuandong	30,000	30,000	30,000	20,000	20,000
Qingli Tianmeng	20,000	20,000	20,000	16,000	16,000
Dongying Shuntong	15,000	15,000	15,000	6,000	6,000
Total	355,000	355,000	255,000	197,000	211,000

Source: CCM

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