

Production of Citric Acid and Sodium Citrate in China

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Basic info of citric acid producers

Chinese name	English name	Abbreviation	Location
山东英轩实业股份有限公司	Shandong Ensign Industry Co., Ltd.	Shandong Ensign	Shandong
日照金禾生化集团股份有限公司	RZBC Group Co., Ltd.	RZBC	Shandong
山东柠檬生化有限公司	Shandong TTCA Co., Ltd.	TTCA	Shandong
江苏国信协联能源有限公司	Jiangsu Guoxin Union Energy Co., Ltd.	Guoxin Union	Jiangsu
吉林协联生物科技有限公司	Jilin Union Biotechnology Co., Ltd.	Jilin Union	Jilin
莱芜泰禾生化有限公司	Laiwu Taihe Biochemistry Co., Ltd.	Laiwu Taihe	Shandong
七星柠檬科技有限公司	Seven Stars Citric Acid Technology Co., Ltd.	Seven Stars	Shandong
中粮生物科技股份有限公司	COFCO Biotechnology Co., Ltd.	COFCO	Jilin

1 Summary of citric acid and sodium citrate production

Table 1-1 Capacity and output of citric acid producers in China, 2021–2023

No.	Producer	Capacity, t/a			Output, tonne			Operating rate 2023	Self-consumption volume, tonne	Sales, tonne
		2021	2022	2023	2021	2022	2023			
1	Shandong Ensign	600,000	1,000,000	1,000,000	520,000	670,000	700,000	70%	105,000	595,000
2	RZBC	370,000	370,000	370,000	320,000	323,000	325,000	88%	49,700	275,300
3	TTCA	350,000	350,000	350,000	270,000	318,000	314,000	90%	9,800	304,200
4	Guoxin Union	180,000	180,000	180,000	152,000	165,000	155,000	86%	17,500	137,500
5	Laiwu Taihe	160,000	160,000	160,000	110,000	118,000	109,000	68%	30,000	79,000
6	Seven Stars	100,000	100,000	100,000	73,000	83,000	78,000	78%	5,600	72,400
7	COFCO	180,000	120,000	120,000	104,000	40,000	0	0%	-	-
Total		1,940,000	2,280,000	2,280,000	1,549,000	1,717,000	1,681,000	74%	217,600	1,463,400

Note: 1) The capacity and output of refined citric acid produced from citric acid as starting raw material is excluded.

2) Capacity of citric acid includes that of citrate, same as the output.

Source: CCM

Table 1-2 Capacity and output of sodium citrate producers in China, 2021–2023

No.	Producer	Capacity, t/a			Output, tonne		
		2021	2022	2023	2021	2022	2023
1	Shandong Ensign	100,000	320,000	320,000	95,000	108,000	120,000
2	RZBC	80,000	80,000	80,000	50,000	53,000	55,000
3	TTCA	30,000	30,000	30,000	10,000	13,000	14,000
4	Guoxin Union	36,000	36,000	36,000	22,000	25,000	25,000
5	Laiwu Taihe	60,000	60,000	60,000	36,000	38,000	39,000
6	Seven Stars	12,000	12,000	12,000	7,000	8,000	8,000
7	COFCO	15,000	0	0	14,000	0	0
Total		333,000	538,000	538,000	234,000	245,000	261,000

Note: 1) The capacity and output of refined sodium citrate produced from sodium citrate as starting raw material is excluded.

2) The company which does not have citric acid capacity is excluded.

Source: CCM

There were only six active citric acid producers in 2023. On 16 Jan., 2024, Jilin Union's citric acid-related products were rolled off the production lines built in the *150,000 t/a citric acid project*.

The industry operating rate of citric acid was relatively high, before 2018. The operating rate decreased to 79% in 2018, 71% in 2019 and 71% in 2020, along with the launch of new projects and expansion projects totaling 275,000 t/a (RZBC and TTCA) in 2018 and 240,000 t/a (Shandong Ensign, Seven Stars) in 2019. The operating rate was about 80% in 2021, driven by rapidly growing demand beyond China. In 2022, though the demand beyond China kept increasing, the operating rate decreased to about 75% as Shandong Ensign's 400,000 t/a citric acid was built up and put into production. In 2023, the operating rate decreased a little to about 74%.

China's output of citric acid was about 1.68 million tonnes in 2023, a decrease of 36,000 tonnes from 2022, mainly caused by the decreasing overseas demand. China exported 1,173,285 tonnes of citric acid in 2023, decreasing by 54,792 tonnes compared to 2022.

A citric acid producer is often a producer of sodium citrate. As of March 2024, there were only six active sodium citrate producers (processors are excluded) in China. The output of sodium citrate increased with a CAGR of 8.5% in 2019–2023, driven by the development of the domestic detergent and food industries as well as increasing overseas demand.

2 Key manufacturers' production information

Shandong Ensign expanded its citric acid capacity from 460,000 t/a to 600,000 t/a in May 2020. Shandong Ensign uses part of its citric acid to make citrates at a maximum of 120,000 t/a, which contains 100,000 t/a sodium citrate.

Shandong Ensign proposed a *green intelligent manufacturing project of 400,000 t/a refined citric acid* (400,000 t/a citric acid, 220,000 t/a sodium citrate, 20,000 t/a potassium citrate, 10,000 t/a calcium citrate), and 62,500 t/a citric acid of this project (plus 115,900 t/a citric acid from *the 600,000 t/a citric acid project*) will be used to manufacture these 250,000 t/a citrates. This project was started in Sept. 2020, and built up in July 2022.

Shandong Ensign also launched a *green intelligent upgrading project of 700,000 t/a citric acid* (700,000 t/a citric acid (calculated as citric acid anhydrous) to be improved from the 600,000 t/a citric acid (calculated as citric acid monohydrate); 350,000 t/a feed; 6,000 t/a crude corn oil; 805,000 t/a calcium sulfate dihydrate powder; 35,000 t/a anaerobic granular sludge) in Sept. 2023, and this project is expected to be built up in H2 2027.

Link of expansion project:

<http://61.133.99.71:3000/clyy/artypz?id=1690806227603125538304>

RZBC (Boyuan) Biochemical Co., Ltd. (RZBC Boyuan) once had a production line only producing citric acid (capacity: 180,000 t/a) and 40,000 t/a sodium citrate production line, in which the 40,000 t/a sodium citrate production line equipped with additional citric acid synthesis device. In 2015, RZBC Group Co., Ltd. (RZBC) made a re-arrangement to its subsidiaries, so RZBC (Luxin) Co., Ltd. dismantled the outdated 140,000 t/a citric acid production line that year; a make-up production work was then entrusted to RZBC Boyuan. In 2019, the 140,000 t/a citric acid production line in RZBC Boyuan was put into commercial production. RZBC Boyuan started the *citrate energy-saving technical transformation project* (50,000 t/a citric acid was replaced by 60,000 t/a sodium citrate, 40,000 t/a sodium citrate was replaced by 20,000 t/a sodium citrate and 20,000 t/a potassium citrate) at the end of 2019, which was built up in May 2020. RZBC Boyuan also proposed a *technical transformation project of 30,000 t/a citrate*, and the 1st phase (20,000 t/a calcium citrate, 1,000 t/a magnesium citrate) was built up in Oct. 2021.

RZBC Boyuan proposed to expand the capacity of citric acid. On 31 March, 2023, the EI document of its *200,000 t/a citric acid project* was approved by the local government.

Link of expansion project:

http://www.juxian.gov.cn/art/2022/9/20/art_163432_10324100.html

http://www.juxian.gov.cn/art/2022/12/27/art_163432_10337138.html

http://www.juxian.gov.cn/art/2023/3/31/art_163432_10346198.html

TTCA once had a production line only producing citric acid (capacity: 185,000 t/a) and a 30,000 t/a sodium citrate production line (equipped with an additional citric acid synthesis device). TTCA's *135,000 t/a citric acid expansion project* was finished and put into production in 2019. The company has no expansion plan for citric acid but proposed a *300,000 t/a pea protein project*.

Guoxin Union had a production line only producing citric acid (capacity: 180,000 t/a) and a 30,000 t/a sodium citrate production line (equipped with an additional citric acid synthesis device). Jilin Union, Guoxin Union's wholly owned subsidiary, started the construction of *the 150,000 t/a citric acid project* (150,000 t/a citric acids (in monohydrate citric acid terms), 32,400 t/a sodium citrate, and 200,000 t/a citric acid gypsum (by-product) and 60,000 t/a liquid organic fertiliser (by-product)) in April 2022, and put it into production in Jan. 2024.

Jilin Union's *250,000 t/a citric acid project (Phase II)* was put on record in June 2023. According to the public information of the project, the construction of Phase II is scheduled to begin in April 2024 and be completed in Oct. 2025 (CCM estimates that the construction work may not be finished until 2026).

Link of expansion project:

http://www.jlzhelai.gov.cn/ztl/hjbh/xmqg/202202/t20220225_929000.html

COFCO currently has only one production base in China called COFCO Bio-chemical Energy (Yushu) Co., Ltd. which is located in Changchun City in Jilin Province. This production base has

a production line only producing citric acid (capacity: 120,000 t/a), which was put into production in June 2018.

Table 2-1 Key statistics of COFCO, 2020–2022

Citric acid, citrate and its by-product	2020	2021	2022
Revenue, USD	102,305,745	175,844,418	253,156,389
Cost of sales, USD	92,895,721	133,885,793	152,915,952
Operating profit, USD	9,410,024	39,131,063	93,485,305
Gross profit margin	9%	22%	37%

Note: COFCO Biochemical (Thailand) Co., Ltd. is included.

Source: COFCO's annual reports

Laiwu Taihe has a production line only producing citric acid (capacity: 100,000 t/a) and a 60,000 t/a sodium citrate production line. The two production lines share the same production process in the early citric acid synthesis. Laiwu Taihe added a refined sodium citrate production line with a 2,000 t/a capacity at the end of 2018, using sodium citrate as material.

Seven Stars, founded on 19 Jan., 2018, planned to build a *food additive project* (500,000 t/a) in two phases. Phase I includes 88,000 t/a of citric acid (44,000 t/a of anhydrous citric acid and 44,000 t/a of citric acid monohydrate) and 12,000 t/a of sodium citrate, which started in 2018, was put into trial production in Sept. 2019 and passed the environmental inspection in June 2020. Phase II includes 352,000 t/a of citric acid (176,000 t/a of anhydrous citric acid and 176,000 t/a of citric acid monohydrate), 48,000 t/a of sodium citrate and 160,000 t/a citric acid gluten feed (by-product), which is under construction and expected to be built up in H2 2024.

Seven Stars takes the mother liquor of citric acid monohydrate to produce sodium citrate.

Link of expansion project:

<http://www.yishui.gov.cn/info/1084/168996.htm>

3 Forecast on citric acid and sodium citrate production in China

Domestic capacity ranking of citric acid and sodium citrate unchanged in 2023.

A total capacity of about 1,100,000 t/a citric acid will be built up and released in 2024–2027, if all these potential projects are processing well as expected.

Table 3-1 Citric acid capacity forecast to 2027

No.	Company	Capacity, '000 t/a						
		2021	2022	2023	2024	2025	2026	2027
1	Shandong Ensign	600	1,000	1,000	1,000	1,000	1,000	1,100
2	RZBC	370	370	370	370	570	570	570
3	TTCA	350	350	350	350	350	350	350
4	Guoxin Union & Jilin Union	180	180	180	330	330	580	580
5	Laiwu Taihe	160	160	160	160	160	160	160
6	Seven Stars	100	100	100	500	500	500	500
7	COFCO	180	120	120	120	120	120	120
Total		1,940	2,280	2,280	2,830	3,030	3,280	3,380

Source: CCM

The following companies planned for citric acid production, but they probably put the projects on hold or may even give up their plans as there is no further progress on the projects.

Qiqihar Longjiang Fufeng Biotechnology Co., Ltd., planned to build a *corn deep processing project* (capacity: 2 million t/a) which was divided into three phases. Only the 3rd phase involves the construction of a 500,000 t/a citric acid production line.

Inner Mongolia Meca Biotechnology Co., Ltd., planned to build a 2,000,000 t/a corn deep processing industrial park with a construction period from 2019 to 2023, which was divided into two phases. Only the 2nd phase involves the construction of 300,000 t/a citric acid and citrates (100,000 t/a anhydrous citric acid, 150,000 t/a monohydrate citric and 50,000 t/a sodium citrate).
 Link: <http://fgw.xam.gov.cn/fgw/1119945/zdjsxm17/3589829/index.html>

Shandong Sanyuan Biotechnology Co., Ltd. was granted record-filing of its *100,000 t/a citric acid technology transformation project* on 11 July, 2022.

Link:

<http://www.bzsanyuan.com/news/shownews.php?lang=cn&id=64>
<http://221.214.94.51:8081/icity/ipro/fmxmgs?sqlid=A30D3985AF184E64AC868C0B70061879&bsnum=DAABA3B3BA8A4D769C309BD0401D2778>

Rizhao Haoyu Biotechnology Co., Ltd. (Haoyu Biotech)'s *1,000,000 t/a citric acid project* was also put on record on 27 July, 2022.

Link:

<http://221.214.94.51:8081/icity/ipro/fmxmgs?sqlid=B67FF6410F9B4B65B4F64C3297422E47&bsnum=8818328BA630421ABFED4B98F6673469>

Hunchun Border Economic Cooperation Zone Infrastructure Investment Co., Ltd. was granted record-filing of a *500,000 t/a citric acid project* on 13 July, 2023.

Link: <https://tzxm.jl.gov.cn/indexjl.jsp>

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