

IDAN Survey in China

The Sixth Edition

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Researched & Prepared by:

Kcomber Inc.

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Executive summary

In China, IDAN supply can satisfy domestic glyphosate production currently. Compared with the DEA route, the IDAN route has an advantage in production cost, and it will remain so in a long period of time.

In 2021, there was 175,000 t/a IDAN capacity in China, with only three active producers which mainly concentrated in Southwest China, where there is an easy access to natural gas resources. The total capacity shrank a bit from over-200,000 t/a during 2012–2016. Regarding the output, in 2020–2021, IDAN output maintained at about 120,000 tonnes in China.

In 2021, the annual average price of 92% IDAN rebounded to USD1,421/t in China thanks to thriving glyphosate market.

Introduction and methodology

- Desk research

Sources of desk research are various including published magazines, journals, government statistics, industrial statistics, customs statistics, association seminars as well as information from the internet. A lot of work has been done to compile and analyse the information obtained. When necessary, checks would be made with Chinese market players regarding market information such as production, demand and consumption.

- Telephone interview

The interviewees cover:

- IDAN manufacturers
- Experts
- Traders
- Local governments
- Researchers
- Industrial associations

CCM carried out extensive telephone interviews with almost all IDAN manufacturers. From those active manufacturers and manufacturers that have suspended or stopped production, CCM sourced and verified the detailed production and market information as well as industry insiders' comments on IDAN.

In a bid to better understand the application of IDAN in China, CCM also made contact with domestic traders and distributors as well.

- Data processing and presentation

The data collected and compiled are sourced from:

- Published articles from Chinese periodicals, magazines, journals and third-party databases
- Government statistics & customs statistics
- Telephone interviews with Chinese manufacturers, traders
- Comments from industrial experts
- CCM's innovative database
- Information from the internet

The data from various channels have been combined to make this report as precise and scientific as possible. Throughout the process, a series of internal discussions have been held in order to analyse the data and draw conclusions from it.

- Glossary

IDAN: Iminodiacetonitrile

IDA: Iminodiacetic acid

DEA: Diethanolamine

EA: Ethanolamine

PMIDA: N-(Phosphonomethyl) iminodiacetic acid

HCN: Hydrocyanic acid

- Unit

Tonne: equals to metric ton in this report

/t: per tonne

t/a: tonne/annual, tonne per year

USD: US dollar, currency unit in the US

RMB: currency unit in China, also named yuan

Table USD/CNY exchange rate, 2016–2021

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
2016	6.5527	6.5311	6.5064	6.4762	6.5315	6.5874	6.6774	6.6474	6.6715	6.7442	6.8375	6.9182	6.6425
2017	6.8918	6.8713	6.8932	6.8845	6.8827	6.8019	6.7772	6.7148	6.5909	6.6493	6.6300	6.6067	6.7662
2018	6.5079	6.3045	6.3352	6.2764	6.3670	6.4078	6.6157	6.8293	6.8347	6.8957	6.9670	6.9431	6.6070
2019	6.8482	6.7081	6.6957	6.7193	6.7344	6.8896	6.8716	6.8938	7.0883	7.0726	7.0437	7.0262	6.8826
2020	6.9614	6.9249	6.9811	7.0771	7.0690	7.1315	7.0710	6.9980	6.8498	6.7796	6.7050	6.5921	6.9284
2021	6.5408	6.4623	6.4754	6.5584	6.4895	6.3572	6.4709	6.4660	6.4680	6.4604	6.4192	6.3693	6.4615

Source: The People's Bank of China

1 IDAN production in China

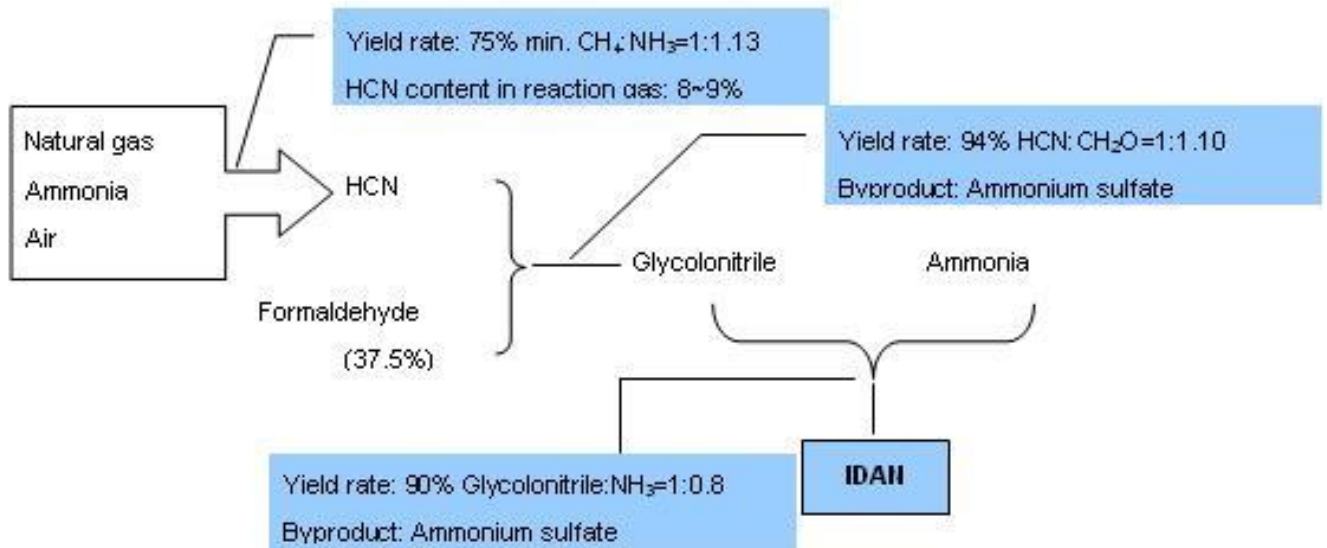
1.1 Routes to produce IDAN

According to hydrocyanic acid (HCN) sources, routes for IDAN production can be classified into:

- Natural gas route: using natural gas as raw material, adopting Andrussov technology to produce HCN.
- HCN (from acrylonitrile production) route: using crude HCN generated in acrylonitrile production as raw material to produce HCN.
- Light oil cracking way: using light oil and liquid ammonia as raw materials to produce HCN.

Now, only the natural gas route is applied to produce HCN & IDAN in China.

Figure 1.1-1 Production process of IDAN by natural gas route in China



Source: CCM

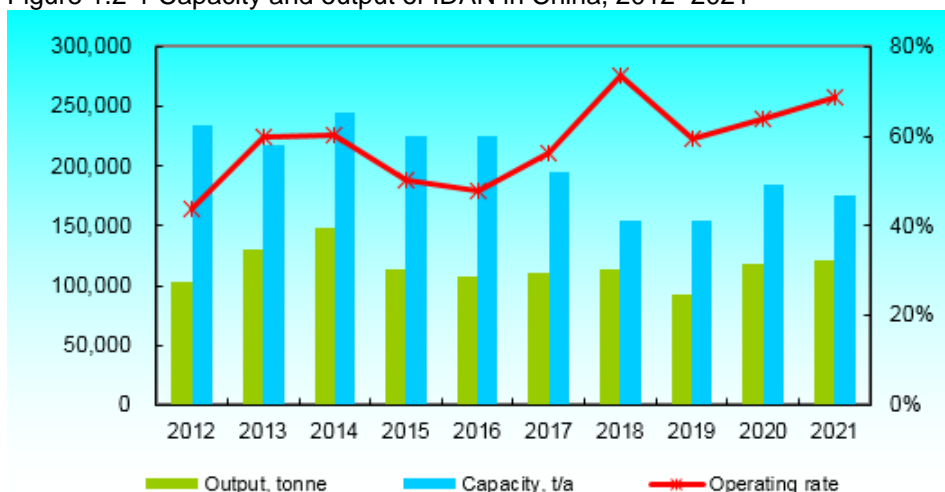
1.2 Capacity and output of IDAN

During 2012–2016, the capacity of IDAN in China kept at over 200,000 t/a. Yet due to oversupply, it began to decline in 2017. By 2021, the capacity reduced to 175,000 t/a, with only three producers.

As for the output of IDAN in China, it peaked at 148,000 tonnes in 2014, but in the following years, it decreased and fluctuated between 110,000 tonnes and 120,000 tonnes, except a dip to 92,000 tonnes in 2019.

In 2020–2021, the output of IDAN in China hovered around 120,000 tonnes.

Figure 1.2-1 Capacity and output of IDAN in China, 2012–2021



Source: CCM

1.3 Major producers of IDAN

Producers of IDAN in China are mainly concentrated in Southwest China, where there is an easy access to domestic natural gas resources. In 2021, there were three active producers of IDAN in China, namely Chongqing Unisplendour Chemical Co., Ltd. (Chongqing Unisplendour), Leshan Hebang Agricultural Science and Technology Co., Ltd. (Leshan Hebang) and Guang'an Chengxin Chemical Co., Ltd. (Guang'an Chengxin).

Chongqing Unisplendour was once the largest producer in China by capacity (with a peak capacity of 140,000 t/a in 2009–2012) before it cut some capacity due to oversupply. As of 2021, Chongqing Unisplendour had two IDAN production bases, one in Inner Mongolia and one in Xinjiang with IDAN capacity of 30,000 t/a and 20,000 t/a respectively.

Leshan Hebang, which has established a complete integrated chain of glyphosate (IDAN route), starting from natural gas to HCN (45,000 t/a), glycolonitrile (90,000 t/a), IDAN (100,000 t/a), PMIDA (180,000 t/a) and glyphosate technical (50,000 t/a), has successfully changed the domestic market structure of glyphosate industry. Almost all domestic glyphosate producers once purchased IDAN to produce PMIDA and then glyphosate technical, but since 2015, some of them switched to purchase PMIDA produced by Leshan Hebang to produce glyphosate technical.

In 2021, Guang'an Chengxin kept its IDAN capacity at 25,000 t/a. It also had 15,000 t/a PMIDA, 20,000 t/a tech-grade glycine and 20,000 t/a glyphosate technical production lines.

Glyphosate technical production through PMIDA has become increasingly popular in China in recent years. However, PMIDA production using IDAN is of high-cost and produces a large quantity of pollutants. Therefore, some glyphosate technical producers have switched to PMIDA as their raw material under tightening environmental protection pressure. For IDAN producers, they tend to take whole-industrial-chain approach and produce products including HCN, glycolonitrile, IDAN, IDA, PMIDA and glyphosate technical to improve their competitiveness.

Table 1.3-1 Capacity and output of IDAN producers in China, 2017–2021

No.	Producer	Status, 2021	Capacity 2021, t/a	Output, tonne				
				2017	2018	2019	2020	2021
1	Leshan Hebang Agricultural Science and Technology Co., Ltd.	Active	100,000	70,000	70,000	70,000	99,000	100,000
2	Chongqing Unisplendour Chemical Co., Ltd.	Active	50,000	30,000	32,000	10,000	7,500	6,500
3	Guang'an Chengxin Chemical Co., Ltd.	Active	25,000	10,000	12,000	12,000	12,000	14,000
Total			175,000	110,000	114,000	92,000	118,500	120,500

Source: CCM

2 IDAN price in China

After dropping to its lowest at USD1,268/t in Oct. 2016, the ex-works price of 92% IDAN in China saw large increases in 2017 and early 2018, and finally peaked at USD1,990/t in Feb. 2019. However, it plummeted after that. In 2020, the price in China fluctuated around USD1,300/t; the price in June was pretty much the same as the lowest in 2016. In 2021, the annual average price rebounded to USD1,421/t in China thanks to thriving glyphosate market.

The price of IDAN in China is mainly affected by the prices of glyphosate technical and raw materials.

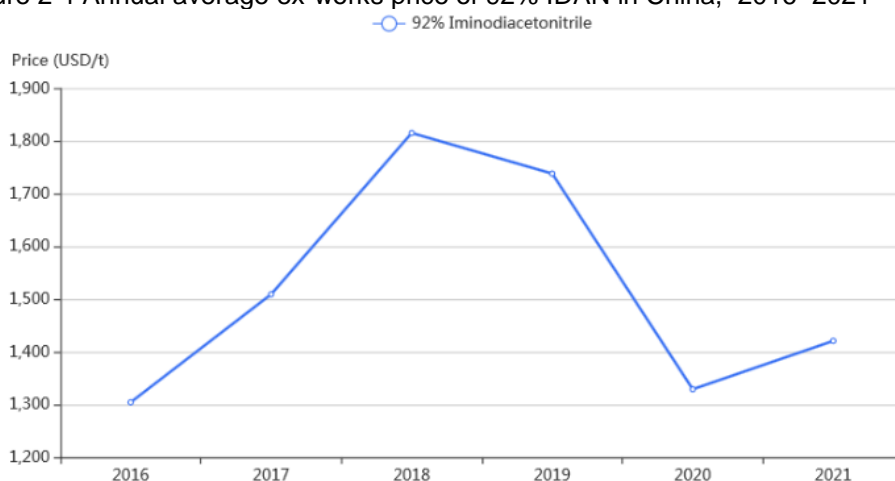
- Price of glyphosate technical

In China, the price of IDAN mainly follows the trend of glyphosate technical market, because glyphosate technical is the main downstream product of IDAN. However, price growth of IDAN in 2021 was much outshined by that of glyphosate technical. After all, not all domestic glyphosate producers use IDAN to produce glyphosate technical.

- Price of raw materials

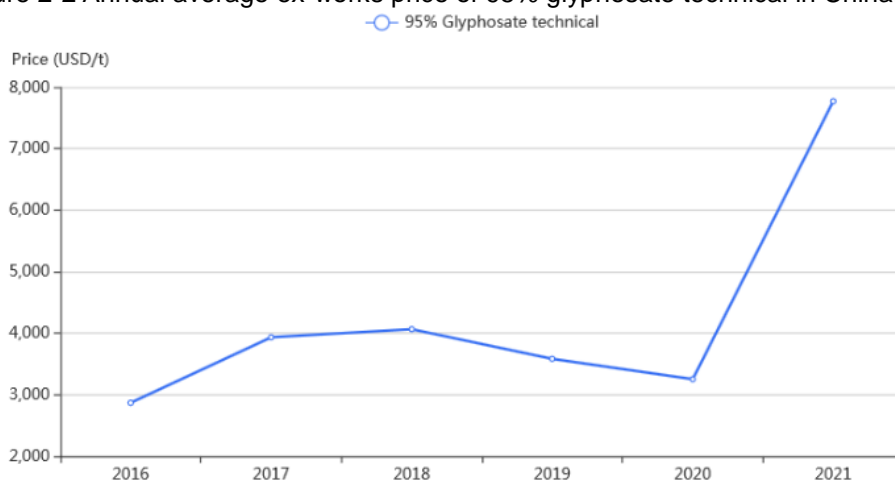
Raw material cost usually takes up about 70% of the total production cost of IDAN. Natural gas plays the most important role in the raw material cost, as it is not only the upstream raw material of IDAN but also the raw material of other important raw materials of IDAN, such as formaldehyde and liquid ammonia. Thus, the price change of natural gas has a large impact on the production cost of IDAN.

Figure 2-1 Annual average ex-works price of 92% IDAN in China, 2016–2021



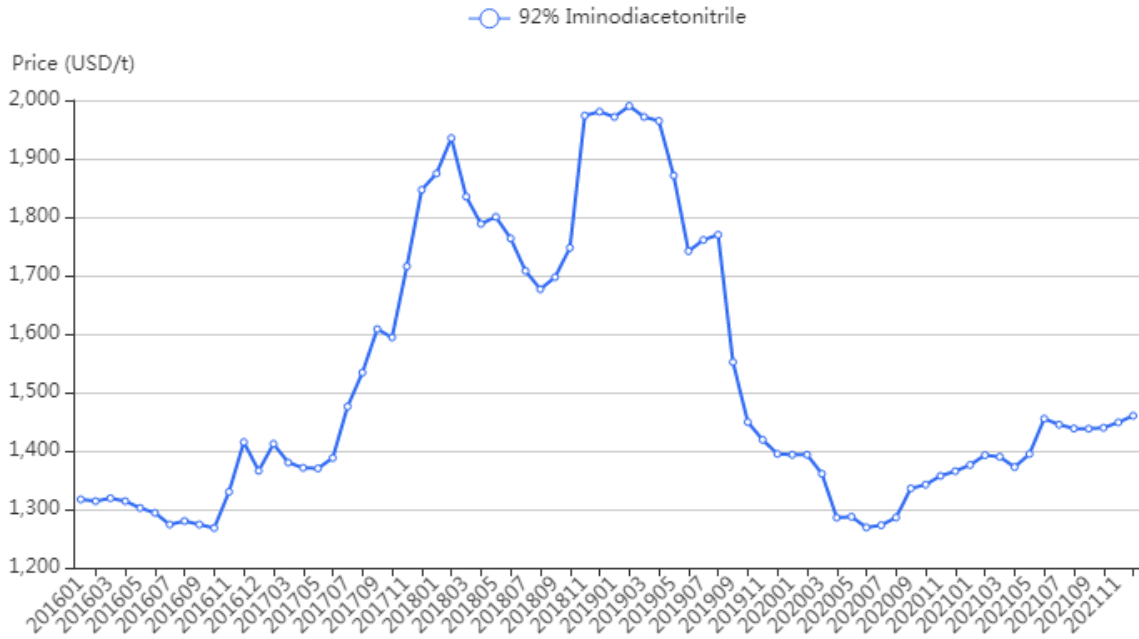
Source: CCM

Figure 2-2 Annual average ex-works price of 95% glyphosate technical in China, 2016–2021



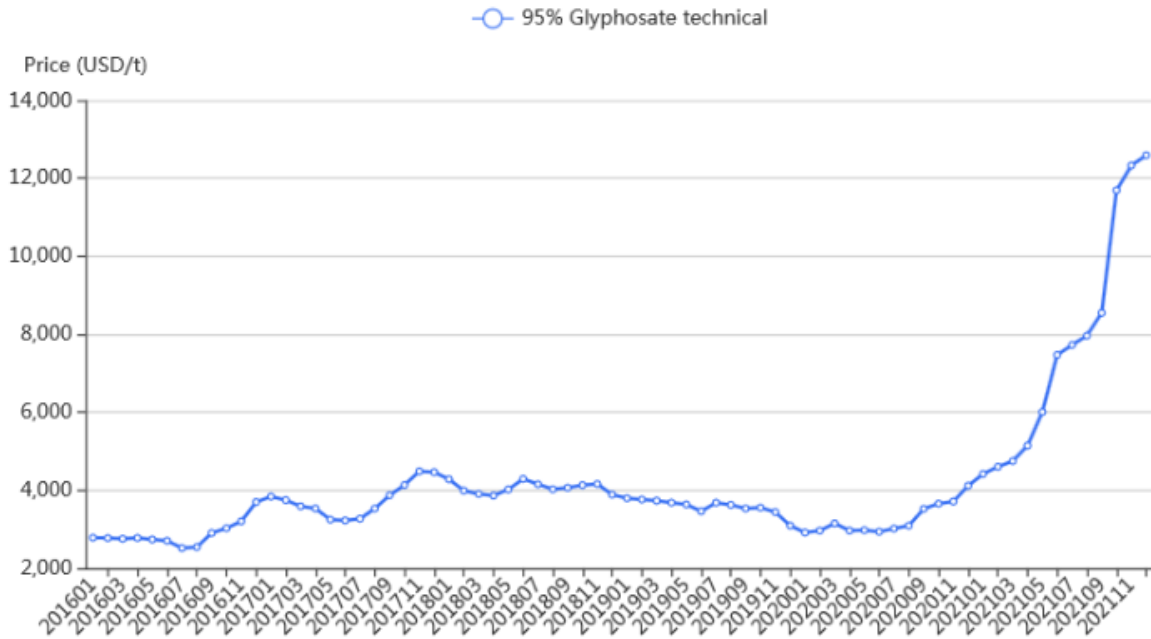
Source: CCM

Figure 2-3 Monthly ex-works price of 92% IDAN in China, Jan. 2016–Dec. 2021



Source: CCM

Figure 2-4 Monthly ex-works price of 95% glyphosate technical in China, Jan. 2016–Dec. 2021



Source: CCM

3 IDAN consumption in China

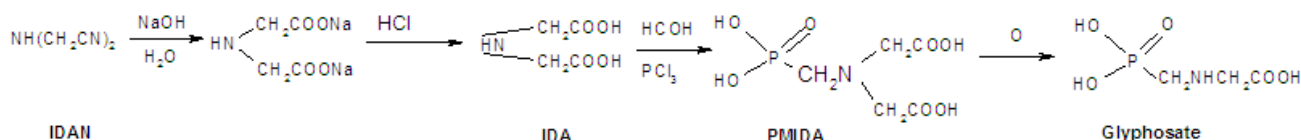
3.1 Glyphosate production

IDAN can be applied in the production of PMIDA & glyphosate technical, electroplate, water treatment, etc., and it is mainly used to produce glyphosate technical in China.

- Introduction to IDAN route for glyphosate technical production

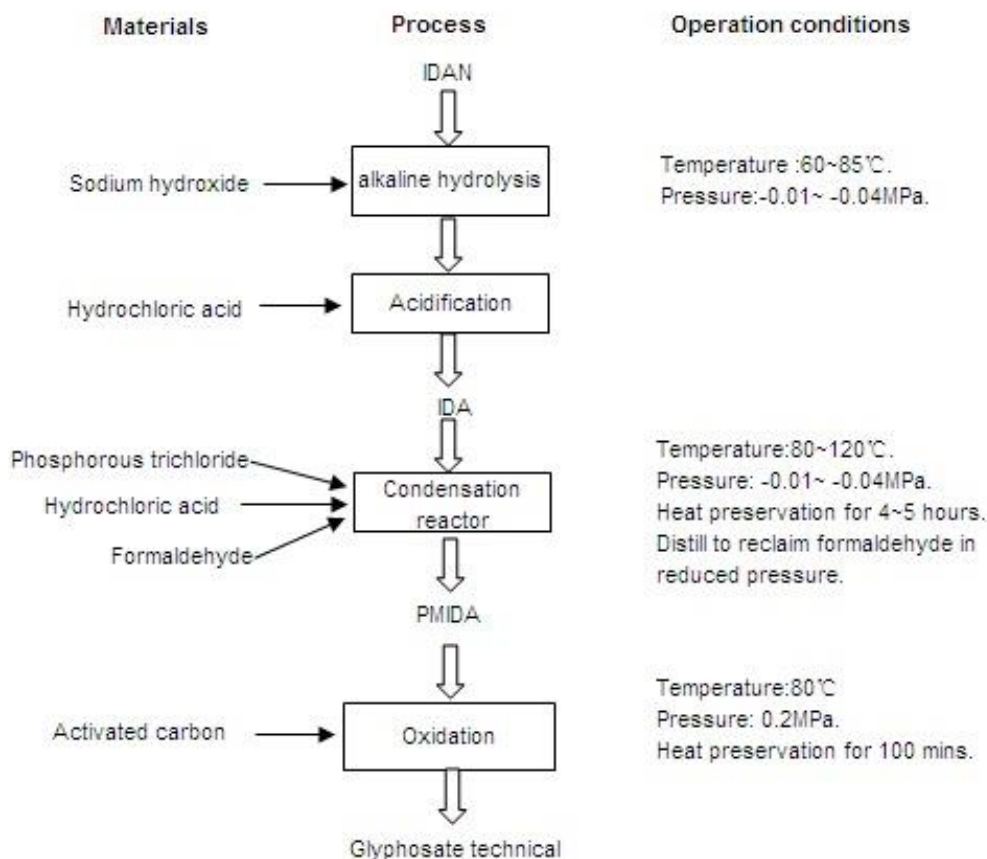
After several years' development, IDAN supply can satisfy the current glyphosate production in China. The detailed IDAN route involves three major procedures, namely hydrolysis reaction, condensation reaction and oxidation process.

Figure 3.1-1 Brief pathway of IDAN route for glyphosate technical production in China



Source: CCM

Figure 3.1-2 Flowchart of IDAN route for glyphosate technical production in China



Source: CCM

The IDAN route was a new production route developed in China in 2005. This route will have a bright future in China for the following factors:

- **Low production cost:** The production cost of IDAN route is lower than the DEA route in most of the times. Though the price of natural gas (raw material of IDAN), under regulation by the Chinese government, has increased slightly in recent years, the price of IDAN is hardly influenced. Domestic glyphosate producers are in a strong bargaining position compared with the IDAN producers, because the consumption field of IDAN is limited.
- **Balanced supply:** By now, the IDAN supply and demand have come to balance.
- **Moderate accessibility of raw materials for the IDAN route:** Based on the cost analysis, IDAN and

phosphorus trichloride are two major raw materials for the IDAN route. At present, some of the glyphosate/PMIDA producers are adopting the IDAN route and establishing their phosphorus trichloride plants to reduce the cost.

- Key glyphosate technical producers by IDAN route

In 2021, there were seven key glyphosate technical producers adopting IDAN route in China with a total capacity of 217,000 t/a.

Table 3.1-1 Capacity of key glyphosate technical producers by IDAN route in China, 2021

No.	Company	Capacity, t/a
1	Jiangsu Good Harvest-Weien Agrochemical Co., Ltd.	62,000
2	Leshan Hebang Agricultural Science and Technology Co., Ltd.	50,000
3	Nantong Jiangshan Agrochemical & Chemicals Co., Ltd.	40,000
4	ADAMA Ltd.	20,000
5	Guang'an Chengxin Chemical Co., Ltd.	20,000
6	Jingma Chemicals Co., Ltd.	15,000
7	Shandong Weifang Rainbow Chemical Co., Ltd.	10,000
Total		217,000

Source: CCM

3.2 Influencing factor analysis

- Influences from other routes for glyphosate production

Routes for glyphosate technical production compete with each other. China's ever stricter environmental policies will force enterprises to choose a production pathway with relatively small pollution.

● Glycine route

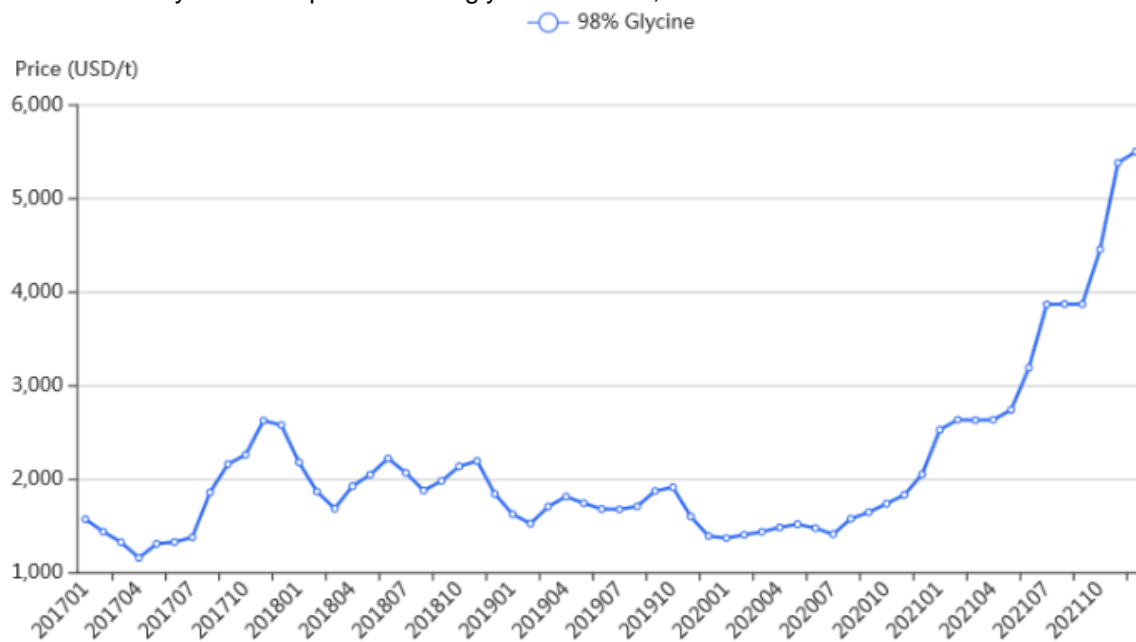
Chinese glycine industry has always witnessed overcapacity in the past few years, and this situation will not change much in the coming few years. Positively, some glycine producers may transform their glycine installations to produce other amino acids. Stricter environmental governance will be implemented on glycine manufacturers as glycine is a polluting chemical, which will limit further capacity expansion.

● DEA route

This route has not been widely chosen by manufacturers in China, because investment and production cost in the route is relatively high.

DEA and IDAN routes have the same intermediate, IDA, but the production cost of glyphosate in IDAN route is less than the cost in DEA route. It is difficult to prepare the catalyst for this route, and DEA needs to be imported, so this method is limited to large-scale industrial production. The Ministry of Commerce of the People's Republic of China imposed anti-dumping duties on EA imported from the US, Saudi Arabia, Malaysia and Thailand on 30 Oct., 2018, which would last for five years. Many glyphosate producers switched to IDAN route to produce their products.

Figure 3.2-1 Monthly ex-works price of 98% glycine in China, Jan. 2017–Dec. 2021



Source: CCM

Figure 3.2-2 Monthly ex-works price of DEA in China, Jan. 2019–Dec. 2021



Source: CCM

- Supporting PMIDA production line

Instead of selling IDAN, some producers sell PMIDA directly for more profit.

More IDAN producers have built supporting PMIDA production lines. What's more, domestic glyphosate technical producers prefer purchasing PMIDA rather than IDAN in order to reduce pollution in their factories.

- Influence from natural gas

The production cost of IDAN in China is affected by the price of natural gas to some extent. It is estimated that the supply of natural gas in China will be tight in the future for the following two reasons:

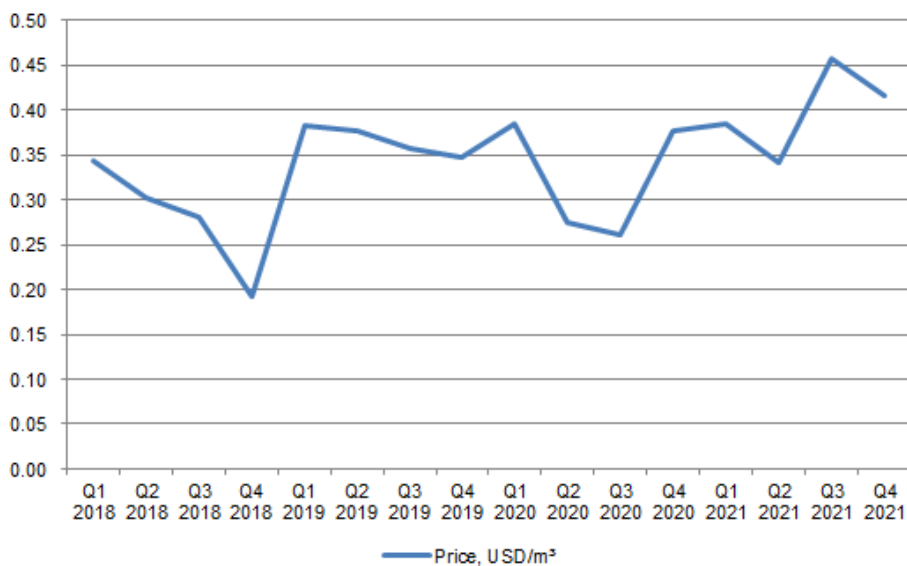
- Firstly, in order to reduce haze pollution, China promotes fuel switching project, from coal to natural gas. If there is a shortage of natural gas, the government will give priority to civilian heating instead of industrial use. The production of many chemicals that require natural gas as raw material, including the production of IDAN, will be affected as a result.
- Secondly, the increase of natural gas output in China could not catch up with its consumption, which leads to high dependence on imports. According to statistics released by China's National Bureau of Statistics, in 2015–2021, more than 30% of natural gas used in China was imported, with the highest ratio of 45.04% in 2021.

Table 3.2-1 Supply and demand of natural gas in China, 2015–2021

Year	2015	2016	2017	2018	2019	2020	2021
Output, billion m3	135	137	148	160	176	192	208
Import, billion m3	61	75	95	125	133	140	168
Consumption, billion m3	193	208	239	282	306	331	373

Source: China's National Bureau of Statistics & CCM

Figure 3.2-3 Quarterly transaction price of pipeline natural gas in China, Q1 2018–Q4 2021



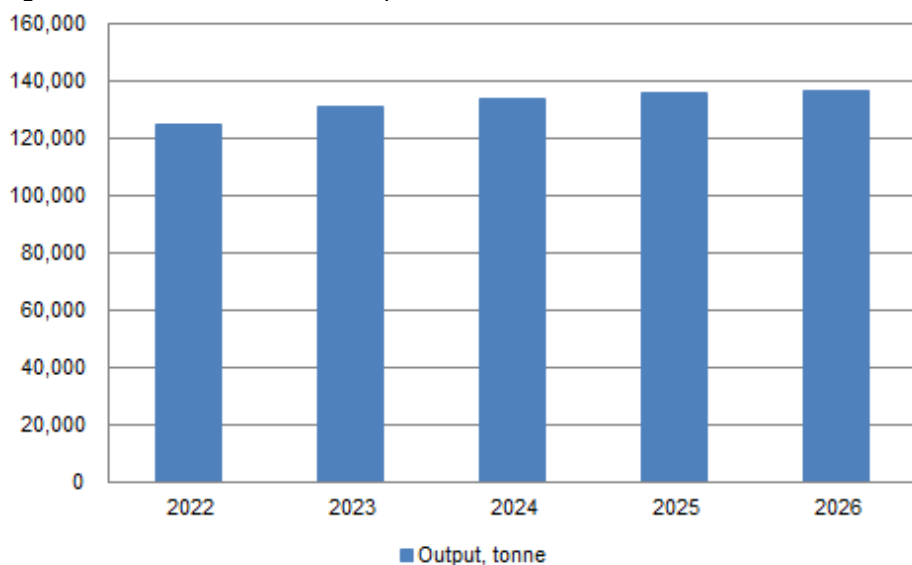
Source: CCM

4 Forecast on IDAN market in China in 2022–2026

It is estimated that the output of IDAN in China will see a slight increase in 2022–2026.

The output is mainly affected by environmental policy and glyphosate market. Environmental policy is expected to be more stringent. Therefore, more downstream manufacturers will want to purchase PMIDA instead of IDAN or DEA to reduce their production waste and environmental protection pressure. Under this background, there is a trend that IDAN manufacturers use self-made IDAN to produce PMIDA themselves, and sell PMIDA directly. On the other hand, demand for glyphosate is expected to remain at a high level for the lack of good substitutes and the bright future of GM crops. Hopefully, China's IDAN output will keep stable with small rise over the next five years.

Figure 4-1 Forecast on IDAN output in China, 2022–2026



Source: CCM

5 Company profiles of top three IDAN producers in China

5.1 Leshan Hebang Agricultural Science and Technology Co., Ltd.

Address: Niuhua Town, Wutongqiao District, Leshan City, Sichuan Province 614801, P. R. China

Tel.: +86-0833-3205580

Fax: +86-0833-3205569

Website: www.hebang.cn

- Company background

Leshan Hebang Agricultural Science and Technology Co., Ltd. (Leshan Hebang) was founded in Nov. 2013 with registered capital of RMB492 million. Leshan Hebang mainly engages in the production of IDAN and PMIDA using natural gas as raw material. It is one of the wholly-owned subsidiaries of Sichuan Hebang Biotechnology Co., Ltd. (Hebang Biotechnology).

Hebang Biotechnology was established in 2002 with registered capital of RMB8.83 billion. It is formerly known as Sichuan Hebang Corporation Limited, and the name was changed into Hebang Biotechnology in July 2015. Hebang Biotechnology got listed on 31 July, 2012 with the code of 603077. The company is mainly engaged in chemical manufacturing, glass manufacturing and the development of salt mine and phosphorite. In recent years, Hebang Biotechnology has turned its main business to other industrial fields such as biological pesticides and other biological products, Internet plus, agriculture, fine chemical and new material industry. Its revenue was about USD1.53 billion (RMB9.87 billion) in 2021, and its total assets reached USD2.77 billion (RMB17.92 billion) by the end of 2021.

- Main chemical products

Sodium carbonate

Ammonium chloride

PMIDA

Glyphosate

IDAN

5.2 Guang'an Chengxin Chemical Co., Ltd.

Address: Xinqiao Energy & Chemical Concentration Area, Economic Development Zone, Guang'an City, Sichuan Province 638019, P. R. China

Tel.: +86-0826-2820021

Fax: +86-0826-2822268

Website: www.guanganchengxin.com

- Company background

Guang'an Chengxin Chemical Co., Ltd. (Guang'an Chengxin), established in 2007, is a subsidiary of Hebei Chengxin Co., Ltd. Its registered capital increased to RMB80 million in 2020, up by RMB30 million from the original figure. It is a fine chemical enterprise producing cyanide and its downstream products by using natural gas as raw material.

- Main chemical products

N-Phenylglycinonitrile

Ethylene diamine tetraacetic acid (EDTA)

Glycolonitrile

Glycolic acid

Formaldehyde

IDA

IDAN

PMIDA

Glyphosate

NaCN

5.3 Chongqing Unisplendour Chemical Co., Ltd.

Address: Floor 13, Building Tianwangxing A, Xingguang Avenue, North New Area, Chongqing City 401121, P. R. China

Tel.: +86-023-67680190

Fax: +86-023-67680203

Website: www.unischem.com

- Company background

Chongqing Unisplendour Chemical Co., Ltd. (Chongqing Unisplendour) was founded in December 2000 with registered capital of RMB180 million.

Chongqing Unisplendour is mainly engaged in research, production and sales of HCN and its derivatives. It has become a major production base of fine chemicals derived from natural gas in China, with advanced technology and competitive cost. The capacity of HCN in Chongqing Unisplendour was 92,000 t/a in 2021.

At present, Chongqing Unisplendour has about 10 subsidiaries and seven production bases in Chongqing City, Inner Mongolia Autonomous Region, Xinjiang Uygur Autonomous Region and Ningxia Hui Autonomous Region.

- Main chemical products

IDAN

N-phenylglycinonitrile

PMIDA

DL-Methionine

4,6-Dihydroxypyrimidine (DHP)

Trimethyl orthoformate

Sodium ferrocyanide

Dimethyl malonate

Formamide

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