

IDAN Survey in China 2022

The Seventh 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 2022, IDAN capacity remained in line with 2021 at 175,000 t/a, 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, compared to 2021, IDAN output reduced a bit from 120,500 tonnes to 120,000 tonnes in 2022.

In 2022, the annual average price of 92% IDAN suffered a decrease from USD1,421/t in 2021 to USD1,392/t in China.

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 null-1 USD/CNY exchange rate, 2017–2022

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
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
2022	6.3794	6.3580	6.3014	6.3509	6.5672	6.6651	6.6863	6.7467	6.8821	7.0992	7.2081	7.1225	6.6972

Source: The People's Bank of China

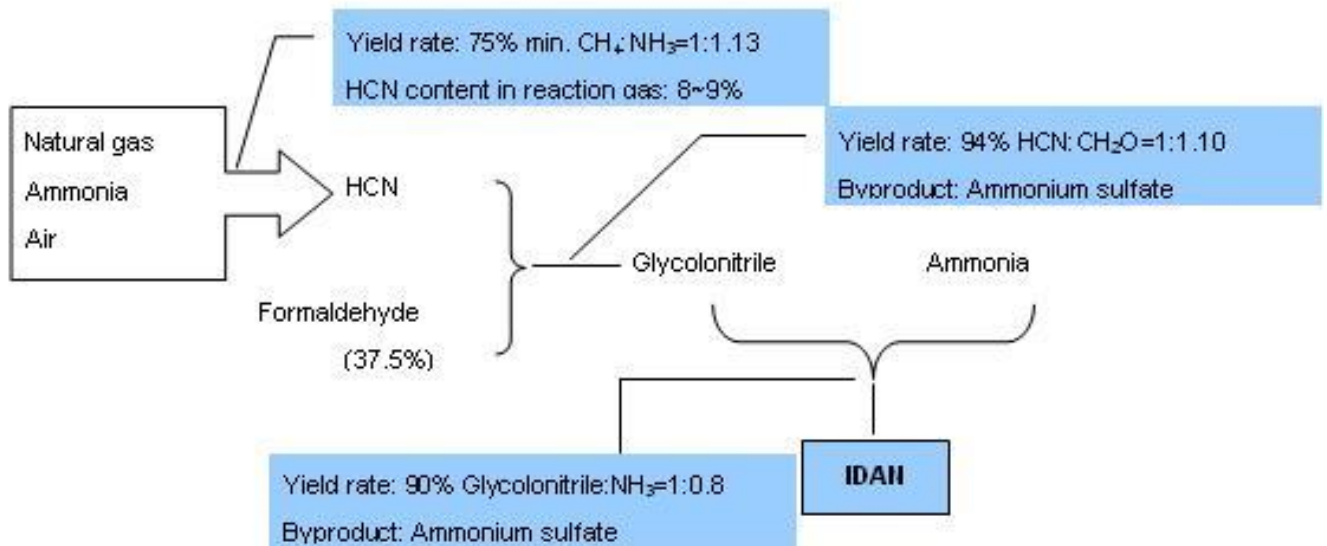
1 IDAN production in China

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



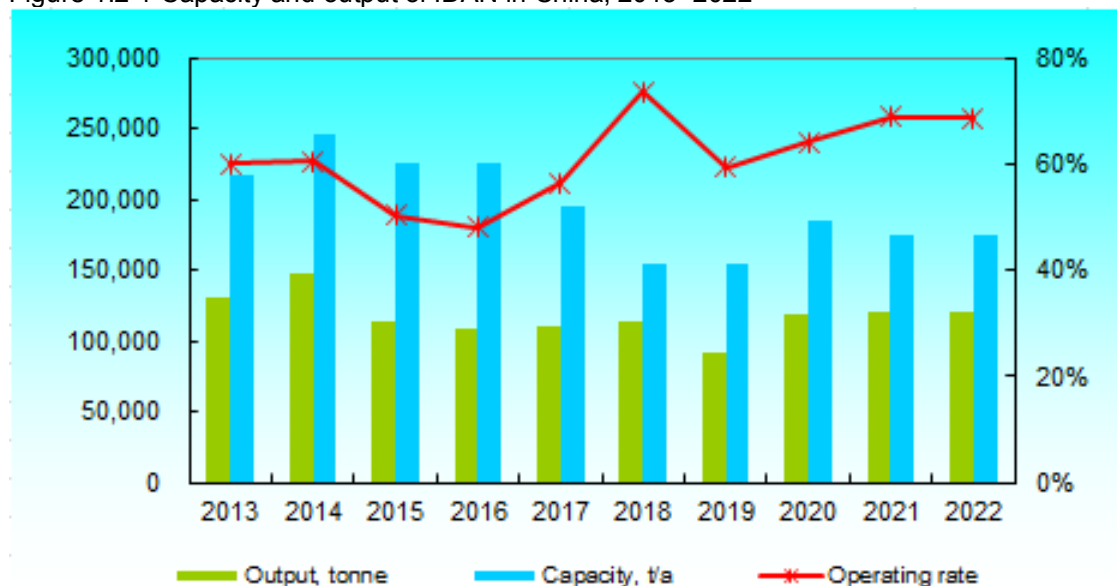
Source: CCM

1.2 Capacity and output of IDAN

During 2013–2016, the capacity of IDAN kept over 200,000 t/a, but due to oversupply, it began to decline in 2017. By 2022, the capacity reduced to 175,000 t/a, with only 3 producers operating in China.

As for output, IDAN's output in China peaked at 148,000 tonnes in 2014, but in the following years, IDAN's output decreased and kept stable at around 110,000–120,000 tonnes (except for 2019).

Figure 1.2-1 Capacity and output of IDAN in China, 2013–2022



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 2022, 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 2022, 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 established a complete integrated chain of glyphosate (IDAN route) 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 purchased IDAN to produce PMIDA and then glyphosate technical, but since 2015, some of them switched to purchasing PMIDA produced by Leshan Hebang to produce glyphosate technical.

In 2022, 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, 2018–2022

No.	Producer	Status in 2022	Capacity in 2022, t/a	Output, tonne				
				2018	2019	2020	2021	2022
1	Leshan Hebang Agricultural Science and Technology Co., Ltd.	Active	100,000	70,000	70,000	99,000	100,000	100,000
2	Chongqing Unisplendour Chemical Co., Ltd.	Active	50,000	32,000	10,000	7,500	6,500	6,000
3	Guang'an Chengxin Chemical Co., Ltd.	Active	25,000	12,000	12,000	12,000	14,000	14,000
Total			175,000	114,000	92,000	118,500	120,500	120,000

Source: CCM

2 IDAN price in China

- Price of IDAN

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. In 2022, the annual average price reduced to USD1,392/t in China.

The price of IDAN in China is mainly affected by the price of glyphosate technical and raw material costs, under the oversupply of IDAN.

- Price of glyphosate technical

The domestic price of IDAN was influenced by that of glyphosate technical, especially when the price of glyphosate technical is high because PMIDA & glyphosate technical is the only end-use segment of IDAN in China. In 2022, although the ex-works price of 95% glyphosate technical is rising, the rate of increase is slower than in 2021, and since January 2022, the monthly ex-works price of glyphosate technical has declined. So the price of IDAN has decreased since 2022.

- Raw material cost

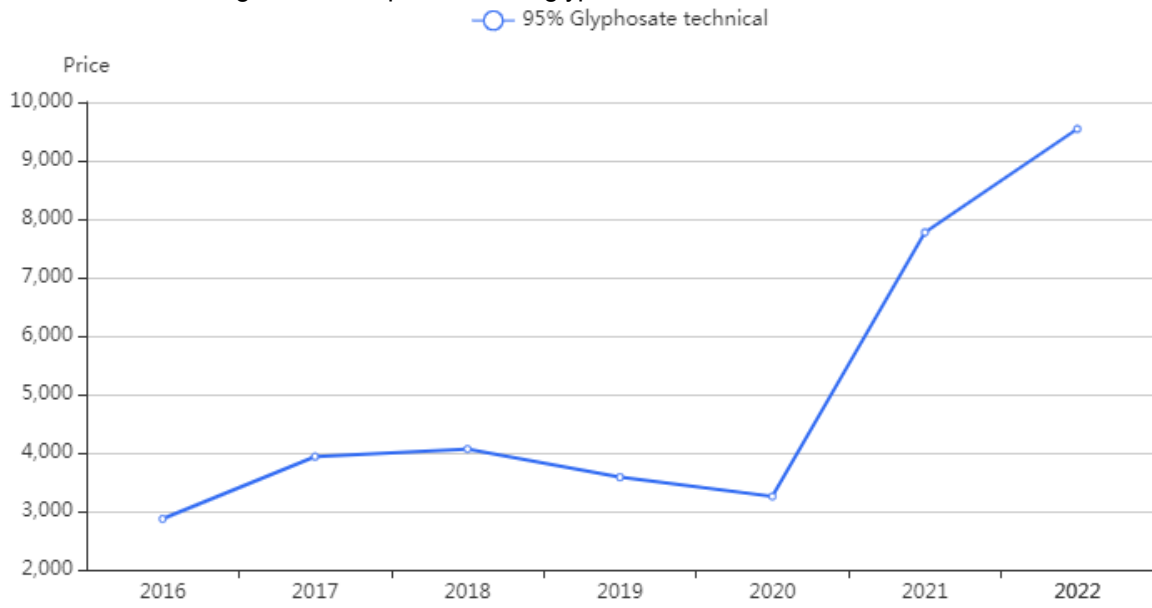
The raw material cost usually takes up about 70% of the total production cost of IDAN. And natural gas plays the most important role in raw material cost, as it is not only the starting raw material of IDAN but also the raw material of the other important raw materials of IDAN, such as formaldehyde and 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, 2016–2022



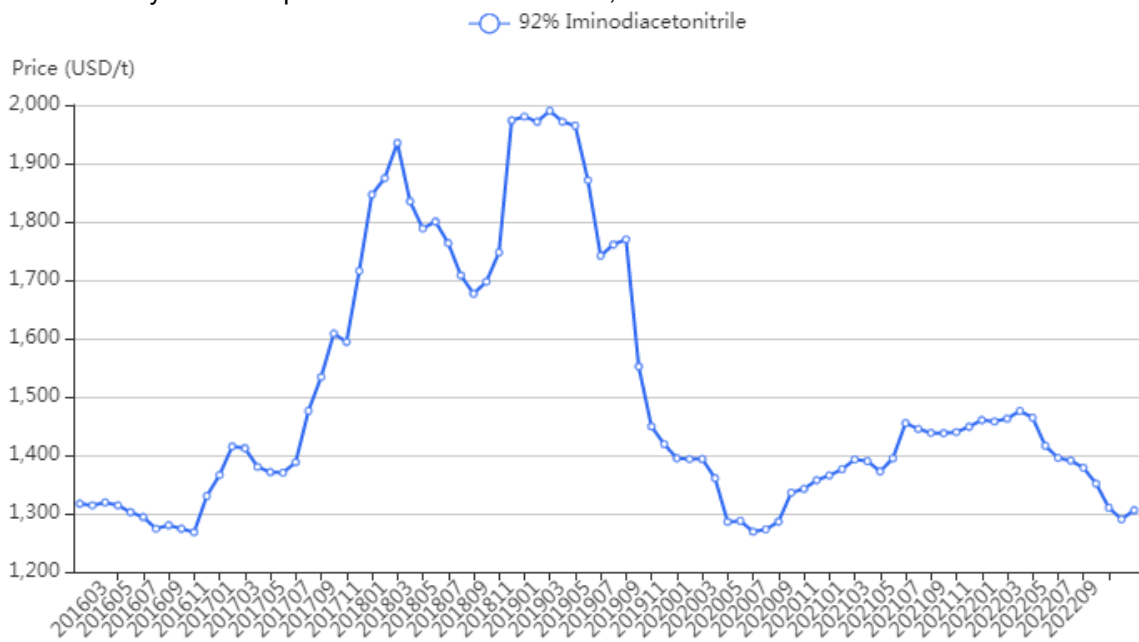
Source: CCM

Figure 2-2 Annual average ex-works price of 95% glyphosate technical in China, 2016–2022



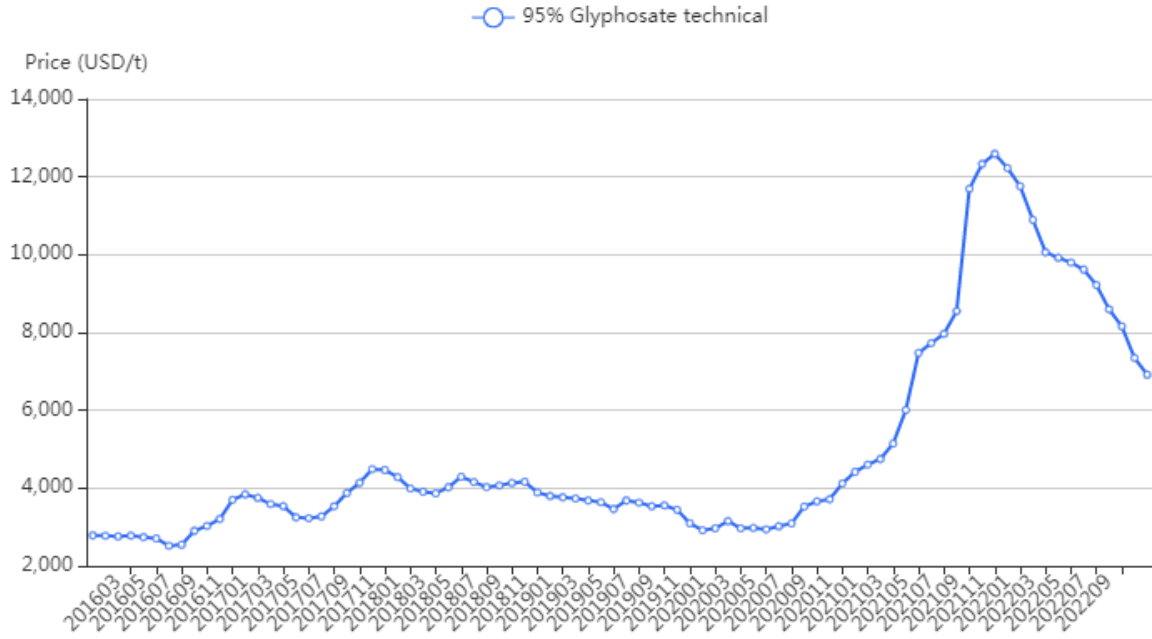
Source: CCM

Figure 2-3 Monthly ex-works price of 92% IDAN in China, Jan. 2016–Dec. 2022



Source: CCM

Figure 2-4 Monthly ex-works price of 95% glyphosate technical in China, Jan. 2016–Dec. 2022



Source: CCM

3 IDAN consumption in China

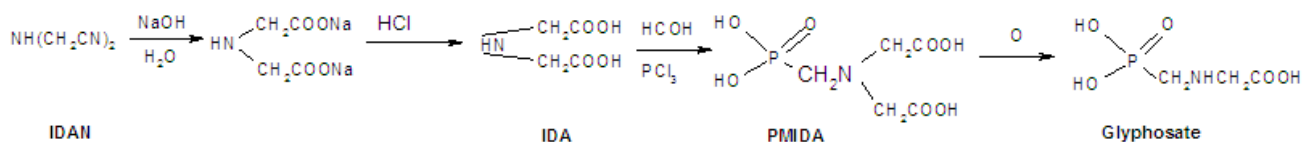
3.1 Glyphosate production

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

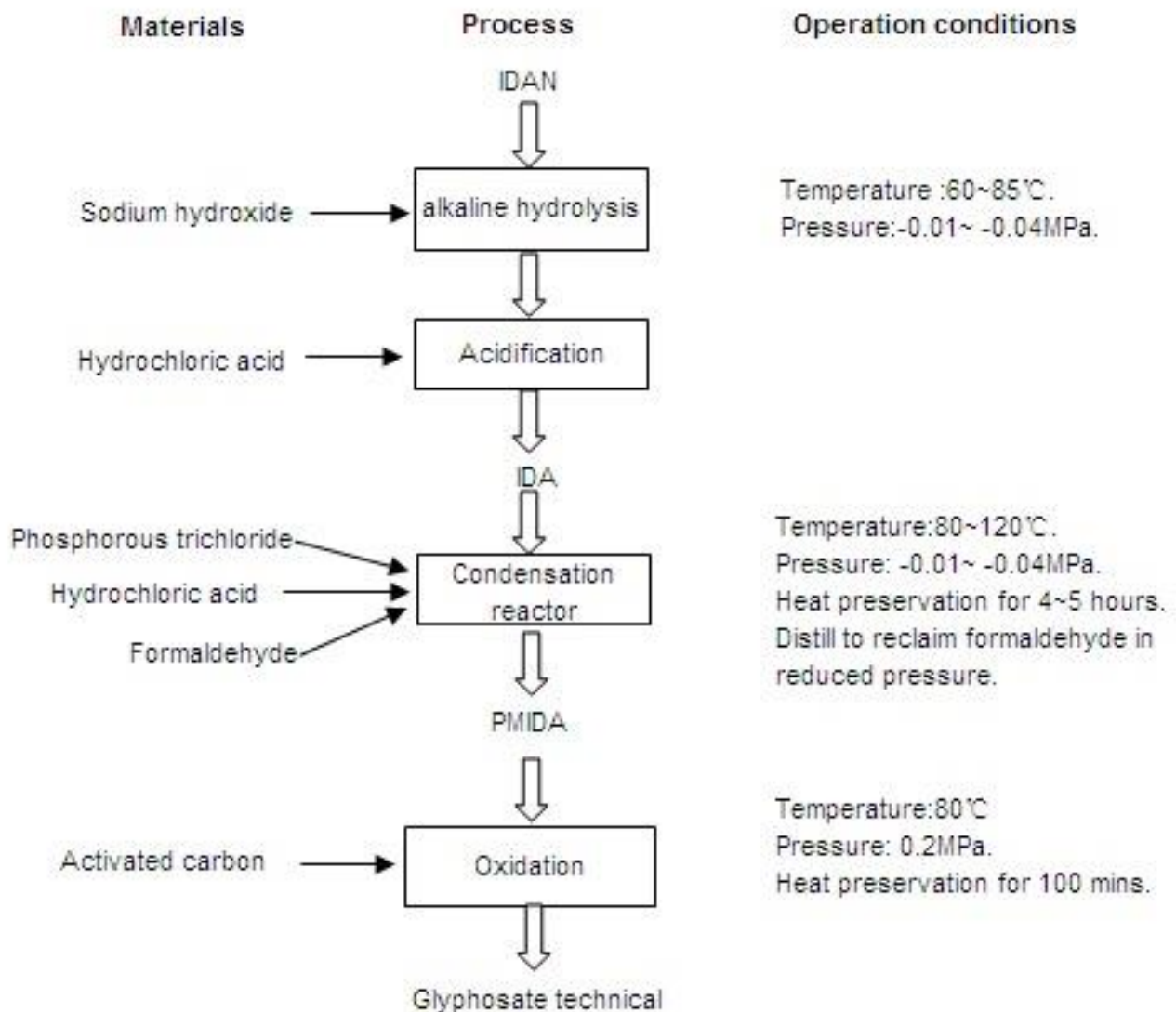
After several years' development, IDAN supply can satisfy the current glyphosate production in China. The detailed IDAN route involves three major procedures, namely hydrolysis reaction, condensation reaction and oxidation process.

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 2022, 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 Key glyphosate technical producers adopting IDAN pathway in China, 2022

No.	Company	Capacity, t/a
1	Jiangsu Good Harvest-Weien Agrochemical Co., Ltd.	62,000
2	Leshan Hebang Agricultural 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

The glycine route remains dominant in producing glyphosate, accounting for 72%–76% of the total glyphosate output in China in 2018–2022. 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.

As for price, there is a great oversupply in glycine in China, and in most cases, glycine price won't change much. And due to some environmental policies, supply of and demand for glycine and enterprises' operating profits in China are limited, affecting the price of glycine.

● DEA route

This route has not been widely chosen by manufacturers in China, because investment and production cost in the route is relatively high. The output of glyphosate technical taking DEA as raw material in China was 26,000 tonnes in 2015–2017, and 30,000 tonnes in 2018–2022.

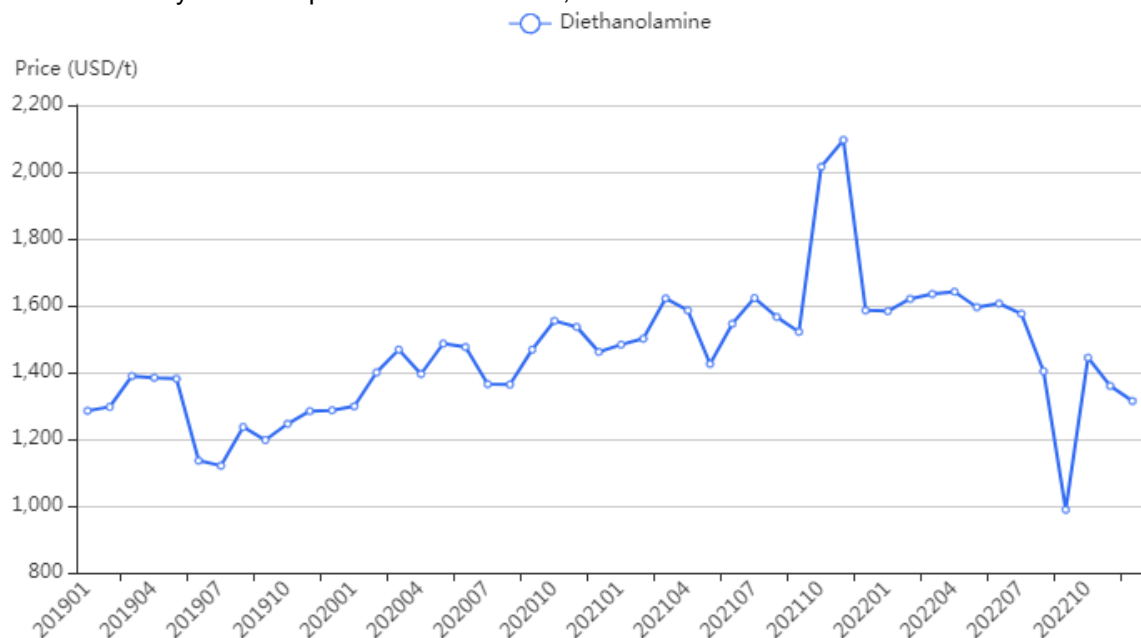
DEA and IDAN routes have the same intermediate, IDA, but the production cost of glyphosate in IDAN route is less than the cost in DEA route. It is difficult to prepare the catalyst for this route, and DEA needs to be imported, so this method is limited to large-scale industrial production. The Ministry 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. 2018–Dec. 2022



Source: CCM

Figure 3.2-2 Monthly ex-works price of DEA in China, Jan. 2019–Dec. 2022



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 requires 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 2016–2022, more than 30% of natural gas used in China was imported, with the highest ratio of 45.04% in 2021.

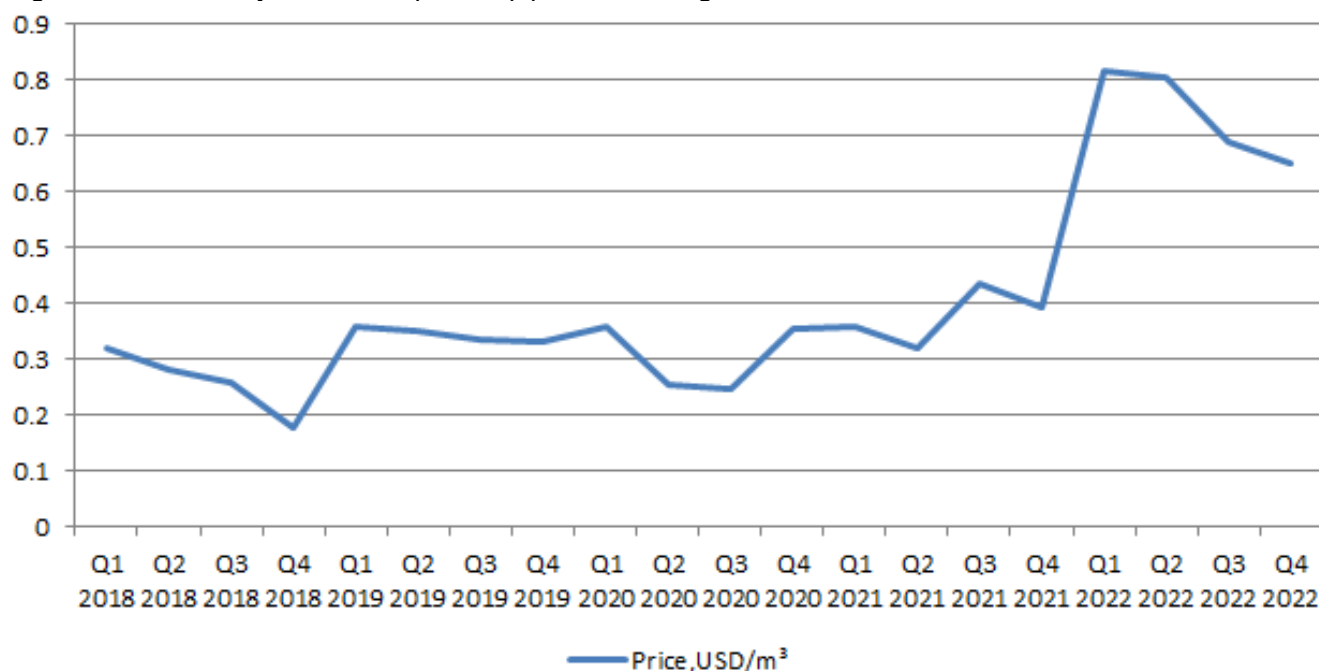
What's more, the Russia-Ukraine conflict that broke out in 2022 affected the normal operation of the international natural gas market. Europe gradually reduced natural gas imports from Russia and increased imports from other international markets, while Russian natural gas is difficult to quickly switch to other demand markets, and the global natural gas market is tightening, which in turn has led to a sharp increase in the price of imported natural gas in China. In addition, natural gas prices have also been affected by rising oil prices, with exorbitant prices suppressing demand for natural gas in China.

Table 3.2-1 Supply and demand of natural gas in China, 2016–2022

Year	2016	2017	2018	2019	2020	2021	2022
Output, billion m ³	137	148	160	176	192	208	220
Import, billion m ³	75	95	125	133	140	168	152
Consumption, billion m ³	208	239	282	306	331	373	366

Source: China's National Bureau of Statistics & CCM

Figure 3.2-3 Quarterly transaction price of pipeline natural gas in China, Q1 2018–Q4 2022



Source: CCM

4 Forecast on IDAN market in China in 2023–2027

It is estimated that the output of IDAN will decline slightly in 2023 and a small increase is expected between 2024 and 2027.

In the short term, the output of IDAN will decline slightly in 2023.

In China, there are two ways to produce PMIDA, the DEA route and the IDAN route, of which the vast majority of PMIDA is produced using the IDAN route due to the lower cost. On one hand, the output of PMIDA, one of the downstream products of IDAN, has declined from 191,000 tonnes in 2019 to 114,000 tonnes in 2022, and downstream demand is weak. On the other hand, in 2022, the output and monthly price of glyphosate, which is downstream of IDAN, are declining, and terminal demand is sluggish. Since 2018, the operating rate of manufacturers using the IDAN route has been dwindling, and this situation is likely to continue for some time without significant positive news. In addition, we need to consider another route for the production of glyphosate—the glycine route. Currently, the domestic supply of glycine greatly exceeds the domestic demand. The oversupply leads to a lower price of glycine, which causes glyphosate producers to choose the glycine route.

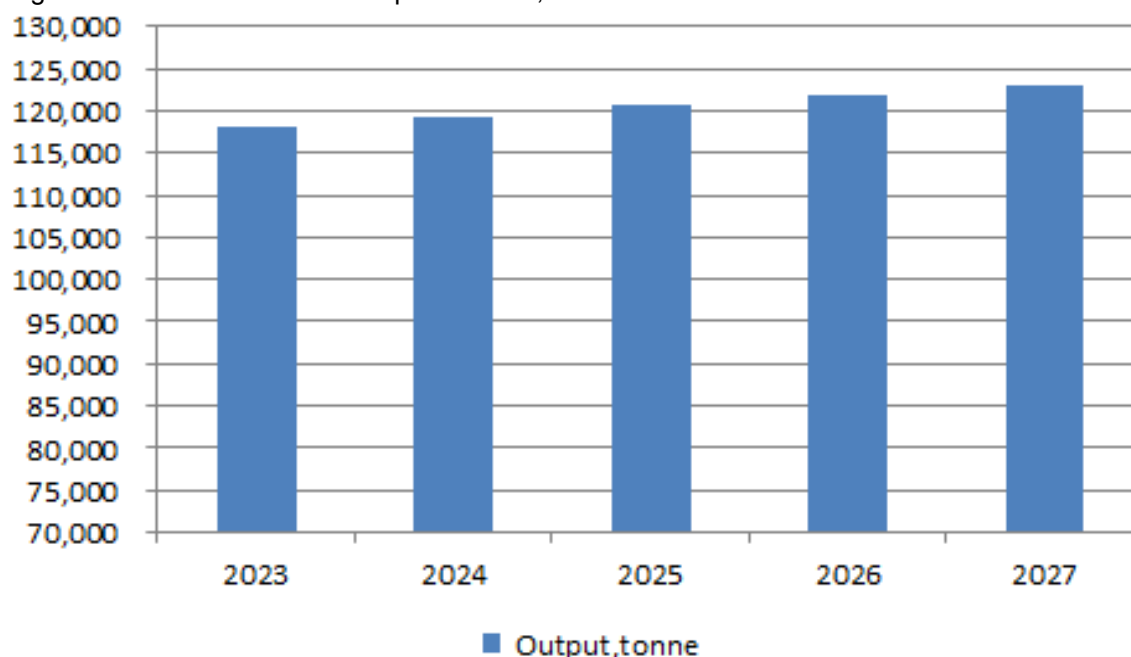
In the long term, a small increase is expected between 2024 and 2027.

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. Against this backdrop, there is a trend that IDAN manufacturers use self-made IDAN to produce PMIDA themselves, and sell PMIDA directly. The industrial concentration of IDAN is relatively high (only three producers), and it will be further heightened in the future, because Leshan Hebang has played a dominant role in IDAN & PMIDA industrial chain. Leshan Hebang also publicised that it proposed a 500,000 t/a PMIDA expansion plan in April 2022. This project will be completed in 24 months from the date the conditions for commencement of construction were met.

Glyphosate is a restricted investment project by the National Development and Reform Commission, and the main reason for the restriction on production of glyphosate is pollution. The IDAN route emits fewer wastes, so some manufacturers may switch their production routes in the future to increase IDAN's output.

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, the domestic approval of GM products has been significantly accelerated in recent years. It is expected that the output of glyphosate technical in China will further increase. Therefore, this may lead to an increase in the output of IDAN.

Figure 4-1 Forecast on IDAN output in China, 2023–2027



Source: CCM

5 Company profiles of top three IDAN producers in China

5.1 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 Dec. 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.

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

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

Address: Niu Hua 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 USD1.95 billion (RMB13.04 billion) in 2022, and its total assets reached USD3.60 billion (RMB24.10 billion) by the end of 2022.

- Main chemical products

Sodium carbonate
Ammonium chloride
PMIDA

Glyphosate
IDAN

5.3 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

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