CCM Data & Business Intelligence

Survey of Fluorine Industry in China 2023

Researched & Prepared by:

Kcomber Inc.

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1. Introduction

2. Approach for this report

The report is drafted by diverse methods as follows:

X) Desk research

The 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 gone into the compilation and analysis of the obtained information. When necessary, checks have been made with all kinds of suppliers regarding market information such as key manufacturers, key end-users, production, consumption, export, demand and so on.

X) Telephone interviews

CCM has carried out extensive telephone interviews in order to track the actual market situation of the fluorine industry in China.

Interviewees cover:

- Major manufacturers of fluorite
- Major manufacturers of inorganic fluorides
- Major manufacturers of organic fluorides
- Major manufacturers of semi-finished products
- Major manufacturers of finished products
- Major traders
- Associations

X) Network search

CCM employs a network to contact industry participants by using BXB website and software.

X) Data processing and presentation

The data collected and compiled is variously sourced from:

CCM's database

- Published articles from periodicals, magazines, journals and third party databases
- Statistics from governments and international institutes
- Telephone interviews with domestic manufacturers, joint ventures, service suppliers and government agencies

- Third-party data providers
- Customs statistics
- Comments from industrial experts
- Information from the Internet

The data have been combined and cross-checked to make the report as accurate and methodologically sound as possible. Throughout the process, a series of discussions have been held within CCM to analyse the data and draw appropriate conclusions.

- Glossary

CAGR: compound annual growth rate

AHF: anhydrous hydrogen fluoride

HCFC: hydrochlorofluorocarbon

RXX: difluorochloromethane

RXXXa: X,X,X,X-tetrafluoroethane

RXX: difluoromethane

RXXX: pentafluoroethane

RXXXa: mixture of RXX and RXXX

HFP: hexafluoropropylene

PTFE: polytetrafluoroethylene

PVDF: polyvinylidene fluoride

CTFE: chlorotrifluoroethylene

VDF: vinylidene fluoride

TFE: tetrafluoroethylene

- Unit

RMB: currency unit in China, also called Yuan

USD: currency unit in the US, also called US Dollar

Tonne: ton, equals to metric ton in this report

/t: per tonne

t/a: tonne per year, tonne per annual

kg: kilogram

Source:The People's Bank of China

3. Executive summary

Fluorine industry has been one of the fastest developing and most promising chemical industries in China. China has become one of the largest production and consumption areas of fluorine chemicals. There are four important sectors for China's fluorine industry, consisting of inorganic fluoride, fluorine refrigerant, fluor polymer and fluor-intermediate.

According to statistics from the United States Geological Survey, China's fluorite reserves remained at XX million tonnes from XXXX–XXXX and rose to XX million tonnes in XXXX, ranking second in the world. In XXXX–XXXX, China's fluorite output stayed above X million tonnes. To protect the fluorite resources, China has established fluorite industry access standards and issued strict policies.

Great progress has been made in the research and development of inorganic fluorides in China. Inorganic fluorides have been widely used in chemical, mechanical, optical instrument, electronic and medical fields and have become important chemical products in the national economy. China is the largest producer of anhydrous hydrogen fluoride, aluminum fluoride and cryolite in the world, with the production capacity of X,XXX,XXX t/a, X,XXX,XXX t/a and XXX,XXX t/a respectively in XXXX. In addition, the production of lithium hexafluorophosphate has developed fast in the past five years and its capacity reached XXX,XXX t/a in XXXX.

China agreed to take steps to phase out HCFCs. To achieve targets set in the phaseout plan of HCFCs, China has implemented quota management system for production and use of HCFCs since XXXX. In recent years, the total production quotas of HCFCs have seen a general decrease and have been concentrated in large enterprises. In XXXX, a decrease was seen in both the output and consumption of RXX. As a refrigerant, RXX production dropped because of strict environmental protection policies and the increasing use of other HFCs, but its use as a raw material to produce tetrafluoroethylene has been on the rise. As HFCs have been substituting HCFCs, both the production and consumption of HFCs such as RXXXa, RXX, RXXX and RXXXa have increased. In XXXX, quota of the third-generation refrigerants will be implemented, pushing the producers in the industry to compete for more quotas by increasing its production or sales.

There are two main varieties of fluor polymer in China, including fluor resin and fluor rubber. The fluor polymer industry, especially fluor resin, is developing very quickly in China, though still facing many problems such as inefficient technology and the lack of high-end products. PTFE is the principal product of fluor resins in China, followed by PVDF and FEP. Fluor resins are widely used in coatings, sealing, architecture, electronics and other fields. As to fluor rubbers, along with the development of automobile and

petrochemical industries, the industry developed rapidly in XXXX–XXXX. However, in XXXX, the development of fluor rubbers industry slowed down due to the lack of high-end products and the shrinking of low and medium-end markets.

4. What is in the report?

Note: Key data/information in this sample page is hidden, while in the report it is not.

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2.1 Overview of fluorite reserves in China

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- Characteristics of fluorite reserves in China
  - Low impurity content
  - Less high-grade ore. The average grade of CaFX of a single fluorite ore is about XX%–XX%, the fluorite with CaFX grade greater than XX% (which can be directly used as metallurgical grade lump ore) only accounts for XX% of the total single fluorite deposits, and that with CaFX grade greater than XX% accounts for less than XX% of the total.

- Distribution of fluorite reserves in China
  - Jiangxi Province, Inner Mongolia Autonomous Region, Heilongjiang Province, and Hunan Province. Fluorite reserves in Jiangxi Province and Inner Mongolia Autonomous Regions accounted for nearly XX% of the national total.

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3.2.2 Price

In HX XXXX, the ex-works price of AHF (XX.XX%) rose sharply from USDX,XXX/t to USDX,XXX/t, up by XX.X%. The main reasons were as follows:

- The price of fluorite, the key raw material of AHF, rose greatly.
- There was a short supply of AHF due to environmental protection pressures, routine maintenance and other factors which resulted in a low operating rate.
- The demand for AHF for the production of downstream refrigerants (like RXX) market increased greatly.

After a short time of decline in July–Aug. XXXX, the price went up again and rocketed to USDX,XXX/t in March XXXX, the highest price in the past six years. The shortage of fluorite was the main reason for this

round of surge.

In XXXX, the price of AHF fluctuated dramatically with the highest price reaching USDXXXX/t in March XXXX while the lowest dived to USDXXXX/t in May XXXX. Specifically:

- In Jan.–Feb.: Main producers overhauled their production lines temporarily due to environmental and safety issues, leading to a short supply of AHF. Seasonal demand of refrigerants also pushed up the price.
- In March–Aug.: AHF price dived significantly as manufacturers resumed production while downstream demand started to abate.
- In Sept.–Dec.: The tight supply of AHF appeared again in the market with more and more major governmental conferences held and producers had to suspend production again to prevent unnecessary inspections.

In XXXX, the price fluctuated between USDX,XXX/t and USDX,XXX/t. It was deeply affected by the Sino-US trade dispute. With news on the phase-one trade deal between the two countries coming, the price finally stabilized at around USDX,XXX/t in QX. In general, the AHF price trend in XXXX can be divided into four stages:

- From Jan. to early April: AHF market price fell sharply, mainly contributed by the following factors—The first is the restart of the AHF devices after maintenance. The supply of AHF was sufficient in the market. Meanwhile, operating rate of upstream raw material fluorite rose slightly, especially in Inner Mongolia and Hebei provinces. On the whole, the supply of fluorite increased, and the falling price of fluorite dragged down AHF price significantly. In addition, sluggish downstream refrigerant market also affected the price.
- From mid-April to mid-July: The price rebounded. During this period, operating rate of domestic refrigerant industry rose slightly. Demand for AHF from the refrigerant sector increased. On the other hand, supply of fluorite was slightly tight. The price of fluorite went up, which strongly supported AHF price.
- From late July to mid-Nov.: The price of AHF fluctuated. The operating rate of AHF was about XX%. Spot AHF was sufficient while downstream refrigerant production was at a low level. Demand for upstream fluorite and AHF was poor. Specifically, operating rate of refrigerant RXX was around XX%. The operating rate of RXXXa remained low. Market demand for refrigerants was moderate and mainly for export.
- From the end of Nov. to the end of the year: AHF price rose slightly. Fluorite mining and flotation operated normally. As automotive industry was active in stocking, the supply of RXX was tight.

In HX XXXX, the price first climbed to USDX,XXX/t in March, but dropped to USDX,XXX/t in May. The price rise in QX was mainly influenced by the COVID-XX pandemic, as raw material supply was tight then due to impeded production, restricted transportation and lack of available labor resources. The AHF price followed the rising trend shown in prices of the raw materials. As domestic conditions eased, production gradually

resumed and AHF supply recovered, so the price began to fall. In HX XXXX, the price stayed at a low level and rebounded within a narrow range, reaching USDX,XXX/t in Dec. XXXX. The price was affected by sluggish downstream demand, especially a weak demand from refrigerant industry.

In XXXX, AHF price started from USDX,XXX/t in Jan. and climbed to USDX,XXX/t in Dec., up by XX.X%. Specifically:

- In Jan.–Feb.: AHF price increased, driven by a mismatch between supply and demand and the increasing price of raw material fluorite.
- In March–Aug.: AHF price fluctuated slightly, influenced either by cost or by demand.
- In Sept.–Dec.: The rose rapidly, and peaked at USDX,XXX/t in Nov., mainly because prices of both the upstream material fluorite and downstream refrigerants rose.

XXXX saw ups and downs in AHF price, with the highest price at USDXXXX/t and the lowest of USDXXXX/t, specifically:

- In Jan.–May: AHF remained at a high level ranging from USDXXXX/t to USDXXXX/t. During this period, supply of AHF was sufficient but downstream demand was rather stagnant, resulting in the fluctuation of AHF price.
- In June–Oct.: AHF price fell significantly. The demand for refrigerants diminished terribly, which further dragged the price to the lowest point of the year to USDXXXX/t in Oct.
- In Nov.–Dec.: AHF price climbed back as the raw materials fluorite was in tight supply resulting from the low operating rate of producers.

In HX XXXX, the overall AHF price continued the downward trend, with the highest seen in Jan. and the lowest in May.

Figure 3.2.2-1 Monthly ex-works price of AHF in China, Jan. 2018–June 2023

Source:CCM

3.2.3 Import and export

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The main export destinations of China in XXXX lies in Asian countries and regions. In XXXX, Japan was the largest export destination for China's AHF, followed by South Korea, Taiwan of China, and Thailand. Meanwhile, Japan was also the largest source of AHF imports into China, accounting for XX.X% of total imports.

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3.3.3 Import and export

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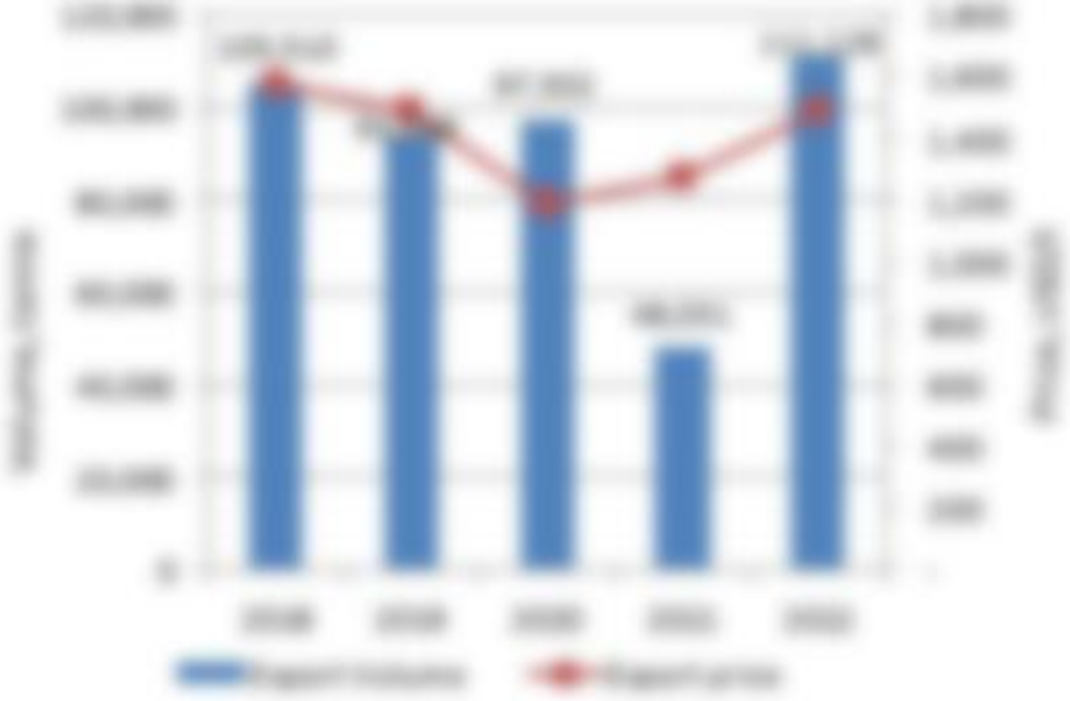
Figure 3.3.3-1 China's exports of aluminum fluoride, 2018–2022



Note:Anhydrous aluminum fluoride and other aluminum fluoride are included.
Source:China Customs & CCM

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3.4.1 Production situation

Most cryolite is consumed in the production of electrolytic aluminum, while a small part is consumed in welding electrodes, enamels and ceramics.

The rapid expansion of the scale of China's electrolytic aluminum industry has further stimulated the development of the cryolite industry. In XXXX, after China issued the supply-side reform and actions to rectify illegal production capacity of electrolytic aluminium, the country began to limit new capacity of electrolytic aluminium. Therefore, in recent years the capacity of cryolite has seen a downtrend. In XXXX, the capacity of cryolite decreased to XXX,XXX tonnes, with a YoY decrease of X.XX%.

In the past five years, few manufacturers announced plans to expand production capacity, and some got out of the business. As a result, the capacity of cryolite in China decreased slightly from XXX,XXX t/a to XXX,XXX t/a in XXXX–XXXX. At the same time, the output of cryolite dropped from XXX,XXX tonnes in XXXX to XXX,XXX tonnes in XXXX, influenced by supply-side reform in electrolytic aluminum industry. Besides, new technologies of electrolytic aluminum production such as "use of electrolytes instead of cryolite" and "obtaining cryolite from aluminum electrolytic waste residue", have also contributed to the decrease. In XXXX, capacity and output followed the downward trend to XXX,XXX tonnes and XXX,XXX

tonnes respectively.

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3.4.2 Price

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Figure 3.4.2-1 Monthly ex-works price of cryolite in China, Jan. 2018–June 2023

Source:CCM

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4.1.1.1 Production situation

RXX is one of the major fluorine refrigerants in China.

Although the production quota of RXX as refrigerant is reduced, the production of RXX used as a raw material is not restricted. Therefore, the reduction of RXX in ODS use can be offset by the increase in raw material use. In China, both the capacity and output of RXX used in raw material field have been on the rise with the capacity expansion of products such as PTFE and HFP.

The capacity of RXX continued to go upwards, to XXX,XXX t/a in XXXX from XXX,XXX t/a in XXXX, with a CAGR of X.X% in this period. As for output, from XXXX to XXXX, the output of RXX grew along with increasing domestic demand in non-ODS field. However, influenced by the COVID-XX in XXXX, the output

of RXX shrank by X.X% from the year before. As China's economy recovered in XXXX, increasing domestic demand pushed up RXX output. In XXXX, demand in the non-ODS field rose, but RXX output declined slightly, mainly due to tight controls in the refrigerant sector.

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In China, the capacity and output of RXX are mainly concentrated in three large producers, namely Shandong Dongyue Chemical Co., Ltd., Zhejiang Juhua Co., Ltd. and Meilan Chemical Group Co., Ltd. Their RXX capacity and output combined accounted for about XX.X% and XX.X% of China's totals respectively in XXXX.

In particular, Dongyue Group Ltd. is the largest RXX producer in China, with capacity and output of XXX,XXX t/a and XXX,XXX tonnes respectively in XXXX. The company, having formed a complete fluorine industrial chain, is capable of not only self-supporting some raw materials for RXX like hydrogen fluoride and chloroform, but also participating in PTFE manufacturing with self-provided RXX.

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4.2.1.2 Price

Affected by the increasing price of fluorite and AHF, the price of PTFE increased in Jan. XXXX–May XXXX.

Since June XXXX, due to the US Department of Commerce's preliminary anti-dumping measures on PTFE produced in China and India, and the impact of the Sino-US trade dispute, the price of PTFE fell. The trend did not stop in XXXX, as PTFE market competition was increasingly fierce.

In XXXX–HX XXXX, there was little variation in the demand for PTFE, price changes were mainly inspired by fluctuations in the price of its raw material RXX.

Since Sept. XXXX, the PTFE price started to decline again as RXX prices have fallen. The overall downward tendency continued until HX XXXX.

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4.2.1.3 Export and import

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In XXXX, export volume of China's PTFE to each of the top XX export destinations exceeded X,XXX tonnes. Italy topped other countries as the largest export destination, followed by Korea and The United States. As for imports, Japan, Malaysia and Korea were the top three import origins, taking up XX.X% of the total.

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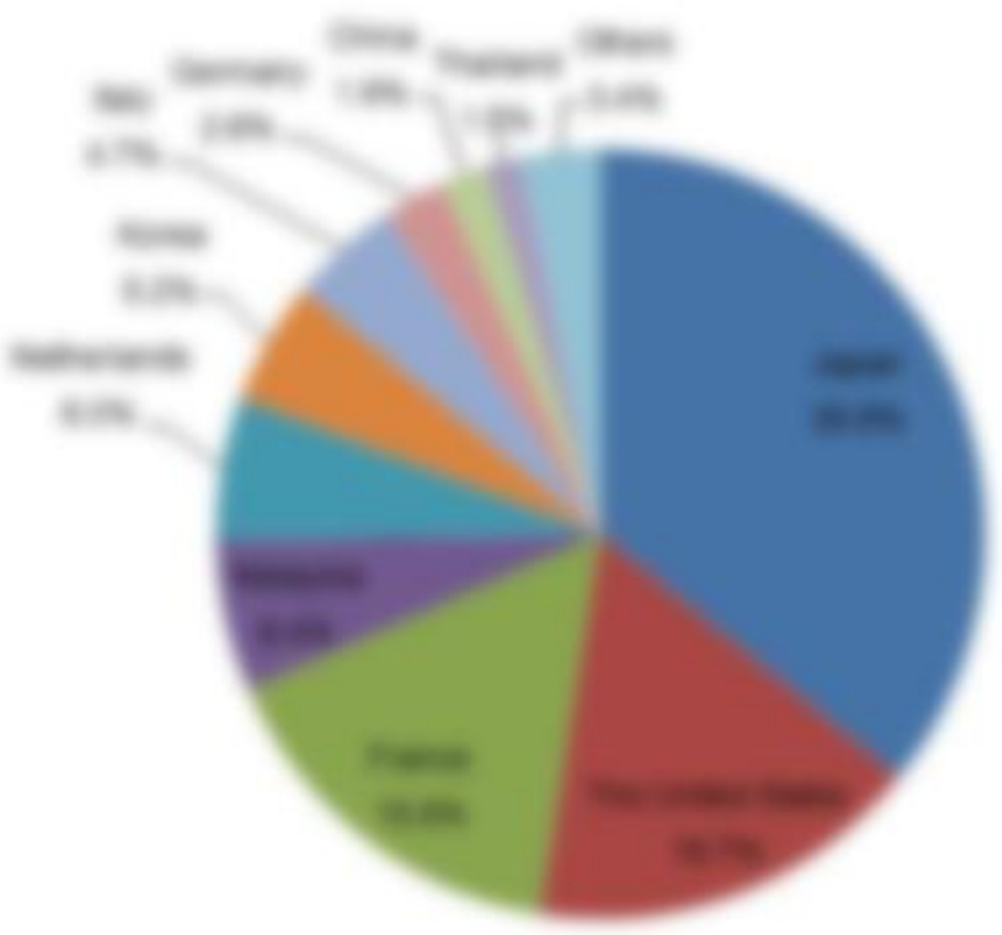
Figure 4.2.1.3-1 Top ten import origins of PTFE in China by volume, 2022



Source:China Customs & CCM

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4.2.2.1 Production situation

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Figure 4.2.2.1-1 Capacity and output of PVDF in China, 2018–2022

Note:The data of 2018–2019 have been revised.
Source:CCM

In XXXX, there were XX active PVDF manufacturers in China and most of them are located in East China. About XX% of the PVDF capacity is concentrated in Jiangsu and Zhejiang provinces.

In China, about half of the capacity and output are concentrated in the top three players, as they have the advantage in R&D, technology and capital. In XXXX, most producers maintained a operating rate of more than XX% to ease the tight supply.

Arkema (Changshu) Fluorochemical Co., Ltd. mainly purchases the raw material RXXXa from Changshu XF Fluorochemical Industry Co., Ltd., and its products are widely used in the high-end market owing to the high quality and good reputation. Since XXXX, the company has invested a lot in the research of PVDF in order to meet the increasing demand from downstream industries such as lithium battery, filtration membrane and solar panel.

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4.2.5.1 HFP

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Figure 4.2.5.1-1 Capacity and output of HFP in China, 2018–2022

Source:CCM

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If you want more information, please feel free to contact us
Tel: +86-20-37616606 Fax: +86-20-37616968
Email:econtact@cnchemicals.com