China Insights Consultancy

Industry Report on Global and China's Sucralose and Glycine Markets

May 2025

30 May 2025

CIC introduction, methodologies and assumptions

China Insights Consultancy was commissioned to conduct research, provide an analysis of, and to produce a report on the global and China's sucralose and glycine markets, and other related economic data. The commissioned report has been prepared by China Insights Consultancy independent of the influence of the Company and other interested parties.

China Insights Consultancy is an investment consulting company originally established in Hong Kong. Its services include industry consulting services, commercial due diligence, strategic consulting, and so on. Its consultant team has been tracking the latest market trends in the chemicals, industry, consumer goods, environment, energy, medicals, transportation, agriculture, e-commerce, finance and other sectors and has insightful market intelligence regarding these industries.

China Insights Consultancy conducted both primary and secondary research using a variety of resources. Primary research involved interviewing key industry experts and leading industry participants. Secondary research involved analyzing data from various publicly available data sources, such as the National Bureau of Statistics, the General Administration of Customs of the PRC, the International Monetary Fund, etc. The market projections in the commissioned report are based on the following key assumptions: (i) the overall social, economic, and political environment in global and China is expected to remain stable during the forecast period; (ii) global and China's economic and industrial development is likely to maintain a steady growth trajectory during the forecast period; (iii) relevant key industry drivers are likely to drive the global sucralose and glycine market (e.g., increasing health consciousness, development of downstream industries, growing trend for forming compound sweeteners, expansion of application scenarios, and investment in new synthesis technology) globally and in China during the forecast period; and (iv) there is no extreme force majeure or unforeseen set of industry regulations in which the market may be affected in either a dramatic or fundamental way.

All statistics are reliable and based on information available as of the date of this report. Other sources of information, including those from the government, industry associations, or market participants, may have provided some of the information on which the analysis or its data is based.

All the information about the Company is sourced from the Company's own audited report or management interviews. China Insights Consultancy is not responsible for verifying the information obtained from the Company.

Terms and abbreviations

Terms:

• **ASEAN**	Association of Southeast Asian Nations	东南亚国家联盟
• **CAGR**	Compound annual growth rate	年均复合增长率
• **Ch.P**	Pharmacopeia of the PRC	中国药典
• **COVID-19**	Coronavirus disease	新冠疫情
• **DDP**	Delivered Duty Paid, - When seller assumes all of the responsibility, risk, and costs associated with transporting goods until the buyer receives or transfers them at the destination port; an international commerce term used for sea or inland waterway transportation	完税后交货
• **DMF**	N,N-Dimethylformamide - A colourless liquid which is miscible with water and the majority of organic liquids and a common solvent for chemical reactions	二甲基甲酰胺
• **FOB**	Free on Board - Title and risk pass to the buyer including payment of all transportation and insurance cost once delivered on board the ship by the seller; an international commerce term used for sea or inland waterway transportation	离岸价
• **Etc.**	Et cetera	等等
• **FTA**	Free trade area	自由贸易区
• **GDP**	Gross domestic product	国民生产总值
• **GHG**	Greenhouse Gas	温室气体
• **GI**	Glycemic Index	升糖指数
• **HFCS**	High fructose corn syrup	果葡糖浆
• **HIS**	High-intensity sweetener	高倍甜味剂
• **IMF**	International Monetary Fund	国际货币基金组织
• **LIS**	low-intensity sweetener	低倍甜味剂
• **N/A**	Not applicable	不适用

Terms and abbreviations

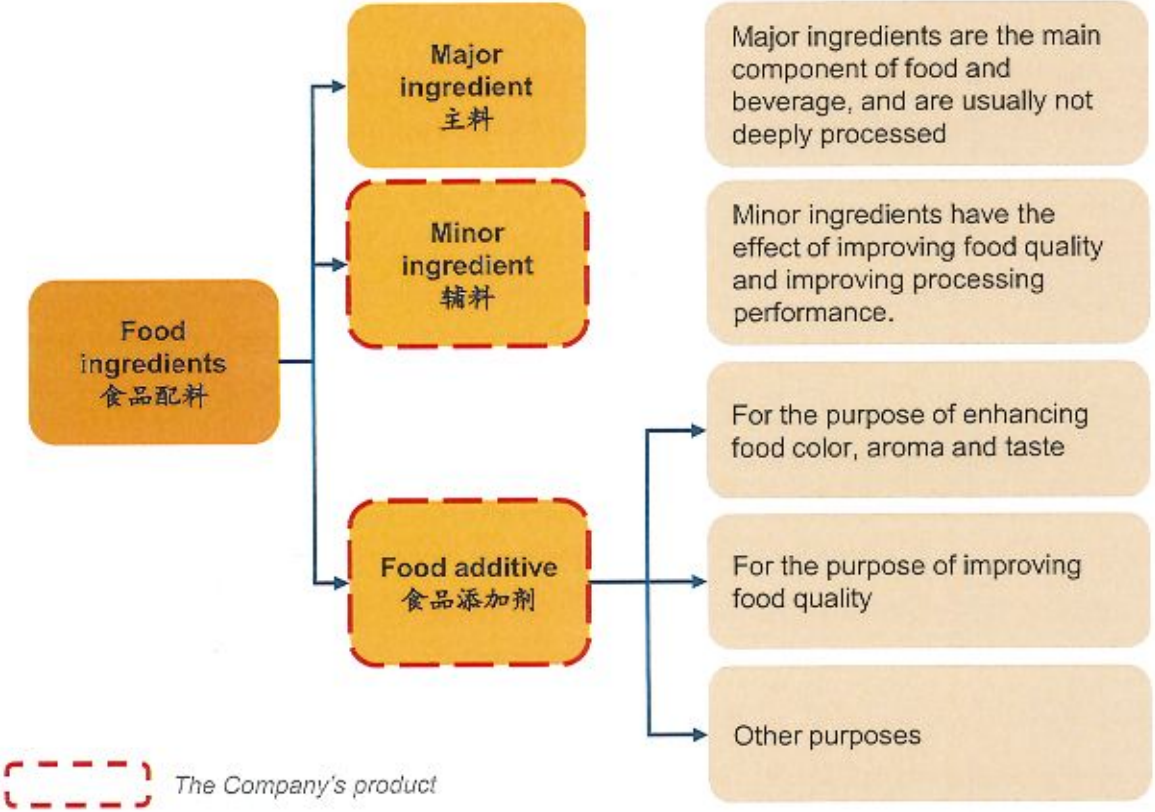
Terms:

• **NBS**	National Bureau of Statistics of China	中国国家统计局
• **NHC**	National Health Commission of the PRC	中华人民共和国国家卫生健康委员会
• **NMPA**	National Medical Products Administration	国家药品监督管理局
• **OECD**	Organization for Economic Co-operation and Development	经济合作与发展组织
• **pH level**	A measure of how acidic or alkaline a substance or solution is; acidic solutions are measured to have lower pH values than alkaline solutions	酸碱度水平
• **RMB**	Ren Min Bi	人民币
• **ROW**	Rest of the world	世界其他国家与地区
• **RTD**	Ready-to-drink	即饮
• **Ton**	A unit of weight, one ton = 1,000kg	吨
• **U.K.**	United Kingdom	英国
• **U.S. FDA**	U.S. Food and Drug Administration	美国食品药品监督管理局
• **U.S. NIH**	U.S. National Institutes of Health	美国国立卫生研究院
• **USD**	U.S. Dollar	美元
• **WHO**	World Health Organization	世界卫生组织

Contents

Food additives refer to artificial or natural substances added to food to improve its quality, color, aroma, preservation, freshness, and processability. There is clarified usage limits of each food additive in different foods

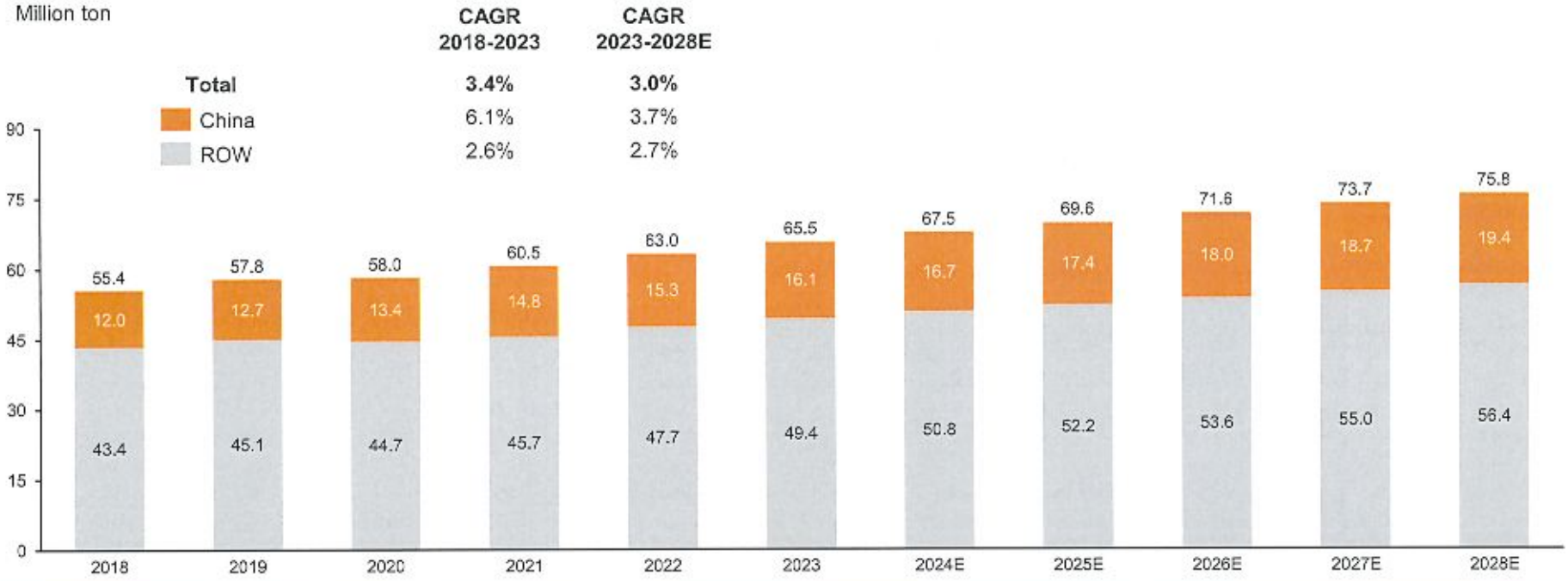
- In accordance with the Fundamental terms of Food Industry (《食品工業基本術語》) (GB/T 15091-94), food ingredients represent any materials used and contained in the final products during food manufacturing and processing. Food ingredients have three main components, major ingredients, minor ingredients, and food additives. Major ingredients include sucrose, meat, vegetables, fruits, milk, eggs, etc. Minor ingredients have the effect of improving food quality and improving processing performance, which include dietary fiber (膳食纤维), yeast, spices, starch, high fructose corn syrup (果葡糖浆, HFCS), plant extracts (植物提取物), etc. There is no usage limit to major ingredients and minor ingredients.
- According to the *National Standards for Food Safety* (食品安全国家标准 GB 2760-2024), food additives refer to synthetic or natural substances added into food for the purpose of improving food color, smell, taste, corrosion protection, preservation and processing technology of foods The food additives could be further classified into 23 categories depend its functions, such as sweeteners, flavor enhancers, emulsifiers, thickeners, etc. The *National Standards for Food Safety* clarify the usage limits of each food additive in different foods.



Source: NHC, China Insights Consultancy

Food additives are an integral part of the food industry and have greatly promoted its development. The overall global sales volume of food additives reached 65.5 million tons in 2023 and is expected to grow steadily in the next five years

Market size of the food additives, global and China, by sales volume, 2018-2028E



- Food additives are an integral part of the food industry and have greatly promoted its development by extending the shelf life of food, improving food quality, providing nutritional supplements, enhancing food safety, facilitating processing and storage, and increasing food appeal. Many food additives offer substantial nutritional benefits to human bodies, such as vitamins and minerals that prevent deficiencies. Additionally, natural derived food additives have the characteristics of healthy and green, and becoming popular among consumers due to the increasing health awareness.
- The overall global sales volume of food additives increased from 55.4 million tons in 2018 to 65.5 million tons in 2023 with a CAGR of 3.4%, and is expected to further reach 75.8 million tons by 2028, representing a CAGR of 3.0% from 2023 to 2028, mainly driven by factors such as the development of food industry, increasing demand for food quality/taste/function/nutrition and safety from consumers, technological innovation and research and development, as well as improvement of laws and regulations related to food safety. . The sales volume of food additives in China grew from 12.0 million tons in 2018 to 16.1 million tons in 2023, and is expected to further reach 19.4 million tons by 2028, representing a CAGR of 3.7% from 2023 to 2028.
- The food additives industry is relatively fragmented. There are approximately 4,000 manufacturers that have obtained production qualification certificates from State Administration of Market Regulation (國家市場監督管理總局) in China.

Source: China Insights Consultancy

The drivers and trends of global food additives industry include development of food industry, increasing health awareness, technological advancements and innovation, as well as strengthened regulatory environment

Drivers and trends	Descriptions
Development of food industry	With the global economy expanding and people's living standards improving, the food industry is experiencing stable growth. The increasing variety and scale of food production have led to a rising demand for food additives. Food additives play an important role in extending shelf life, improving taste, and preserving nutritional content in almost all kinds of processed foods, including snacks, RTD soft drinks, condiments, etc. Therefore, the development of the food industry directly propels the expansion and advancement of the food additives industry.
Consumers' rising demand for food quality, taste and functionality	Consumers are not only concerned with food safety but also have higher expectations for the flavor, texture, and color of food. Additionally, with increasing health awareness, there is a growing demand for functional foods. For example, diabetic patients need to eat foods that use low-calorie sweeteners instead of sucrose to avoid fluctuations in blood sugar. This diverse demand drives food additive manufacturers to continuously improve formulations and innovate products to meet market needs.
Technological advancement and innovation	Advances in food science and technology enable the creation of new and improved food additives with enhanced functionalities and benefits. Whether it's improving the shelf life of products, enhancing taste and texture, or addressing specific dietary needs, ongoing innovation drives the growth and evolution of the food additives industry. For example, artificial sweeteners have evolved from the first generation product, saccharin, to the fifth generation product, sucralose, which has is sweeter, safer, and tastes better. Meanwhile, there are more than 4,000 food additives approved in the U.S., while there are approximately 2,400 food additives approved in China. The continuously increase in the types of food additives that are allowed to be used is expected to drive the steady growth of both global and China's food additives market.
Improvement of regulatory environment	Strict food safety and food additive regulations play a vital role in ensuring consumer rights and public health. As the penalties against illegal manufacturers increases, it is expected to further promote the development of the global and Chinese food additive markets in a more healthy and sustainable direction. This trend helps to increase consumer confidence in food quality and safety, while also prompting leading manufacturers to pay more attention to quality control, driving the market to move towards higher standards of products and production practices.

Source: China Insights Consultancy

The key success factors and entry barriers of China's food additive manufacturers include mature production technology, abundant production capacity, stable relationship with clients, supply chain management, and capital threshold

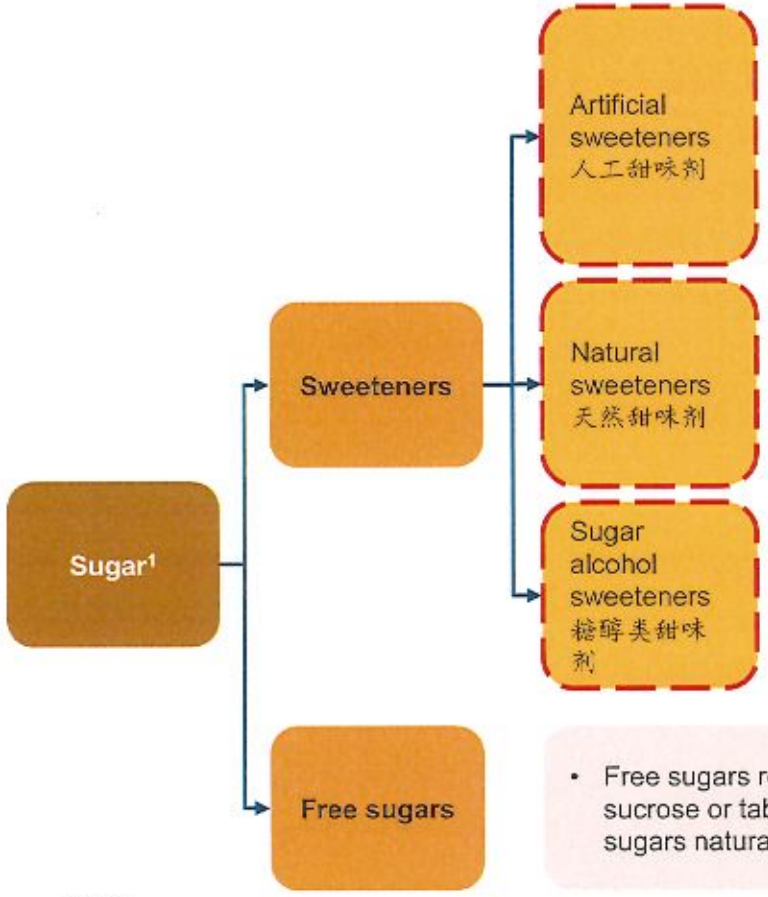
	Key success factors and entry barriers	Description
1	Mature production technology	• The production of food additives involves complex chemical processes and advanced technologies, where even minor variations can lead to significant differences in product quality. Manufacturers are required to possess rich production experience, mature production technologies, and technical talents to ensure the stability of product quality. This requires substantial investments, expertise, and years of experience. New market entrants may not possess the necessary technology capabilities and experience with chemical production processes.
2	Abundant production capacity	• The production capacity of food additive products has gradually become an essential consideration when choosing food additive manufacturers. Industry-leading players own sufficient factories, production lines and facilities to support production capacity, so that they can provide continuous stable supply to customers, which is especially important to giant downstream manufacturers with global business. The expansion or establishment of production capacity will take 1-2 years. New market entrants may not have sufficient funds and resources to establish product capacity within a short period of time.
3	Stable relationship with clients	• Clients of food additive manufacturers, such as food and beverage manufacturers, prioritize the quality and the stability of supply of raw materials, showing reluctant to change suppliers in short term. These customers, especially reputable multinational corporations, have high standards and stringent criteria in selecting their suppliers. Their suppliers are expected to provide stable and high-quality products with timely and reliable delivery. These customers are unlikely to switch their suppliers, considering the high switching cost and the immense hurdles in establishing long-lasting and credible relationship. They also exercise caution in selecting suppliers to avoid the incurrence of high replacement costs. Giant downstream companies often implement [quantitative frame work supply agreement] that involve bidding process and grant allocation letter once a year. In addition, these downstream companies often hold high requirement on services, such as DDP delivery term, which can only be provided by leading food additive manufactures with risk control measurements. Industry-leading food additive manufacturers had the experience in providing high quality product and services and established stable relationships with these major clients, ensuring long-term production arrangement. New market entrants may not be able to build such stable relationship with clients in a short period of time.
4	Supply chain management	• Leading food additive manufacturers are generally deeply involved in the supply chain management, including securing high-quality raw material supply, maintaining bargaining power in the price of raw material, and monitoring the warehousing and transportation process. The establishment of supply chain management requires abundant resources accumulated from business operations. New market entrants or small-scale players may lack the relevant resources to achieve the foregoing.
5	Capital threshold	• Investments in production equipment, sales channel development, research and development, and labor expenses involve significant capital investments. New market entrants with limited capital resources are at a disadvantage in competing against established players.

Source: China Insights Consultancy

Contents

Sweeteners are food additives added to foods to give them sweetness. Sweeteners can be divided into artificial sweeteners, natural sweeteners and sugar alcohol sweeteners. Meanwhile, sweeteners are generally low in calories

- According to the *National Standards for Food Safety* (食品安全国家标准 GB 2760-2024), sweetener is a kind of food additive added to foods to give them sweetness. Sweeteners can be divided into artificial sweeteners, natural sweeteners and sugar alcohol sweeteners based on the raw materials and the manufacturing process. Sweetener is generally lower in calories than high-calorie sources of sweetness such as sucrose and glucose fructose syrup.



- **Artificial sweeteners are normally high-intensity sweeteners**, whose sweetness[2] is at least dozens of times that of sucrose
- Saccharin (糖精), 1st generation artificial sweetener, invented in 1897
- Cyclamate (甜蜜素), 2nd generation artificial sweetener, invented in 1937
- Aspartame (阿斯巴甜), 3rd generation artificial sweetener, invented in 1965
- Acesulfame K (安赛蜜), 4th generation artificial sweetener, invented in 1967
- Sucralose (三氯蔗糖), 5th generation artificial sweetener, invented in 1976
- Other artificial sweeteners, such as Neotame (纽甜) and other products

- **Natural sweeteners are normally high-intensity sweeteners**
- Stevia (甜菊糖), extracted from the leaves of the stevia rebaudiana plant.
- Mogroside (罗汉果甜苷): derived from the fruit of siraitia grosvenorii (known as monkfruit or luohan guo)
- Other natural sweeteners such as glycyrrhizin (甘草甜素)

- Sugar alcohol sweeteners, also known as polyols, are a type of carbohydrate that chemically has characteristics of both sugars and alcohols. **Sugar alcohol sweeteners are normally low-intensity sweeteners**
- Common sugar alcohol sweeteners include sorbitol (山梨糖醇), erythritol (赤藓糖醇), isomalt (异麦芽酮糖醇), etc.

- Free sugars refer to monosaccharides (such as glucose, fructose)(单糖) and disaccharides (such as sucrose or table sugar)(双糖) added to foods and drinks by the manufacturer, cook or consumer, and sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates.

Note:

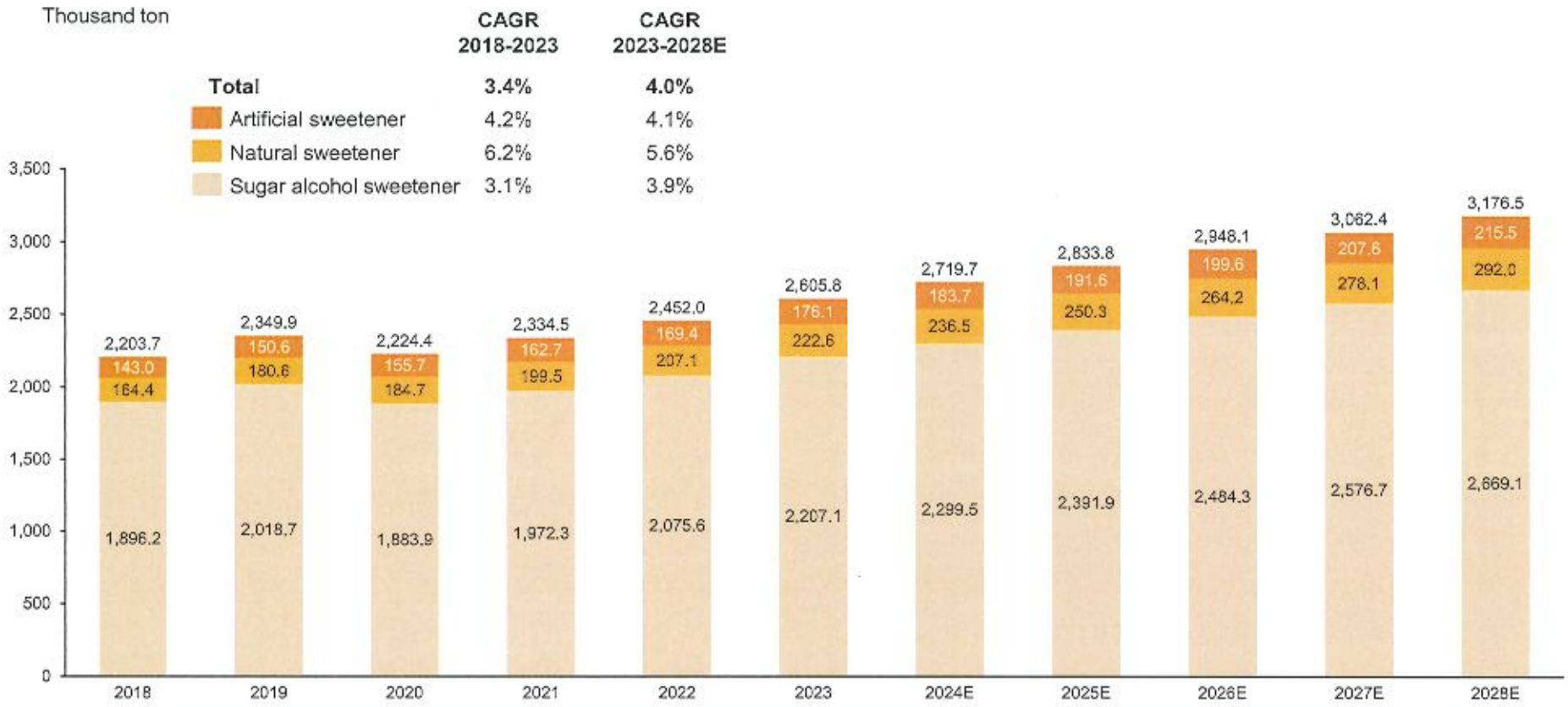
1. *Sugar in this report does not include sugar intake from food raw materials such as fruits and vegetables*
2. *Sweetness (甜度) is a standard of measurement. The sweetness of sucrose is 1 (relative to a 10% sucrose solution)*

Source: NHC, WHO, China Insights Consultancy

The Company's product

The sugar alcohol sweeteners accounted for over 80% of the global sweetener market in terms of the sales volume. The natural sweeteners are expected to be the fastest growing category among the global sweetener market in the next five years

Market size of the sweetener, global, by sales volume, 2018-2028E

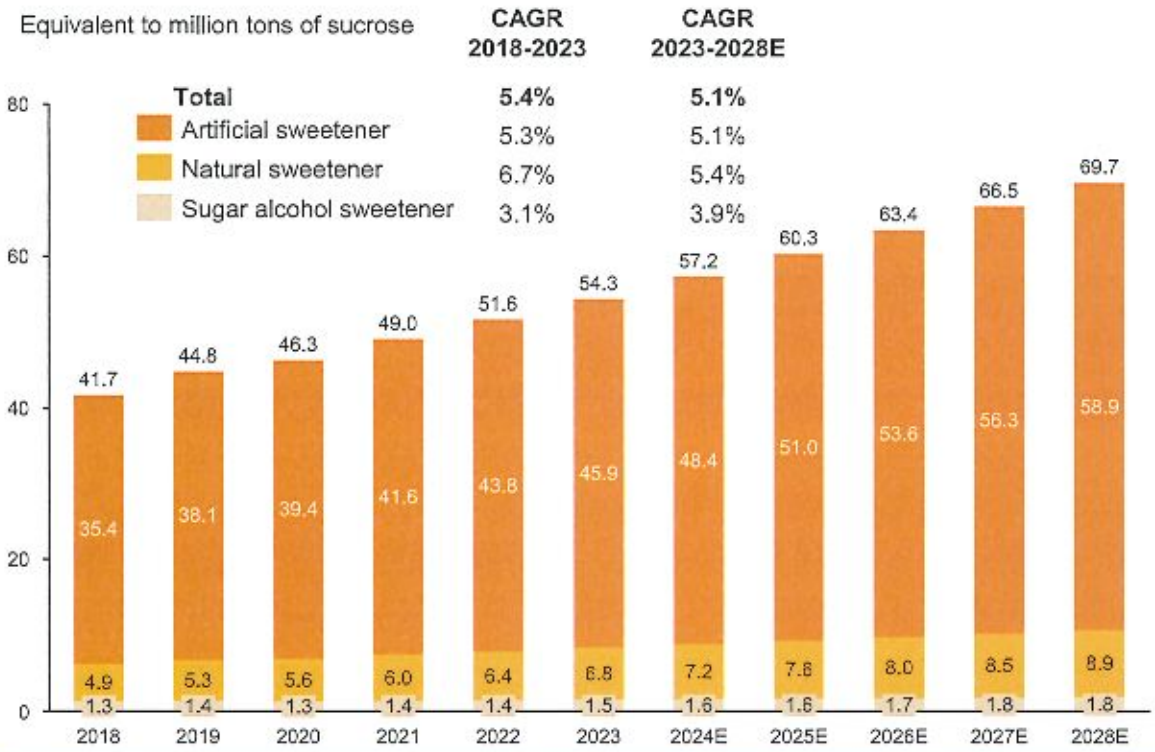


- The overall global sales volume of artificial sweeteners increased from 143.0 thousand tons in 2018 to 176.1 thousand tons in 2023 with a CAGR of 4.2%, and is expected to further reach 215.5 thousand tons by 2028, representing a CAGR of 4.1% from 2023 to 2028.
- As the natural sweeteners have the characteristics of natural derivative and low-calories, the natural sweeteners are expected to enjoy a relatively higher growth rate compared to other types of sweeteners. The overall global sales volume of natural sweeteners increased from 164.4 thousand tons in 2018 to 222.6 thousand tons in 2023 with a CAGR of 6.2%, and is expected to further reach 292.0 thousand tons by 2028, representing a CAGR of 5.6% from 2023 to 2028.
- The sugar alcohol sweeteners accounted for over 80% of the global sweetener market in terms of the sales volume.

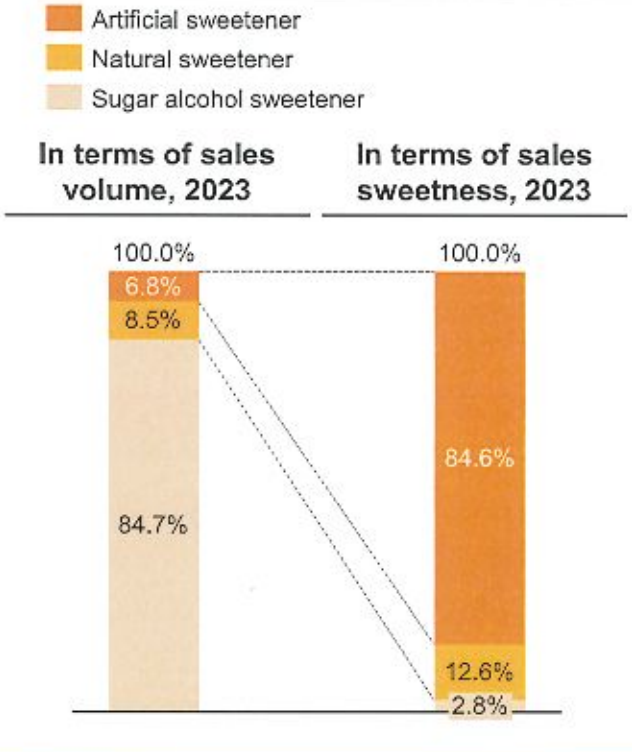
Source: China Insights Consultancy

The artificial sweeteners are usually high-intensity sweeteners, making them an important role in the global sweetener market. The artificial sweeteners contribute for over 80% of the overall sweetness in the global sweetener market

Global sweetener market, in terms of sweetness, 2018-2028E



The artificial sweeteners are usually high-intensity sweeteners and contribute for over 80% of the overall sweetness in the global sweetener market



- The artificial sweeteners are usually high-intensity sweeteners, making them an important role in the global sweetener market. The artificial sweeteners contribute for over 80% of the overall sweetness in the global sweetener market. The overall sweetness of artificial sweeteners increased from the equivalent of 35.4 million tons of sucrose in 2018 to the equivalent of 45.9 million tons of sucrose in 2023 with a CAGR of 5.3%, and is expected to further reach the equivalent of 58.9 million tons of sucrose by 2028, representing a CAGR of 5.1% from 2023 to 2028.
- Natural sweeteners are normally high-intensity sweeteners. The natural sweeteners accounted for over 10% of the global sweetener market, in terms of sweetness in 2023.

Source: China Insights Consultancy

The drivers and trends of global sweeteners industry include development of downstream industries, increasing health awareness, as well as technological innovation

Drivers and trends	Descriptions
Development of downstream industries	Sweeteners are commonly used in multiple industries, such as RTD soft beverage, snacks, dairy products, bakery foods, etc. On the one hand, with the global population growth and accelerating urbanization, the demand for food and beverage is rising, fueling the development of the sweeteners market. On the other hand, there is a notable increase in the market demand for low-sugar or sugar-free products, prompting food and beverage manufacturers to use sweeteners as sugar substitutes extensively.
Increase health awareness	As consumers become more health-conscious, they are more inclined towards lower-calorie, low-GI foods and beverages. Sweeteners, as sugar substitutes, normally provide sweetness without increasing calorie intake, making them popular among health-conscious consumers. This trend is notable not only in developed countries but also increasingly evident in many developing countries such as China.
Technological innovation	Continuous breakthroughs in the development of new sweeteners, such as natural sweeteners like mogroside and psicose (阿洛酮糖), are gaining popularity. Additionally, advancements in biotechnology and synthetic techniques have reduced production costs, improved taste, and expanded the applications of artificial sweeteners. For example, the production process of sucralose through chemical-enzyme synthesis is considered to be the one of the most promising methods for the future due to its environmentally friendly and highly selective characteristics.

Source: China Insights Consultancy

A compound sweetener is a mixture of two or more artificial or natural sweetening agents designed to enhance the sweetness profile while reducing potential negative effects associated with using a single sweetener

Sweetness characteristics of different sweeteners by sensory evaluation

Sweetener	Sweetness presentation speed	Sweetness duration (seconds)	Flavor characteristics						Aftertaste		
			Pleasant flavor			Unpleasant flavor			Pleasant flavor	Unpleasant flavor	
			Sweetness 甜味	Licorice flavor 甘草味	Cool feeling 清凉感	Bitterness 苦味	Astringency 涩味	Metallic taste 金属味	Sweetness 甜味	Bitterness 苦味	Astringency 涩味
Sucralose (三氯蔗糖)	Medium	10	✓		✓				✓		✓
Acesulfame K (安赛蜜)	Medium	10-30	✓				✓	✓	✓	✓	
Cyclamate (甜蜜素)	Medium	10-30	✓		✓		✓		✓		
Saccharin (糖精)	Medium	10-30	✓			✓	✓	✓	✓	✓	✓
Stevia (甜菊糖)	Fast	>60	✓	✓		✓			✓	✓	✓
Mogroside (罗汉果甜苷)	Fast	30	✓	✓	✓				✓		✓
Glycyrrhizin (甘草甜素)	Slow	>30	✓	✓	✓		✓		✓		✓

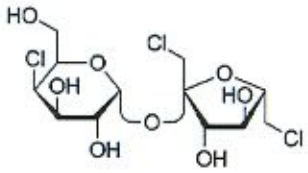
Analysis

- Sweetener syrup is a liquid sweetener typically made by mixing water with sweeteners, offering a texture and taste similar to regular syrup but with lower sugar content.
- Co-crystallisation sweetener products often include a sweetener and a filler (such as lactose, maltose, etc.), through the co-crystallisation process to form a product with excellent physical and sensory properties. Co-crystallisation sweetener product is usually able to provide a more uniform sweetness and better processing properties. Co-crystallization technology can combine the advantages of various sweeteners to create a low-calorie and delicious sweet solution.
- A compound sweetener is a mixture of two or more artificial or natural sweetening agents designed to enhance the sweetness profile while reducing potential negative effects associated with using a single sweetener. The compound sweetener could achieve a taste closer to sucrose, provide a more balanced sweetness, and often improve stability and shelf-life.
- The advantages of compound sweetener include: (i) balance the overall taste and make it closer to sucrose; (ii) reducing unpleasant aftertaste; (iii) increase overall stability; and (iv) decrease the calories intake compared to those high-calorie sugar.
- Common combinations of compound sweeteners include sucralose plus erythritol, acesulfame K plus aspartame, stevia plus mogroside V plus erythritol, etc.
- The downstream of compound sweeteners is similar to sweeteners and is mainly used in the food and beverage industry.

Source: Food Science, China Insights Consultancy

Contents

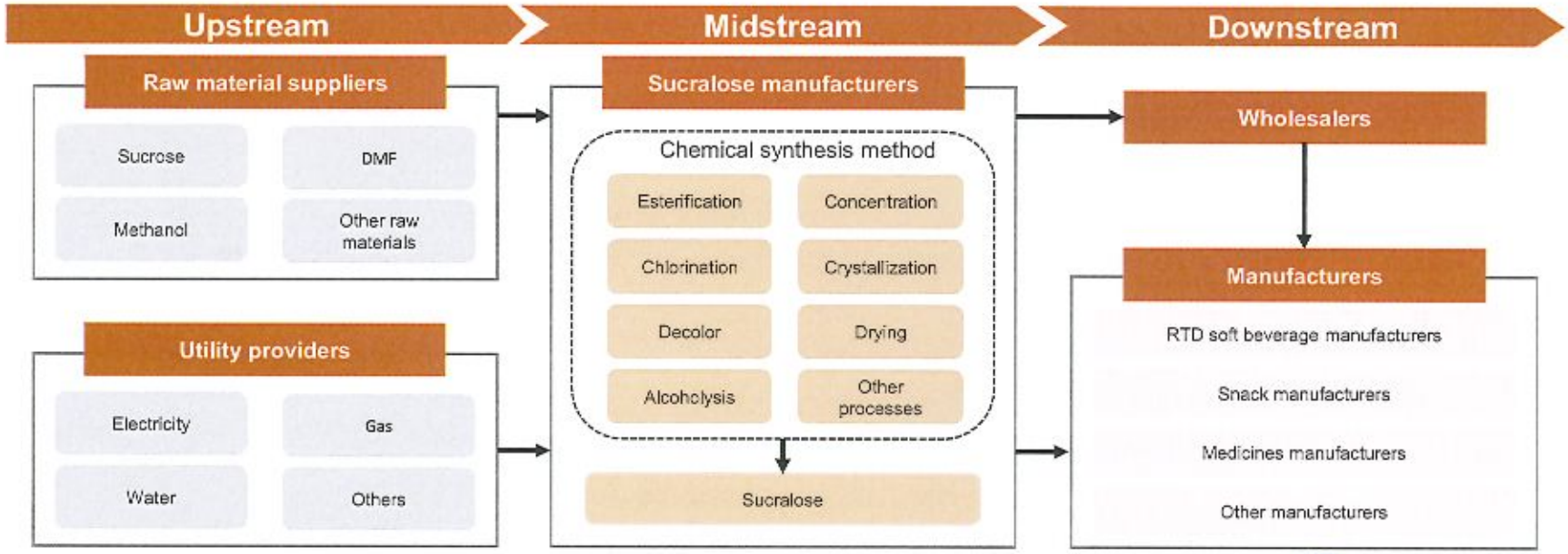
Sucralose is a low-calorie, safe, high-intensity sweetener, and was approved by multiple countries as a food additive worldwide. At present, the major production method for sucralose is chemical synthesis method



Introduction

- Sucralose is an artificial sweetener with the chemical formula $C_{12}H_{19}Cl_3O_8$.
- As the majority of ingested sucralose is not metabolized by the human body, sucralose is considered as a low-calorie sweetener (3 calories per gram).
- Sucralose is a high-intensity sweetener with low calorie. It exists in the form of white powder and it is easily soluble in water, ethanol and methanol. It is a functional sweetener using sucrose as raw material. Its sweetness is 600 times more than that of sucrose and its sweetness characteristics are very similar to that of sucrose.
- Sucralose is considered as a safety sweetener by multiple food safety regulatory bodies worldwide, including the U.S. FDA, NHC of the PRC, European Union's Scientific Committee on Food, etc.
- At present, the major production method for sucralose is chemical synthesis method. Under the chemical synthesis method, the main raw materials include sucrose and chemical raw materials, such as DMF, methanol, catalysts, etc. The raw materials undergo multiple processes such as esterification, chlorination, decolor, alcoholysis, concentration, crystallization to obtain high-purity sucralose.
- The production of sucralose involves a series of chemical reactions that can be controlled in a laboratory or industrial setting, independent of external seasonal conditions. Thus, sucralose companies are not evidently subject to seasonality including weather, climate or other environmental factors.
- Sucralose is widely applied in various kinds of food and beverages as a healthy sweetener with high intensity, such as soft drinks, confectionery and snacks, baked goods, syrups and nutritional supplements.

Value chain of sucralose, take chemical synthesis method as example



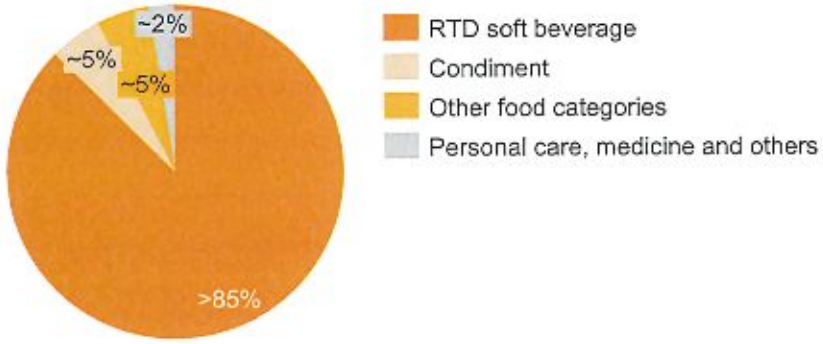
Source: China Insights Consultancy

Compared with other major artificial sweeteners, sucralose has the characteristics of high sweetness, good taste, high safety, and high stability. It is widely recognized by downstream manufacturers and used in multiple industries including food and beverage, personal care, medicine, etc.

Comparison between major artificial sweeteners

Sweetener	Invented time	Sweetness	Pleasant flavor	Unpleasant flavor	Safety	Stability
Sucralose (三氯蔗糖)	1976	600	✓		High	High
Acesulfame K (安赛蜜)	1967	200	✓	✓	High	High
Aspartame (阿斯巴甜)	1965	200	✓		Medium	Low
Cyclamate (甜蜜素)	1937	30-50	✓	✓	Low	High
Saccharin (糖精)	1879	300	✓	✓	Low	Low

Downstream analysis of sucralose, global, 2023



Analysis

- Compared with other major artificial sweeteners, sucralose has the characteristics of high sweetness, good taste, good safety, and high stability. It is widely recognized by downstream manufacturers and used in multiple industries such as RTD soft beverages, snacks, dairy products, ice cream, bakery foods, etc.
- In 2023, over 85% of sucralose was used in the RTD soft beverage industry. In recent years, sucralose has gradually expanded its application field, and has been successfully used in toothpaste, makeup, medicine and other fields.

Source: Food Science, China Insights Consultancy

The sucralose is expected to be the fastest growing category among global artificial sweeteners in the next five years, growing from 20.0 thousand tons in 2023 to 29.1 thousand tons in 2028, representing a CAGR of 7.8%

Market size of the artificial sweeteners, global, by category, in terms of sales volume, 2018-2028E

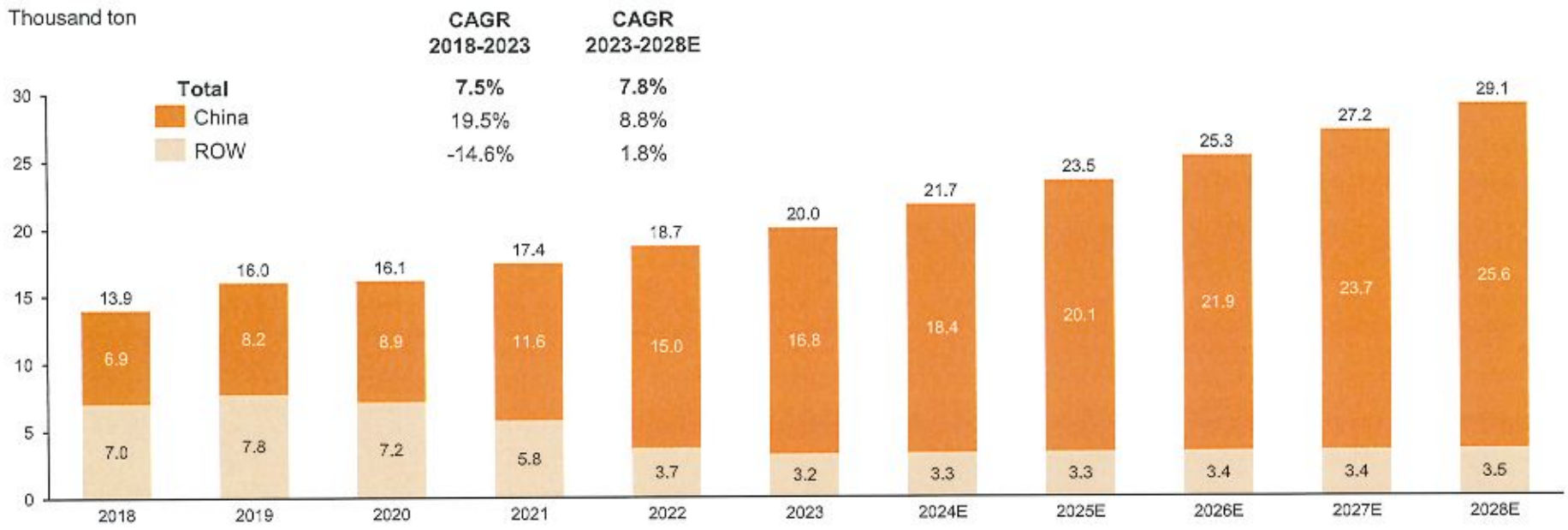
	CAGR 2018-2023	CAGR 2023-2028E
Total	**4.2%**	**4.1%**
Cyclamate	3.4%	3.0%
Aspartame	4.8%	4.1%
Acesulfame K	5.2%	5.5%
Sucralose	7.5%	7.8%
Saccharin	1.4%	2.4%
Others	5.7%	4.4%

- Among artificial sweeteners, saccharin and cyclamate are restricted in use by most countries due to safety concerns, whereas aspartame was classified as possibly carcinogenic to humans by the International Agency for Research on Cancer (IARC), the World Health Organization (WHO), the Food and Agriculture Organization (FAO) and the Joint Expert Committee on Food Additives(JECFA) inJuly2023, and is expected to see a slow down in the growth of use in the next few years. Acesulfame K and sucralose are gradually being accepted by downstream customers due to their relatively higher safety stability compared to other artificial sweeteners. In particular, sucralose is expected to be the fastest growing category among global artificial sweeteners in the next five years.

Source: China Insights Consultancy

China has become the main producer of sucralose in terms of sales volume. The share of sucralose produced in China accounted for 84.0% of the overall global sales volume, and is expected to reach 88.0% by 2028

Market size of the sucralose, global, by production country, in terms of sales volume, 2018-2028E



Share of sucralose produced in China, in term of sales volume:

2018	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E
49.5%	51.5%	55.5%	66.9%	80.3%	84.0%	85.0%	85.9%	86.6%	87.3%	88.0%

- The overall global sales volume of sucralose increased from 13.9 thousand tons in 2018 to 20.0 thousand tons in 2023 with a CAGR of 7.5%, and is expected to further reach 29.1 thousand tons by 2028, representing a CAGR of 7.8% from 2023 to 2028.
- China-produced sucralose has the good reputation of high value-to-money and is widely recognized among downstream customers. The Chinese manufacturers increased their production capacities over the past few years, and China become the main producer of global sucralose. The sales volume of sucralose produced in China increased from 6.9 thousand tons in 2018 to 16.8 thousand tons in 2023 with a CAGR of 19.5%, and is expected to further reach 25.6 thousand tons by 2028, representing a CAGR of 7.8% from 2023 to 2028. The share of sucralose produced in China accounted for 84.0% of the overall global sales volume, and is expected to reach 88.0% by 2028.
- In 2023, sucralose accounted for approximately 0.03% in the global food additives market in terms of sales volume.
- The estimated production volume of sucralose for rest of the world, as compared with that of the PRC, would be relatively stable at ranging from 3,300 tons to 3,500 tons in the four upcoming years from 2024 onwards.

Source: The General Administration of Customs of the PRC, China Insights Consultancy

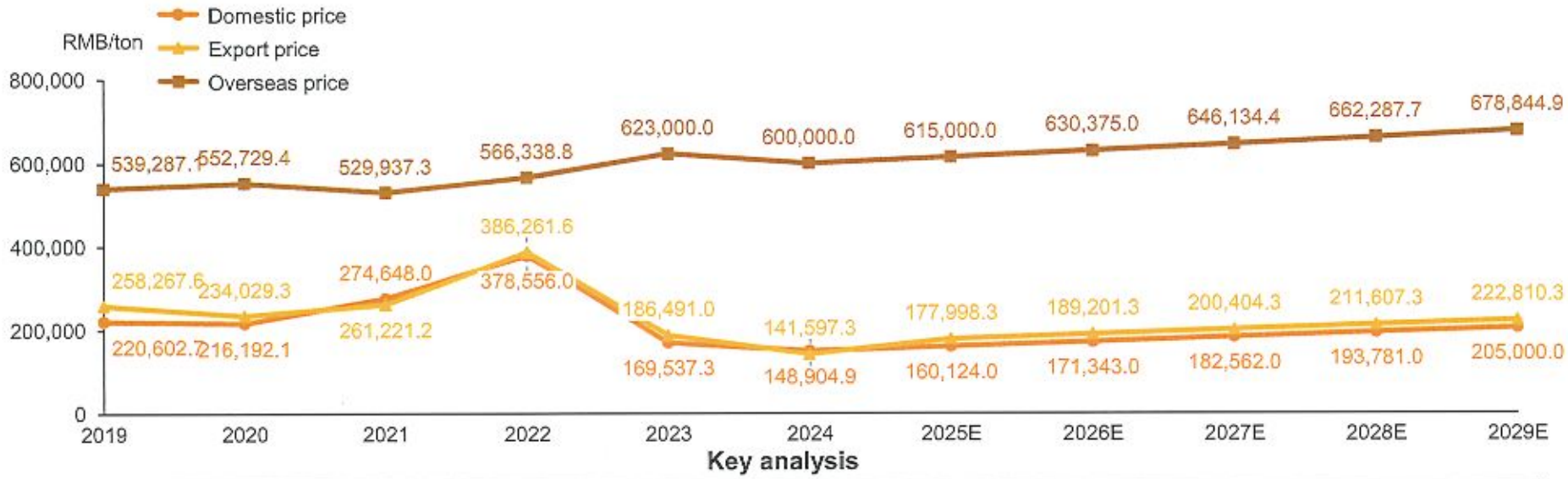
The drivers and trends of global sucralose industry include increasing health consciousness, development of downstream industries, growing trend for forming compound sweeteners, as well as investment in new synthesis technology

Drivers and trends	Descriptions
Increase health consciousness	• Sweet is one of five human's basic taste, and the improvement of people's living standards has also promoted the demand for food and beverages with rich flavors. However, commonly used sweet raw materials such as sucrose, glucose and glucose fructose syrup are high fructose corn syrup are higher in calories. As people become more health-conscious, the demand for low-calorie sweeteners continues to grow. Sucralose is increasingly favored by downstream manufacturers and consumers due to its characteristics of low calories and good taste.
Development of downstream industries	• Over 85% of sucralose was used in the RTD soft beverage industry in 2023 globally. The steadily development of RTD soft beverage market support the stable growth of sucralose industry. The global RTD soft beverage market increased from USD770.4 billion in 2018 to USD926.9 billion by 2023 and is expected to reach USD1,195.6 billion by 2028, representing a CAGR of 5.2%. Furthermore, sucralose has gradually expanded its application field, and has been successfully used in toothpaste, makeup, medicine and other fields.
Growing trend for forming compound sweeteners	• There is a growing trend of using compound sweeteners in the downstream food and beverage industries. The compound sweetener could achieve a taste closer to sucrose, provide a more balanced sweetness, and often improve stability and shelf-life. For example, leading carbonated beverage brand in China use sucralose and erythritol as a combination in its soda products.
Investment in new synthesis technology	• At present, sucralose is mainly produced through chemical synthesis method. In recent years, due to the green, environmentally friendly and low-cost characteristics of biological enzyme synthesis technology, major manufacturers have paid growing attention to it and increased their R&D investment in this field. It is expected that the maturity and application of biological enzyme synthesis technology will support the further sustainable development of global sucralose industry in the future.

Source: China Insights Consultancy

The price of sucralose in China has experienced fluctuations in the past few years, including both domestic price and export price. The price of sucralose in China recorded a continuous drop in the first quarter of 2024

Average price[1] of sucralose, by sales method (2019-2029E)



Key analysis

- The price of sucralose in China has experienced fluctuations in the past few years, with the average export price falling from RMB258,267.6/ton in 2019 to RMB234,029.3/ton in 2020. With environmental policy restrictions such as the Guiding Opinions on Strengthening Prevention and Control at the Source of Ecological Environment in High Energy Consumption and High Emission Construction Projects issued by Ministry of Ecology and the Environment in 2021, the growing freight prices for China produced sucralose transported to overseas markets, the average export price of sucralose reached RMB386,261.6/ton in 2022. In 2023, due to the expansion of production capacity by major global leading companies, as well as the decline in demand caused by downstream manufacturers stockpiling due to concerns that the price would continuously rise, the average price of export sucralose dropped significantly, reaching RMB186,491.0/ton. The export price of sucralose in China recorded a continuous drop in the first quarter of 2024, but the rate of decrease has slowed. The export price of sucralose in China is expected to stabilize by the end of 2024, and start to rise since 2025 as the anticipated growth of demand for sucralose from downstream manufacturers (especially food and beverage companies).
- Overseas sucralose prices are relatively higher than domestic price due to factors such as downstream customer recognition, manufacturers' brand awareness, as well as customers' demand to diversify supply source. Some foreign downstream customers of sucralose show a preference of choosing sucralose suppliers whose production factory located outside of China, taking into the consideration of securing stable supply, different producing regulations and mitigating the risks from international trade such as international relations and volatile tariff. During the Track Record Period, the U.S. duty rate for sucralose subject to the China-wide rate is 3.7%, the general rate. In addition, the price fluctuation of sucralose overseas is relatively smooth, mainly attributable to the relatively stable downstream demand from a major overseas manufacturer, which has certain bargaining power in the overseas market.
- With Executive Order of 3 March 2025 issued by President Donald Trump, effective on 4 March 2025, most U.S. imports from China are now subject to the US 2025 IEEPA Tariff, in addition to any other applicable import duties with certain exemptions. The additional duties may raise export costs or price of products exported from China. It is indeterminate whether further discussions between China and the US will materialise, as well as potential adjustments to tariff policies or impact on entities with global operations and supply chains.

Note:

1. *Average price include VAT, duty fee, transportation cost, etc.*

Source: The General Administration of Customs of the PRC, China Insights Consultancy

Using historical price war event as a reference, the current price war of sucralose is expected to cease in a short-term as 1)the current price merely cover the cost of sale and 2)inferior manufacturers have suspended their production and are expected to exit the market, reducing the market supply of sucralose

Key analysis of the price war in sucralose

a The reason of the price war

- The sucralose market in China is highly concentrated with several companies dominate the industry while smaller competitors still exists. As market supply of sucralose exceeds the demand, manufacturers are willing to sell product in extreme low price to reduce the storage. In addition, leading companies, driven by the imperative to preserve their respective market shares and to curb the influx of minor competitors that could potentially undermine the sustainable growth and profitability of the industry, have triggered the price war. Compared with small-scale companies, leading companies are less affected by the price war as they usually enjoy lower unit costs with a large number of long-term orders.

b The analysis of previous price war

- The previous price war (2019-2021) in China persisted around two years as the average price of sucralose in China dropped from RMB250.0 thousand per ton in 2018 to RMB220.6 thousand per ton in 2019 and further dropped to RMB216.2 thousand per ton in 2020. Specifically, the industry average price of sucralose reached RMB210.0 thousand per ton in May 2019, representing the start of price war. The lowest industry average price of sucralose among 2018 to 2022 is RMB205.0 thousand per ton in January 2021 and the industry maintained the same price until Augst 2021. Similar with price reducing strategy, this price war (2019-2021) was initiated by leading companies in the quest for market dominance. This price war (2019-2021) has changed the competition pattern of the industry. During the price war (2019-2021), inferior sucralose manufacturers has suspended their production, shut down factories, and exited the market as their limited cash flow could not support the business to go through the period of sluggish market. Consequently, the sucralose market in China has become more concentrated after the price war.

c The analysis of current price war

- The current price war commenced since the last quarter of 2022, when the price dropped from RMB410.0 thousand per ton, and intensified in march 2023, when the price dropped to RMB190.0 thousand per ton, reaching the price below the lowest price of last price war (RMB205.0 thousand per ton). Compared to the previous price war (2019-2021), the current Sucralose Price War poised to be more intense as the average price of sucralose in the PRC dropped to RMB105,789.5 per ton in June 2024, reaching the price below the lowest price, RMB205,000.0 per ton, of last price war. As the gross profit margin has decreased, leading companies are expected to increase prices in the near term to restore profit margins. In addition, nearly half of the over ten main sucralose manufacturers that maintained production in FY2022 have ceased their production as of June 2024. In August and September 2024, several major sucralose manufacturers in the PRC increased their respective selling price of sucralose in the PRC (with market price of sucralose in the PRC increased from approximately RMB105,789.5 per ton in June 2024 to RMB191,333.3 per ton in September 2024), which indicated the end of the Sucralose Price War.
- In addition, under the pressure of negative profit margin and limited cash flow, many sucralose manufactures, including JK Sucralose Inc., Hebei Sukeleshi Science & Technology Co.,Ltd., and Sunvision Sweet Co., Ltd. have suspended their production as of April 2024. The number of main sucralose manufacturer in operating reduced from approximately 10 manufacturers in September 2022 to 4 manufacturers in April 2024. These small-scale manufacturers are expected to exit the market as their cash flow are limited, reducing the market supply of sucralose and implying the end of a price war. Lastly, industry participants typically start enter into annual supply agreements and determine sales prices with major customers during the third quarter of each year. At this juncture, sucralose manufacturers have reason to begin adjusting prices to ensure their profits for the next year.

Source: China Insights Consultancy

Contents

The Company ranked the 5th place by sales volume of sucralose among global sucralose manufacturers in 2023

Top Five Manufacturers in Global Sucralose Market, Global, 2023

Ranking	Company/Group Name	Headquarters	2023 sales volume of sucralose (thousand tons)	Market share, %
1	Company A	Anhui, China	5.6	27.8%
2	Company B	Shandong, China	4.7	23.4%
3	Company C	Fujian, China	2.8	14.0%
4	Company D	London, United Kingdom	2.7	13.3%
5	The Company	Jiangxi, China	1.0	4.8%
	Top five subtotal		**16.7**	**83.3%**
	Total market size		**20.0**	**100%**

- The top five companies collectively held around 83.3% of the total global market share in terms of sales volume of sucralose. In 2023, the Company ranked the 5th place among global sucralose manufacturers in terms of sales volume of sucralose, with 4.8% market share in the global market.

1. Established in 2006 In Anhui Province, China, Company A is a listed company focusing on fine chemical industry and basic chemical industry that sells sweeteners, spices, bulk chemicals and other products both domestically and globally, with a focus on Chinese market, with sales revenue of sucralose reached RMB993.4 million in 2023. In 2023, , Company A had over 3,000 employees and total revenue of RMB5.3 billion.
2. Established in 2012 in Shandong Province, China, Company B. is a non-listed food-additive company that sells sucralose both domestically and globally, with a focus on overseas market, with sales revenue of sucralose reached RMB856.9 million in 2023. Company B had approximately 1,000 employees in 2023.
3. Established in 2003 in Fujian Province, China, Company C.is a non-listed food-additive company that sells sweeteners, dietary supplements, amino acid surfactants both domestically and globally, with a focus on Chinese and US' markets, with sales revenue of sucralose reached RMB514.1 million in 2023. Company C had approximately 500 employees in 2023.
4. Established in 1921 in London, United Kingdom, Company D is a listed multinational food and beverage solutions company that sells food & beverage, sucralose and sweeteners and industrial starches both domestically and globally, with a focus on Asian and European markets, with sales revenue of sucralose reached RMB1,657.1 million in 2023. In the fiscal year ended 31 March 2024, Company D had achieved RMB15.1 billion revenue with over 3,000 employees.

Source: China Insights Consultancy

The Company ranked the 5th place by revenue of sucralose among global sucralose manufacturers in 2023

Top Five Manufacturers in Global Sucralose Market, Global, 2023

Ranking	Company/Group Name	Headquarters	2023 revenue of sucralose (RMB in millions)	Market share, %
1	Company D	London, United Kingdom	1,657.1	32.9%
2	Company A	Anhui, China	993.4	19.7%
3	Company B	Shandong, China	856.9	17.0%
4	Company C	Fujian, China	514.1	10.2%
5	The Company	Jiangxi, China	228.3	4.5%
	Top five subtotal		**4,249.9**	**84.5%**
	Total market size		**5,031.8**	**100%**

- The top five companies collectively held around 84.5% of the total market share in terms of revenue of sucralose. In 2023, the Company ranked the 5th place among global sucralose manufacturers in terms of revenue of sucralose, with 4.5% market share in the global market.
- .As of 31 December 2024, the Company is the only domestic company among the top five sucralose producers in the PRC that has established overseas production plant for sucralose production, and is also the only company among the top five global sucralose manufacturers that has established a production plant for the sucralose production outside the PRC and the United States.

Source: China Insights Consultancy

The Company ranked the 4th place by sales volume of sucralose and revenue of sucralose among China's sucralose manufacturers in 2023

Top Five Manufacturers in China's Sucralose Market*, China, 2023

Ranking	Company/Group Name	2023 sales volume of sucralose (thousand tons)	Market share, %	2023 revenue of sucralose (RMB in millions)
1	Company A	5.6	33.1%	993.4
2	Company B	4.7	27.8%	856.9
3	Company C	2.8	16.7%	514.1
4	The Company	1.0	5.7%	228.3
5	Company E	0.6	3.7%	112.5
	Top five subtotal	**14.6**	**87.0%**	**2,705.2**
	Total market size	**16.8**	**100%**	**3,051.2**

- The top five companies collectively held around 87.0% of the total market share in terms of sales volume of sucralose. In 2023, the Company ranked the 4th place among China's sucralose manufacturers in terms of both sales volume of sucralose and revenue of sucralose, with respectively 5.7% and 7.5% market share in the market.

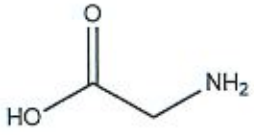
5. Established in 2012 in Shandong Province, China, Company E is a non-listed food-additive company that mainly sells sucralose both domestically and globally, with a focus on European and American markets, with sales revenue of sucralose in the PRC reached RMB112.5 million in 2023. Company E had over 200 employees in 2023.

*Manufacturers' sales volume and revenue in China's sucralose market include products that are produced in China and are sold in domestic market and oversea market

Source: China Insights Consultancy

Contents

Glycine is an animo acid with wide range of applications. At present, there are multiple methods to produce glycine, and most Chinese manufacturers adopt chloroacetic acid ammonolysis method



Introduction

- Glycine, also known as aminoacetic acid is an amino acid that has a single hydrogen atom as its side chain. The chemical formula of glycine is $C_2H_5NO_2$.
- At present, there are multiple methods to produce glycine, including chloroacetic acid ammonolysis method (氯乙酸氨解法), Strecker method (施特雷克法), hydrocyanic acid synthesis method (氢氰酸法合成法), biosynthesis method (生物合成法), etc.
- China was the main producer of glycine. Most of Chinese manufacturers adopt chloroacetic acid ammonolysis method to produce glycine.
- Glycine has a wide range of applications. At present, the main downstream of glycine is the herbicide industry, which is used to manufacture glyphosate (草甘膦). In addition, glycine can be used as a flavor enhancer or preservative in condiments, a nutritional supplement in functional foods, and an attractant in pet foods. Furthermore, glycine could also be used in other areas such as medicine, cosmetics, etc.
- Glycine is produced through chemical synthesis, which can be performed in controlled environments that are not affected by the seasons. Thus, glycine companies are not evidently subject to seasonality and can maintain a steady production rate regardless of the time of year.
- Glycine is a non-essential amino acid for the human body. It exists in the form of white crystalline powder, which is sweet and soluble in water. It is also slightly soluble in methanol, ethanol and is insoluble in aceton and ether.
- Food-grade glycine can act as feed attractants (substance to enhance smell and taste in pet food), condiments/flavour enhancers (substance to enhance food flavours), surfactants (primary component of cleaning detergents) and stabilisers/preservatives (food additive which helps preserve structure of the food). It is therefore typically applied in pet food, fish paste, peanut butter, dairy products, soy sauce and other condiments.
- Industrial-grade glycine can be used as raw materials of glyphosate, which is used as herbicide and crop desiccant.

Source: China Insights Consultancy

Comparison

Compared with other major glycine production methods, the biosynthesis method has the characteristics of green, environmentally friendly and low-cost. It is expected that the biosynthesis method will achieve industrial-scale production with the maturity and advancement of the technology

Comparison between major glycine production methods

	Chloroacetic acid ammonolysis method (氯乙酸氨解法)	Strecker method (施特雷克法)	Hydrocyanic acid synthesis method (氢氰酸法合成法)	Biosynthesis method (生物合成法)
Main raw materials	Mono chloroacetic acid (氯乙酸), ammonia (氨水), hexamine (乌洛托品)	Formaldehyde (甲醛), sodium cyanide (氰化钠), ammonium chloride (氯化铵)	Formaldehyde (甲醛), hydrocyanic acid (氢氰酸), ammonium chloride (氯化铵)	Sucrose (蔗糖), active enzyme (活性酶)
Technical difficulty	Easy	Complicated	Medium	It is difficult to select the appropriate active enzyme, and it is currently in the laboratory stage
Equipment requirement for industrial-scale production	Low	High	High	N/A
Product quality	Low	High	High	High
Overall production cost	Medium	Medium	Low	Low
Environmental friendly degree	Medium	Low, because sodium cyanide is highly toxic	Low, because hydrocyanic acid is highly toxic	High

Analysis

- Compared with other major glycine production methods, the chloroacetic acid ammonolysis method is relatively easy to synthesize glycine and has relatively low requirement on the equipment. However, the quality of the glycine product produced by the chloroacetic acid ammonolysis method is relatively low and requires further refining process to obtain higher-purity glycine. Therefore, the overall production cost of the chloroacetic acid ammonolysis method is not as low as the Strecker method or hydrocyanic acid synthesis method.
- The biosynthesis method has the characteristics of green, environmentally friendly and low-cost. It has attracted more and more attention from major manufacturers and has increased investment in research and development of this production method. Due to the fact that it is difficult to select the appropriate active enzyme, the biosynthesis method is currently at the laboratory stage. It is expected that the biosynthesis method will achieve industrial-scale production with the maturity and advancement of the technology.

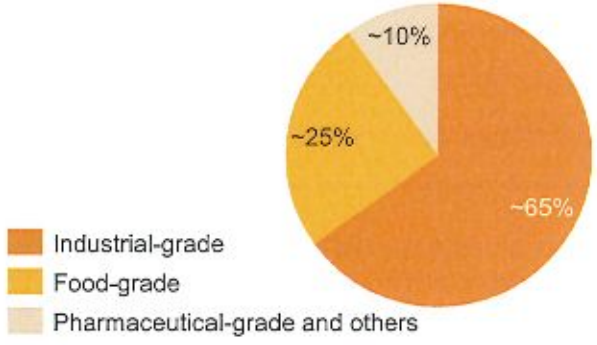
Source: China Insights Consultancy

In China, there are national standards for food-grade and pharmaceutical-grade glycine, which are issued by NHC and NMPA, respectively. In 2023, the share of food-grade and pharmaceutical-grade glycine was approximately 25% and 10% in terms of sales volume, respectively

Comparison between different grade of glycine

	Industrial-grade glycine (工业级甘氨酸)	Food-grade glycine (食品级甘氨酸)	Pharmaceutical-grade glycine (医药级甘氨酸)
Standard in China	HG/T 2029-2004	GB 25542-2010	Ch.P (中国药典)
Assay (on dried basis), % 甘氨酸（以干基计）的质量分数，%	≥ 97.5	98.5-101.5	99.0
Chloride (on Cl basis), % 氯化物（以Cl计）的质量分数，%	≤ 0.6	≤ 0.01	≤ 0.007
Iron (on Fe basis), % 铁盐（以Fe计）的质量分数，%	≤ 0.005	Not required	≤ 0.001
Loss on drying, % 干燥减重的质量分数，%	≤ 0.5	≤ 0.2	≤ 0.2
Residue on ignition, % 灼烧残渣的质量分数，%	Not required	≤ 0.1	≤ 0.1
pH pH值	Not required	5.5-7.0	5.6-6.6

Sales volume of glycine, by product grade, global, 2023



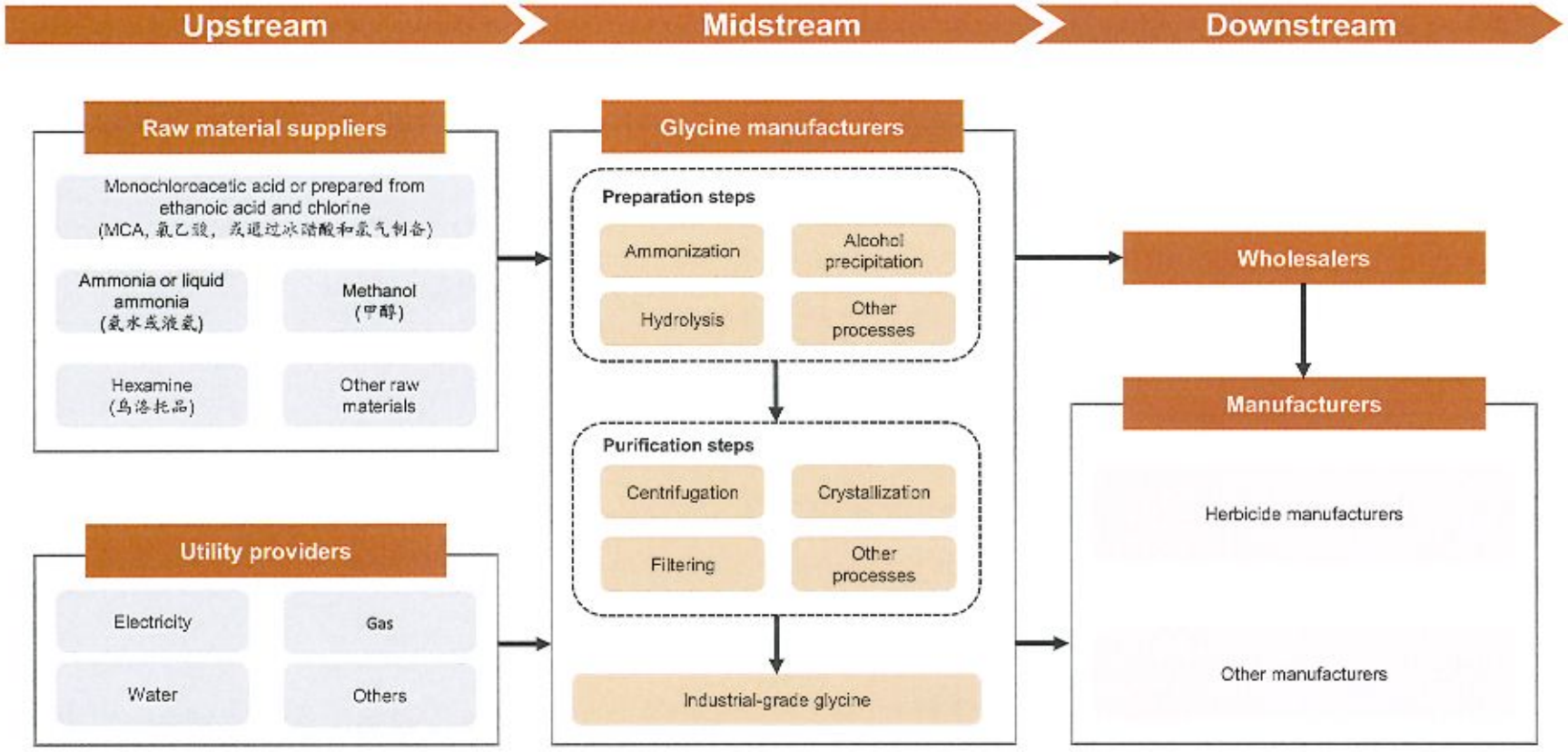
Analysis

- There are national standards for food-grade and pharmaceutical-grade glycine. Compared with industrial-grade glycine, food-grade and pharmaceutical-grade products have higher requirements for product purity, percentage of chloride, loss on drying, and other indicators. In addition to directly preparing food-grade or pharmaceutical-grade glycine by improving the purification process, most manufacturers choose a step-by-step purification method, that is, purifying from industrial-grade glycine to food-grade glycine, and then further purifying to pharmaceutical-grade glycine.
- In 2023, approximately 65% of glycine sold globally was industrial-grade glycine, which was primary used to further produce glyphosate. The food and beverage industry is the second largest application scenario for glycine, such as adding it to condiments and pet food.
- At present, pharmaceutical-grade glycine is mainly used to add to drugs. It is the main component of cell culture media in the production of biopharmaceuticals such as vaccines and antibody protein drugs. It is also a necessary raw material for the synthesis of vitamin B6 and other drugs. With the breakthrough of glycine in clinical research on anti-wrinkle and anti-aging, it is expected to further promote its application in the field of medical beauty industry.

Source: National Food Safety Standard-Food Additive-Glycine (GB 25542-2010), NHC, China Insights Consultancy

Value chain analysis of industrial-grade glycine

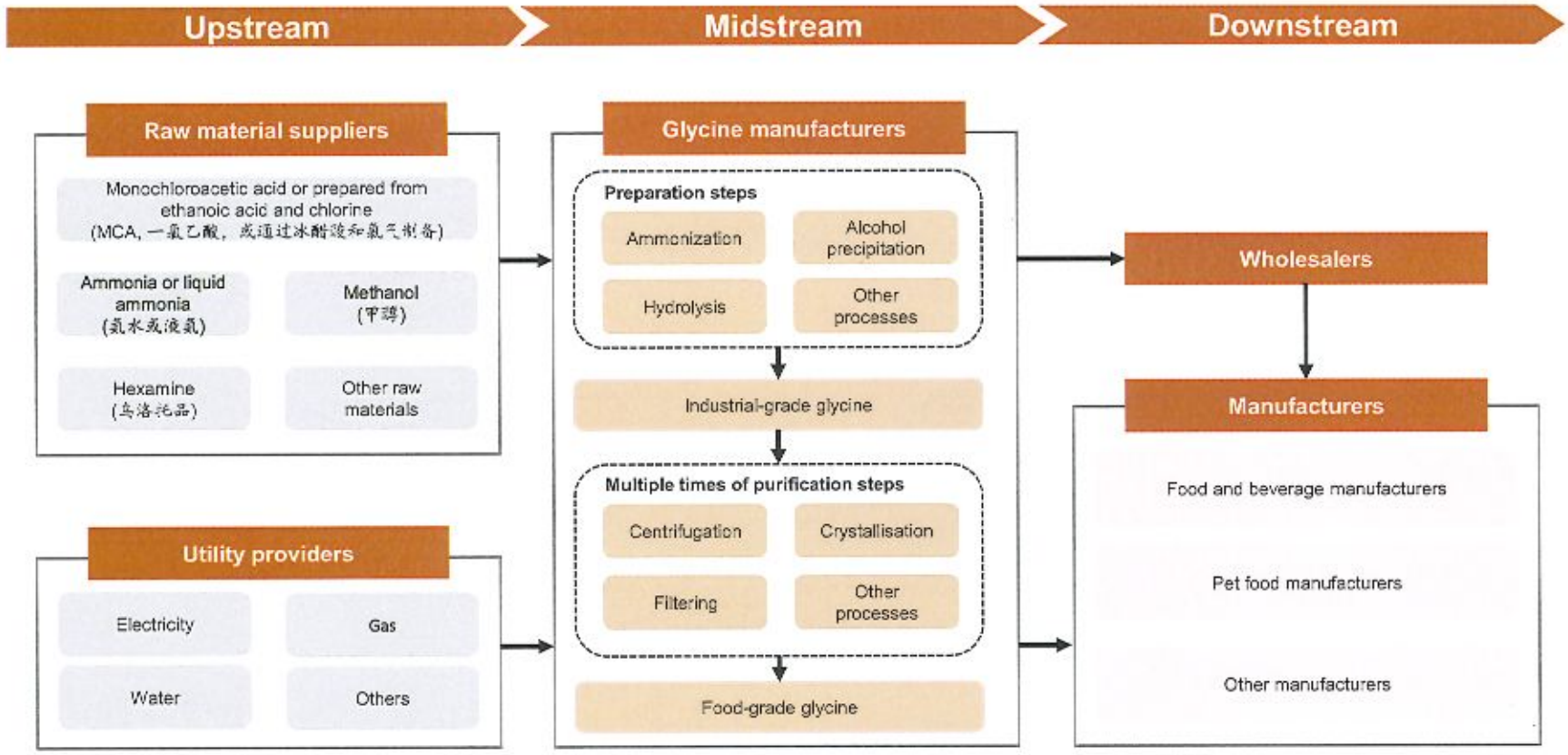
Value chain of industrial-grade glycine, take chloroacetic acid ammonolysis method as example



Source: China Insights Consultancy

Value chain analysis of food-grade glycine

Value chain of food-grade glycine, take chloroacetic acid ammonolysis method as example

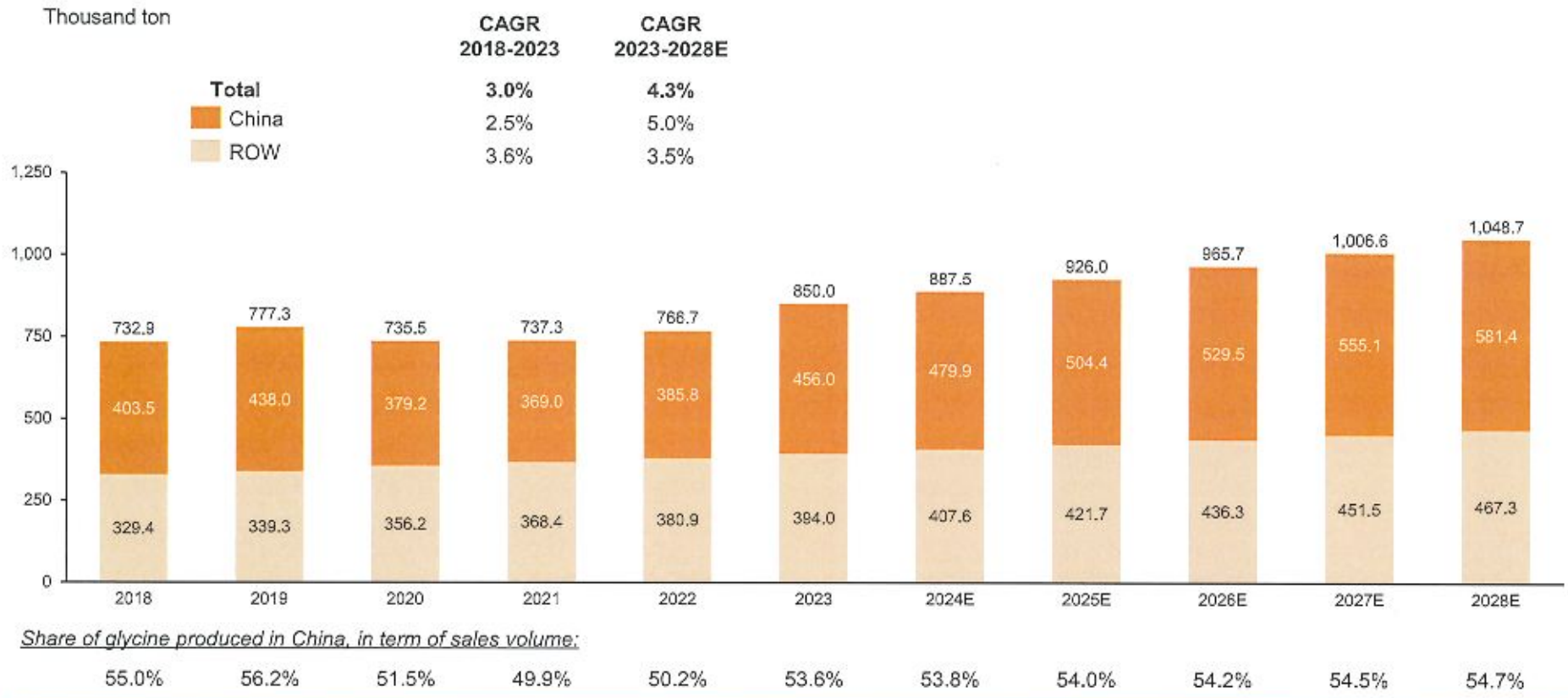


- Taking the chloroacetic acid ammonolysis method as an example, the raw materials include chloroacetic acid (which can be purchased externally or prepared by acetic acid and chlorine), liquid ammonia, urotropine, methanol, etc. High-purity glycine can be obtained after several processes such as ammonisation, alcohol precipitation, drying, filtering, crystallisation, etc. Glycine has a wide range of applications, the most important of which is in the herbicide industry for the manufacture of glyphosate. In addition, glycine can be used as flavour enhancer in condiments or feed attractants in pet food, as well as in other fields such as pharmaceuticals and cosmetics

Source: China Insights Consultancy

In 2023, over 50% of glycine sold globally was produced in China. As Chinese manufacturers continue to improve production processes, reduce production costs, and enhance product competitiveness, it is expected that the sales proportion of Chinese-produced glycine will further increase in the next five years

Market size of the glycine, global, by production country, in terms of sales volume, 2018-2028E



Share of glycine produced in China, in term of sales volume:

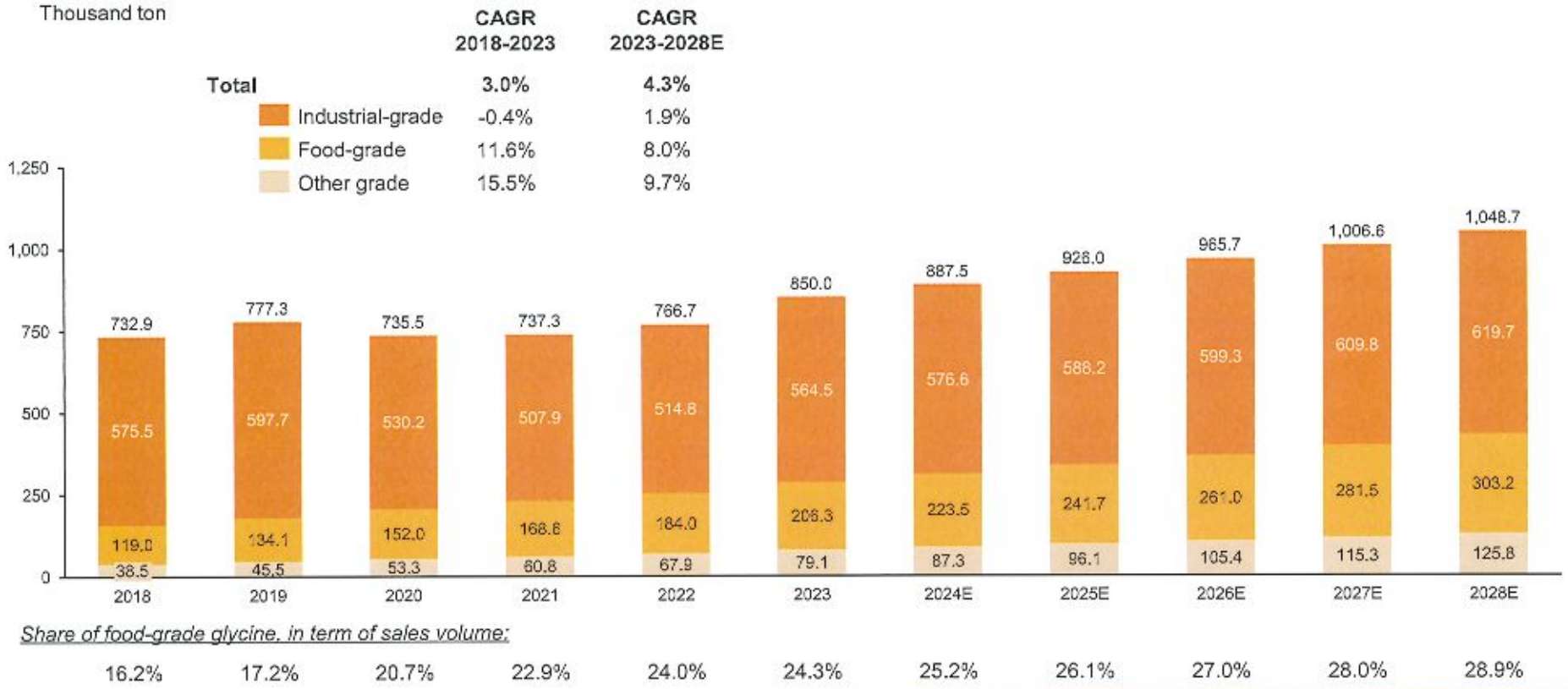
2018	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E
55.0%	56.2%	51.5%	49.9%	50.2%	53.6%	53.8%	54.0%	54.2%	54.5%	54.7%

- China was the main producer of glycine. The sales volume of glycine produced in China increased from 403.5 thousand tons in 2018 to 438.0 thousand tons in 2019. Due to the environmental protection policies, major glycine manufacturers in China reduced their production since 2020. As the relaxation of restriction policies, the overall sales volume of glycine produced in China witness a rapid growth during 2022 to 2023, along with the increase in production volume. The overall sales volume of glycine produced in China reached 456.0 thousand tons, and is expected to further reach 581.4 thousand tons by 2028, representing a CAGR of 5.0% from 2023 to 2028.

Source: The General Administration of Customs of the PRC, China Insights Consultancy

In 2023, the global sales volume of food-grade glycine was 206.3 thousand tons, accounting for approximately a quarter of the global glycine sales volume

Market size of the glycine, global, by product grade, in terms of sales volume, 2018-2028E



Share of food-grade glycine, in term of sales volume:

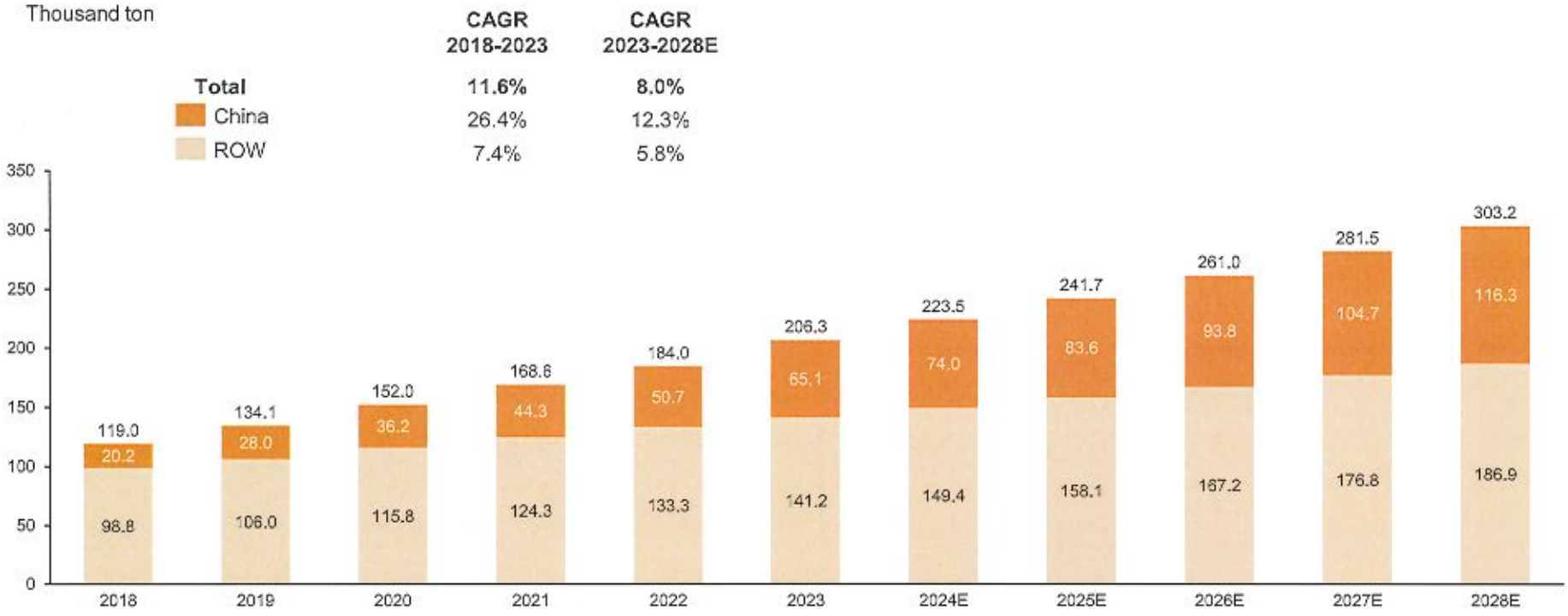
2018	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E
16.2%	17.2%	20.7%	22.9%	24.0%	24.3%	25.2%	26.1%	27.0%	28.0%	28.9%

- The food and beverage industry is the second largest application scenario for glycine, such as adding it to condiments and pet food. The sales volume of food-grade glycine increased from 119.0 thousand tons in 2018 to 206.3 thousand tons in 2023 with a CAGR of 11.6%, and is expected to further reach 303.2 thousand tons by 2028, representing a CAGR of 8.0% from 2023 to 2028.
- In 2023, food-grade glycine accounted for approximately 0.31% in the global food additives market in terms of sales volume.
- As the medicinal value of glycine is gradually developed and recognized, the pharmaceutical-grade glycine is expected to grow at a relatively higher speed, drive the other grade glycine to be the fastest growing category among global glycine market in the next five years.

Source: The General Administration of Customs of the PRC, China Insights Consultancy

As the efficacy of food-grade glycine in terminal products such as condiment, functional food and pet food is gradually recognized by downstream manufacturers and consumers, the sales volume of food-grade glycine produced in China is expected to grow rapidly in the next five years

Market size of the food-grade glycine, global, by production country, in terms of sales volume, 2018-2028E



Share of food-grade glycine produced in China, in term of sales volume:

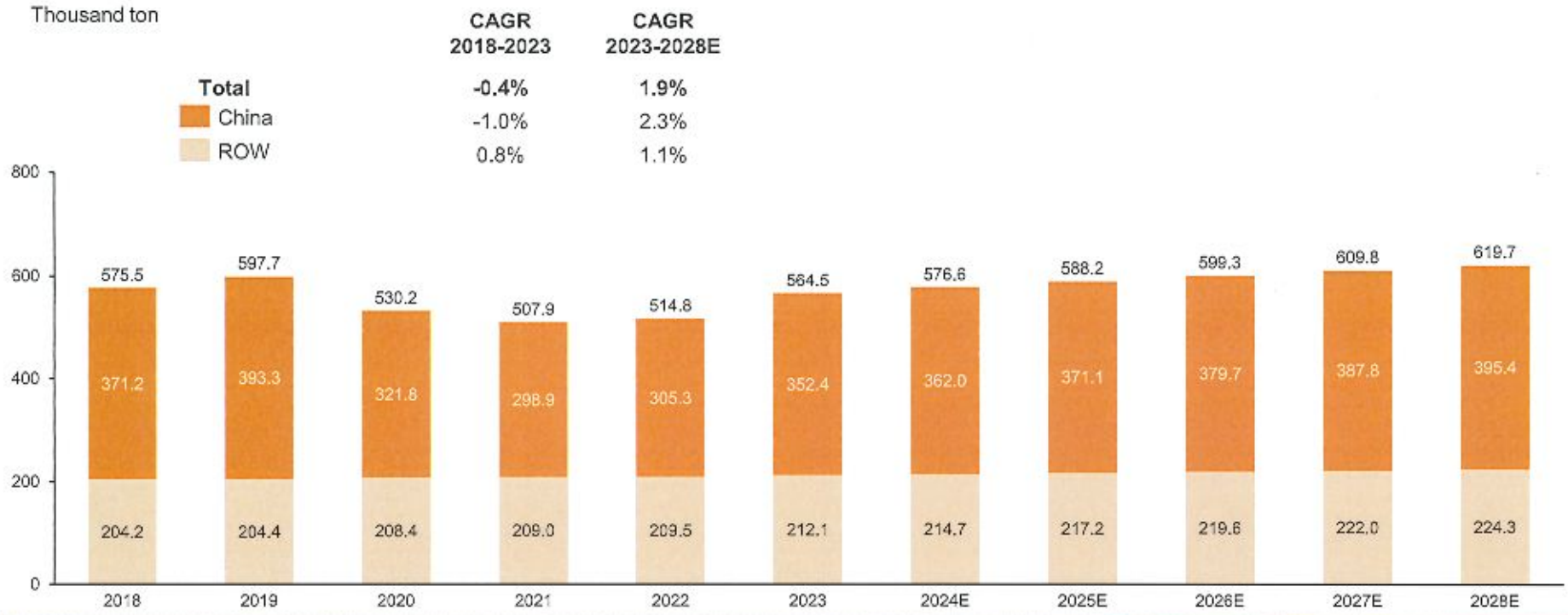
2018	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E	2028E
17.0%	20.9%	23.8%	26.3%	27.5%	31.6%	33.1%	34.6%	35.9%	37.2%	38.4%

- As the efficacy of food-grade glycine in terminal products such as condiment, functional food and pet food is gradually recognized by downstream manufacturers and consumers, the sales volume of food-grade glycine produced in China increased rapidly from 20.2 thousand tons in 2018 to 65.1 thousand tons in 2023 with a CAGR of 26.4%, and is expected to further reach 116.3 thousand tons by 2028, representing a CAGR of 12.3% from 2023 to 2028.
- Some downstream manufacturers' demand declined in 2022 since they stockpiled glycine in 2021 with their concerns in continuous increase in price of glycine caused by the production shutdowns as a result China's environmental restrictions and rising prices of upstream raw materials.

Source: The General Administration of Customs of the PRC, China Insights Consultancy

The overall sales volume of industrial-grade glycine in China witnessed a recovery in the 2022 and 2023, and is expected to maintain a stable growth along with the steady demand of downstream herbicide manufacturers

Market size of the industrial-grade glycine, global, by production country, in terms of sales volume, 2018-2028E



- Due to the environmental protection policies, major glycine manufacturers in China reduced their production since 2020. Meanwhile, with limited production capacity, some manufacturers choose to reduce the output of industrial-grade products and instead increase the output of food-grade or pharmaceutical-grade products with relatively higher price. As a result, the overall sales volume of industrial-grade glycine in China dropped to 298.9 thousand tons in 2021.
- With the relaxation of production restrictions, China's industrial-grade glycine production has recovered in 2022, but downstream manufacturers, especially herbicide manufacturers, have stockpiled a large amount of inventory due to concerns that the price of industrial-grade glycine would continue to rise, resulting in low demand for industrial-grade glycine. The overall sales volume of industrial-grade glycine in China grew slightly to 305.3 thousand tons in 2022.
- In 2023, as the inventory of industrial-grade glycine of downstream manufacturers decreased and the stable demand for glyphosate, the overall sales volume of industrial-grade glycine in China grew to 352.4 thousand tons in 2023.
- It is expected that the overall sales volume of industrial-grade glycine in China will maintain a stable growth along with the steady demand of downstream herbicide manufacturers.

Source: The General Administration of Customs of the PRC, China Insights Consultancy

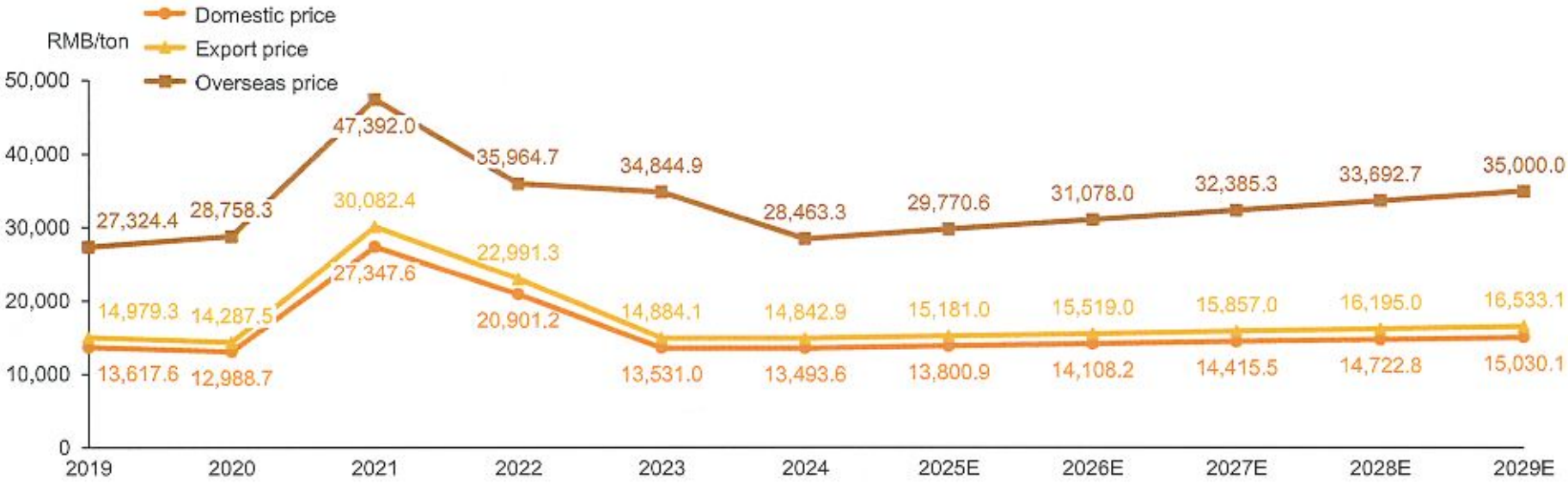
The drivers and trends of global glycine industry include development of downstream industries, expansion of application scenarios, as well as advancement of biosynthesis technology

Drivers and trends	Descriptions
Development of downstream industries	• Glycine is a non-essential amino acid and is widely used in various downstream industries such as condiments, functional foods, dietary supplements, pet foods, pharmaceuticals, etc. With increasing consumer focus on health and nutrition, the market for functional foods and dietary supplements is rapidly expanding, leading to a rise in the demand for glycine as a key ingredient. Furthermore, the growth of the number of pets lead to the rapid growth of the pet food industry, which has also promoted the rapid growth of food-grade glycine sales. For example, China's pet food industry reached RMB100.3 billion in 2023, almost 2.5 times that of 2018.
Expansion of application scenarios	• In recent years, clinical research on glycine has made significant breakthroughs in its anti-wrinkle and anti-aging applications, further expanding its range of uses. Studies have shown that glycine can effectively promote collagen synthesis in the skin, improving elasticity and reducing fine lines. These findings have laid a solid foundation for the application of glycine in the cosmetic and aesthetic fields, with an increasing number of skincare and beauty products incorporating glycine as an active ingredient. With continued R&D and investment, the application scenarios of glycine will continue to expand, driving the stable development of the global glycine industry.
Advancement of biosynthesis technology	• At present, most amino acids can be produced through biosynthesis method, such as glutamic acid (谷氨酸), lysine (赖氨酸), threonine (苏氨酸), etc. However, the biosynthesis method of producing serine (丝氨酸) and cysteine (半胱氨酸) has not been industrialized on a large scale due to the low stability and conversion rate. It is expected that with the further development of biosynthetic technology, the production process of using glycine as raw material to produce serine and further producing cysteine through serine will become more mature and perfect, further promoting the development of the global glycine industry.

Source: China Insights Consultancy

The price of food-grade glycine experienced fluctuations in the past few years. With the downstream manufacturers increase their demand for food-grade glycine, the average price of export glycine is expected to increase in the next five years

Average price of food-grade glycine: by sales method (2019-2029E)



Key analysis

- The price of food-grade glycine in China was relatively stable from 2019 to 2020. In 2021, the export price of food-grade glycine rose rapidly to RMB30,082.4/ton, mainly due to the suspension of production under China's environmental protection policy restrictions, such as the 2021-2022 Autumn and Winter Action Plan for Air Pollution Management issued by the Ministry of Ecology and Environment of the PRC and the increase in the price of upstream chemical raw materials (such as ethanoic acid and synthetic ammonia). With the recovery of production and the substantial increase in total production volume in China, as well as the decline in demand caused by downstream manufacturers stockpiling due to concerns that the price would continuous rise, the average export price of food-grade glycine dropped to RMB14,842.9/ton in 2024. In the first quarter of 2024, albeit the price of food-grade glycine exported from the PRC continuedtoslide,thedeclinehasslowed.Inthenextfiveyears,thedemandforfood-gradeglycine from downstream manufacturers is expected to increase, in line with the rising demand from end-consumers for condiments, pet food, and other products. It is expected that the price of food-grade glycine will stabilize by the end of 2024,and start to rise from 2025.
- Due to factors such as production method, downstream customer recognition, and manufacturer brand awareness, the price of overseas food-grade glycine is relatively higher than that in China. As the global food-grade glycine market is relatively fragmented, the overseas price has also fluctuated in the past five years, increasing from RMB27,324.4/ton in 2019 to a peak of RMB47,392.0/ton in 2021, and gradually falling back to RMB28,463.3/ton in 2024.

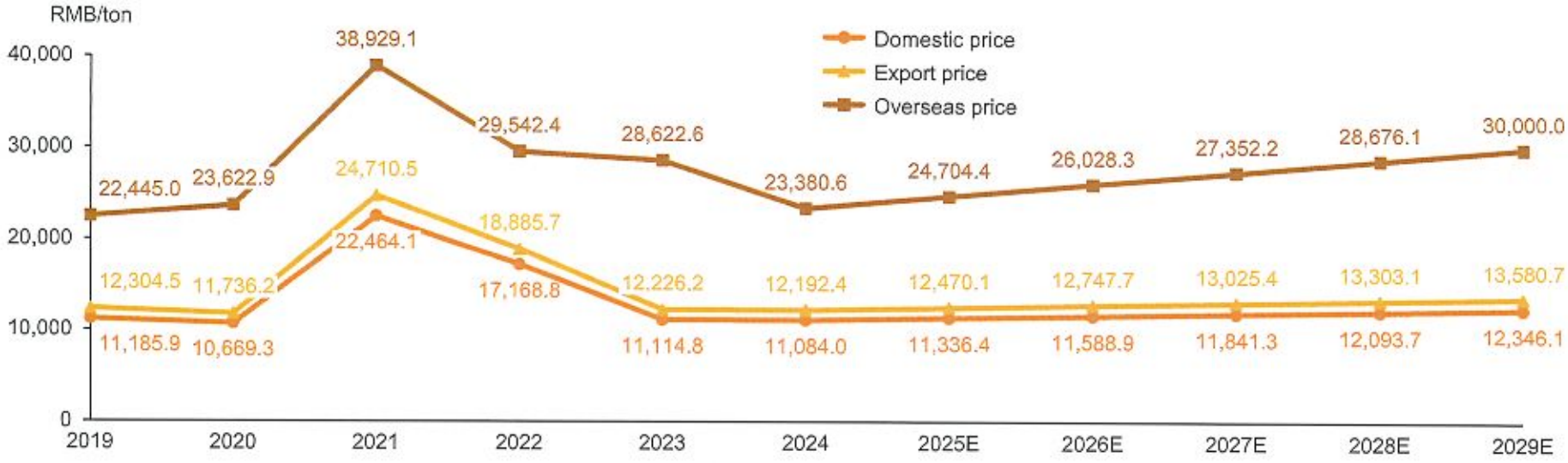
Note:

1. *Average price include VAT, duty fee, transportation cost, etc.*

Source: The General Administration of Customs of the PRC, China Insights Consultancy

Similar to the food-grade glycine, the price of industrial-grade glycine also experienced fluctuations in the past few years

Average price of industrial-grade glycine: by sales method (2019-2029E)



Key analysis

- Similar to the food-grade glycine, the price of industrial-grade glycine also experienced fluctuations in the past few years.
- The average export price of industrial-grade glycine in China dropped from the peak of RMB24,710.5/ton in 2021 to RMB12,192.4/ton in 2024. The average export price of industrial-grade glycine in China witnessed a continuous decrease in 2024. With the anticipated growth in downstream market demand, the export price of industrial-grade glycine in China is expected to stabilize and start to rise since 2025.

Note:

1. *Average price include VAT, duty fee, transportation cost, etc.*

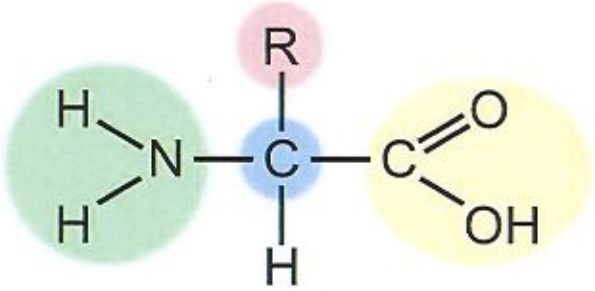
Source: The General Administration of Customs of the PRC, China Insights Consultancy

There are 22 different kinds of amino acids incorporated into proteins, and nine of them are called essential amino acids because the human body cannot synthesize them from other compounds at the level needed for normal growth

Definition

- Amino acids are organic compounds that contain both amino and carboxylic acid functional groups.
- Although over 500 amino acids exist in nature, by far the most important are the 22 α-amino acids incorporated into proteins, including 20 common amino acids and 2 uncommon amino acids.
- Among the 20 common amino acids, nine are called essential amino acids because the human body cannot synthesize them from other compounds at the level needed for normal growth, so they must be obtained from food.

Schematic diagram of amino acid molecular formula



- "R" refers to side chain. Different amino acids have different side chains. For example, the side chain of glycine is "-H", which is the simplest amino acid.

List of 20 common amino acids

Name	3-letter symbols	Chinese name	Side chain (R基)	Whether is essential or not
Alanine	Ala	丙氨酸	$-CH_3$	
Arginine	Arg	精氨酸	-(CH2)3-NHC(NH)NH2	
Asparagine	Asn	天冬酰胺	$-CH_2-CONH_2$	
Aspartate	Asp	天冬氨酸	$-CH_2-COOH$	
Cysteine	Cys	半胱氨酸	$-CH_2-SH$	
Glutamine	Gln	谷氨酰胺	$-(CH_2)_2-CONH_2$	
Glutamate	Glu	谷氨酸	$-(CH_2)_2-COOH$	
Glycine	Gly	甘氨酸	-H	
Histidine	His	组氨酸	-CH2-C3H3N2	✓
Isoleucine	Ile	异亮氨酸	$-CH(CH_3)-CH_2-CH_3$	✓
Leucine	Leu	亮氨酸	$-CH_2-CH(CH_3)_2$	✓
Lysine	Lys	赖氨酸	$-(CH_2)_4-NH_2$	✓
Methionine	Met	蛋氨酸	-(CH2)2-S-CH_3	✓
Phenylalanine	Phe	苯丙氨酸	$-CH_2-C_5H_5$	✓
Proline	Pro	脯氨酸	$-C_3H_6$	
Serine	Ser	丝氨酸	$-CH_2-OH$	
Threonine	Thr	苏氨酸	$-CH(CH_3)-OH$	✓
Tryptophan	Trp	色氨酸	$-CH_2-C_8NH_6$	✓
Tyrosine	Tyr	酪氨酸	$-CH_2-C_6H_4-OH$	
Valine	Val	缬氨酸	$-CH-(CH_3)_2$	✓

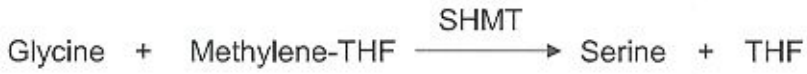
Source: China Insights Consultancy

Serine is a non-essential amino acid that is important for producing proteins and other metabolic functions in human bodies, which are commonly used in the medical, healthy food and cosmetics industries

Overview of the biosynthesis method to produce serine

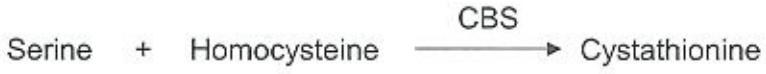
- Although non-essential amino acids can be obtained by the body's own synthesis or conversion from other amino acids, the intake of non-essential amino acids can reduce the need for essential amino acids. There is promising demand for the production of non-essential amino acids.
- Amino acid production methods could be divided into four categories: protein hydrolysate extraction method (蛋白质水解物提取法), chemical synthesis method (化学合成法), enzyme synthesis method (酶合成法) and microbial fermentation method (微生物发酵法). Among which, the enzyme synthesis method and microbial fermentation method could be also classified into biosynthesis method (生物合成法). Biosynthesis method has increasingly attracted the attention of researchers and manufacturers due to its good economic and environmental benefits.
- At present, most amino acids, such as glutamate, lysine, and threonine, could be produced through biosynthesis method at industrial-scale production.
- However, the industrial-scale production technology of serine (丝氨酸) through biosynthesis method is not yet fully mature. Although the biosynthesis method has been extensively researched and has been used in laboratories and small-scale industrial production. It is difficult to maintain the stability and conversion rate in large-scale industrial production. It is expected that with the further development of biosynthetic technology, the production process of using glycine as raw material to produce serine will become more mature, further promoting the development of the global glycine industry.
- Serine is a non-essential amino acid that is important for producing proteins and other metabolic functions in human bodies, which are commonly used in the medical, healthy food and cosmetics industries.
- Driven by the further development of biosynthetic technology, the production process of using glycine as raw material to produce serine will become more mature, which is expected to further promote the development of the global serine and glycine industry. The global demand for serine was over 10,000 tons in 2023, and is expected to surpass 20,000 tons by 2028.

Schematic diagram of preparation of serine from glycine



- **Enzyme**: Serine Hydroxymethyltransferase (SHMT, 丝氨酸羟甲基转移酶)
- **Cofactor:** Tetrahydrofolate (THF, 四氢叶酸)

Schematic diagram of preparation of cysteine from serine



- **Enzyme**: Cystathionine β-Synthase (CBS, 胱硫醚β-合酶)
- **Cofactor:** Pyridoxal Phosphate (磷酸吡哆醛, 维他命B6)

- **Enzyme**: Cystathionine γ-Lyase (CGL, 胱硫醚γ-裂解酶)
- **Cofactor:** Pyridoxal Phosphate (磷酸吡哆醛, 维他命B6)

Source: China Insights Consultancy

Contents

The Company is the largest food-grade glycine manufacturer in terms of both sales volume and revenue of food-grade glycine among global food-grade glycine manufacturers in 2023

Top Five Manufacturers in Global Food-grade Glycine Market, Global, 2023

Ranking	Company/Group Name	Headquarters	2023 sales volume of food-grade glycine (thousand tons)	Market share, %	2023 revenue of food-grade glycine (RMB in millions)
1	The Company	Jiangxi, China	10.5	5.1%	179.4
2	Company F	Hebei, China	9.0	4.4%	135.9
3	Company G	Hebei, China	8.0	3.9%	120.8
4	Company H	Hebei, China	7.0	3.4%	105.7
5	Company I	Hebei, China	4.0	1.9%	60.4
	Top five subtotal		**38.5**	**18.7%**	**602.1**
	Total market size		**206.3**	**100%**	**5,880.3**

- Food-grade glycine market in the PRC is relatively competitive. The top five companies collectively held around 18.7% of the total global market share in terms of sales volume of food-grade glycine. In 2023, the Company is the largest food-grade glycine manufacturer in terms of both sales volume and revenue of food-grade glycine among global food-grade glycine manufacturers, with respectively 5.1% and 3.1% market share in the global market.
- The Company is the only Chinese food-grade glycine manufacturer that posses oversea factory and produce food-grade glycine in the oversea factory among top five Chinese food grade glycine manufacturers. Considering the anti-dumping measures taken by the U.S. International Trade Commission against glycine imports from the PRC and other similar international trade measures, glycine manufacturers with overseas production plants are able to make use of local resources, effectively mitigating the risks from import and export trade policies while increasing market share and influence.
    1. Established in 2000 in Hebei Province, China, Company F. is a non-listed company focusing on amino acid and amino acid derivatives with sales reached domestic and global markets, with a focus on overseas market, while global sales revenue of food-grade glycine reached RMB135.9 million in 2023. Company F had approximately 400 employees in 2023.
    2. Established in 2005 in Hebei Province, China, Company G. is a non-listed company focusing on amino acid with sales reached domestic and global markets, with a focus on overseas market, while global sales revenue of food-grade glycine reached RMB120.8 million in 2023. Company G had approximately 400 employees in 2023.
    3. Established in 2000 in Hebei Province, China, Company H is a non-listed company focusing on glycine with sales reached domestic and global markets, with a focus on the European and American markets, while global sales revenue of food-grade glycine reached RMB105.7 million in 2023.
    4. Established in 2011 in Hebei Province, China, Company I is a non-listed company focusing on amino acid and amino acid derivatives with sales reached domestic and global markets, with a focus on the overseas market, while global sales revenue of food-grade glycine reached RMB60.4 million in 2023.

Source: China Insights Consultancy

The Company is the largest food-grade glycine manufacturer in terms of both sales volume and revenue of food-grade glycine among China's food-grade glycine manufacturers in 2023

Top Five Manufacturers in China's Food-grade Glycine Market*, China, 2023

Ranking	Company/Group Name	2023 sales volume of food-grade glycine (thousand tons)	Market share, %	2023 revenue of food-grade glycine (RMB in millions)
1	The Company	9.5	14.6%	146.6
2	Company F	9.0	13.8%	135.9
3	Company G	8.0	12.3%	120.8
4	Company H	7.0	10.7%	105.7
5	Company I	4.0	6.1%	60.4
	Top five subtotal	**37.5**	**57.6%**	**569.2**
	Total market size	**65.1**	**100%**	**960.8**

- The top five companies collectively held around 57.6% of the total market share in terms of sales volume of food-grade glycine. In 2023, the Company is the largest food-grade glycine manufacturer in terms of both sales volume and revenue of food-grade glycine among China's food-grade glycine manufacturers, with respectively 14.6% and 15.3% market share in the global market.

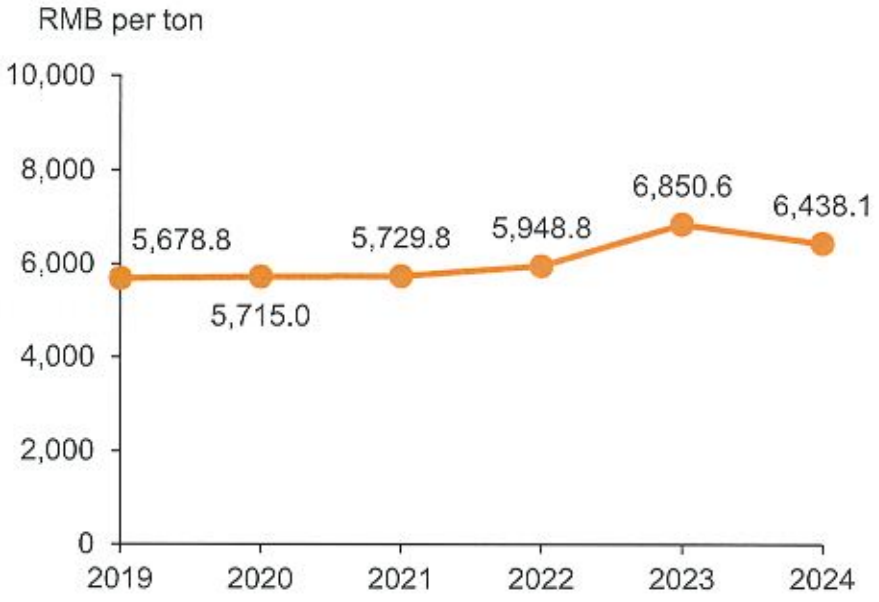
*:Manufacturers' sales volume and revenue in China's food-grade glycine market include products that are produced in China and are sold in domestic market and oversea market

Source: China Insights Consultancy

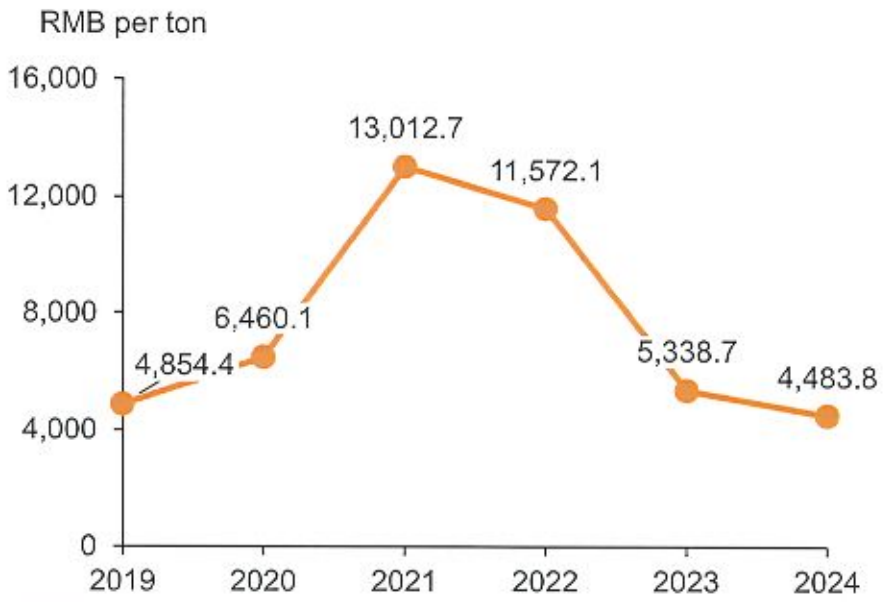
Contents

The major raw materials for sucralose manufacturers include white sugar and DMF

Average price of white sugar, 2019-2024, China



Average price of DMF, 2019-2024, China



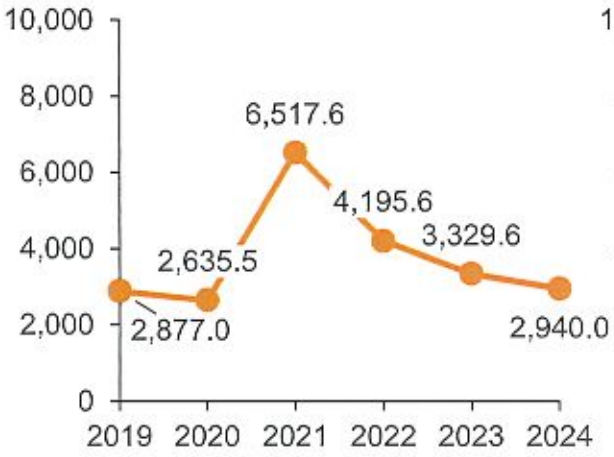
Key analysis

- The market price of white sugar experienced minor fluctuations in the past few years. The price of white sugar increased from RMB5,948.8 per ton in 2022 to RMB6,850.6 per ton in 2023, representing a 15.2% year-over-year growth rate. The main reason for the price increase are as follows: 1) the drought in the main sugar-producing areas in China induced a decrease in domestic sugar production; 2) the sugar production in India was lower than expectation. As the sugar mills in Brazil increased their production in 2023/2024 crushing season, the price of sugar decreased since November 2023. The average price of white sugar recorded a continuous decreasing trend in 2024. In the future, white sugar price could be affected by the climatic reasons and regulation adjustments.
- Historically, the prices for DMF (N,N-Dimethylformamide; C3H7NO) in China have experienced fluctuations as illustrated in the charts above. DMF has a wide range of applications including polyurethane (聚氨酯), acrylic fiber(腈纶), pharmaceuticals and food additives. In 2020, the market exit of a leading DMF manufacturer reduced overall market supply, resulting in the price rise. The price of DMF later climbed to RMB13,012.7 per ton because of tight supply and surging demand. As DMF manufacturers has expanded their production capacity, the price dropped to RMB4483.8 per ton in 2024. In the future, the price of DMF could be affected by supply and demand dynamics and the price of raw material, including Formic acid (甲酸) and Dimethylamine (二甲胺).

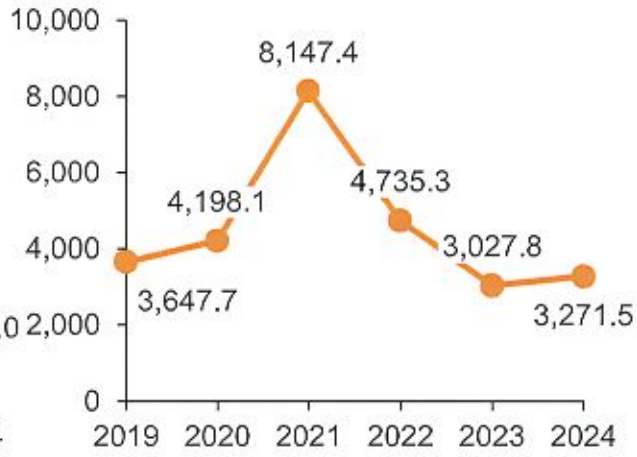
Note: Average price include VAT, duty fee, transportation cost, etc.
Source: BAIINFO, China Insights Consultancy

The major raw materials for glycine manufacturers include ethanoic acid and synthetic ammonia

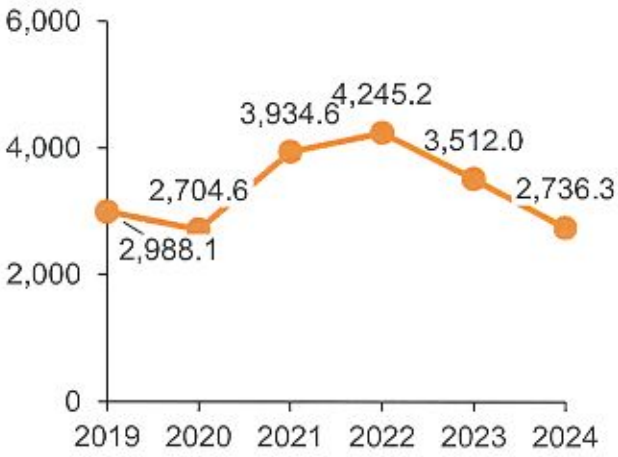
Average price of ethanoic acid, 2019-2024, China



Average price of MCA, 2019-2024, China



Average price of synthetic ammonia, 2019-2024, China



Key analysis

- Historical data indicates fluctuations in market prices for ethanoic acid (乙酸; CH3COOH) , as depicted in the chart above. Specifically, the market price of ethanoic acid rise from RMB2,635.5 per ton in 2020 to RMB6,517.6 per ton in 2021 as ethanoic acid manufacturers in both domestic and overseas markets had suspended their operation for equipment maintenance or climatic reasons, resulting in a significant reduction in market supply. With ethanoic acid manufacturers gradually resumed operation, the price of ethanoic acid decreased to RMB2,940.0 per ton in 2024 In the future, the price of ethanoic acid could be affected by supply and demand dynamics and the price of raw material such as methanol (甲醇).
- The price of liquid ammonia (液氨), also called as synthetic ammonia (合成氨), is highly correlated with the price of urea (尿素), which is a major downstream product of synthetic ammonia. The historical price of synthetic ammonia experienced minor fluctuations, as the price increased from RMB2,704.6 per ton in 2020 to RMB4,245.2 per ton in 2022 and decreased to RMB2,736.30 per ton in 2024, indicating a similar trend with the price of urea. In the future, the price of synthetic ammonia could be affected by the supply dynamic of the market and the demand from urea manufacturers.
- The historical price of Monochloroacetic acid (MCA; 氯乙酸) share similar trend with that of ethanoic acid. Specifically, the market price of MCA rise from RMB4,198.1 per ton in 2020 to RMB8,147.4 per ton in 2021 and fell back to RMB3,271.5 per ton in 2024. In the future, the price of MCA could be affected by demand changes, especially glycine, and the price of raw material, specifically ethanoic acid.

Note: Average price include VAT, duty fee, transportation cost, etc.
Source: BAIINFO, China Insights Consultancy

Contents

Overview of major global trade policies and events (1/2)

Time	Policies/events	Implementing Jurisdiction	Content
December 2023	*The U.S. Department of the Treasury imposed sanctions on 130 entities and individuals from China, Turkey, and the United Arab Emirates*	United States	• The U.S. Department of the Treasury's Office of Foreign Assets Control (OFAC) imposed sanctions on 130 entities and individuals from China, Turkey, and the United Arab Emirates. These sanctions focus on individuals and entities abetting Russia's unconscionable war against Ukraine by providing Russia with much-needed technology and equipment from third countries.
October 2023	*The U.S. Commerce Department added 42 Chinese companies to the Entity List*	United States	• The U.S. Commerce Department, through its Bureau of Industry and Security (BIS), added 42 Chinese companies to the Entity List. These companies are subject to specific license requirements for the export, reexport, and/or transfer of specified items. The move was made due to their support for Moscow's military and defense industrial base, which includes the supply of U.S.-origin integrated circuits.
September 2023	*The Office of the United States Trade Representative announced the further extension of the 352 reinstated exclusions and 77 COVID-related exclusions in the China Section 301 Investigation*	United States	• The Office of the United States Trade Representative announced the further extension of the 352 reinstated exclusions and 77 COVID-related exclusions in the China Section 301 Investigation until December 31, 2023. The exclusions were previously scheduled to expire on September 30, 2023. The extension will allow for further consideration under the statutory four-year review.
November 2022	*China and ASEAN jointly announced the official launch of the Version 3.0 China-ASEAN FTA negotiations*	China, ASEAN	• China and ASEAN jointly announced the official launch of the Version 3.0 China-ASEAN FTA negotiations. The two sides agreed that the negotiations will cover the fields including trade in goods, investment, digital and green economy, so as to build a more inclusive, modern, comprehensive and mutually beneficial China-ASEAN FTA.

Source: China Insights Consultancy

Overview of major global trade policies and events (2/2)

Time	Policies/events	Implementing Jurisdiction	Content
Augst 2022	*USITC makes determination in five-year (sunset) review concerning glycine from China*	United States	• The U.S. International Trade Commission (USITC) determined that revoking the existing antidumping duty order on imports of glycine from China would be likely to lead to continuation or recurrence of material injury within a reasonably foreseeable time. As a result of the Commission's affirmative determination, the existing order on imports of this product from China will remain in place.
January 2022	*RCEP agreement entered into force*	China, ASEAN	• The Regional Comprehensive Economic Partnership (RCEP) agreement is the world's largest free trade agreement that includes 15 member countries from East Asia and the Pacific region. The agreement entered into force on January 1st 2022.
December 2021	*Uyghur Forced Labor Prevention Act (Public Law No. 117-78)*	United States	• The Uyghur Forced Labor Prevention Act (UFLPA) was enacted by the 117th Congress of the United States for a rebuttable presumption that goods mined, produced, or manufactured wholly or in part in Xinjiang or by an entity on the UFLPA Entity List are prohibited from U.S. importation under 19 U.S.C. § 1307. The Entity List includes companies such as COFCO Sugar Holding Co. Ltd and Anhui Xinya New Materials Co., Ltd.

Key analysis

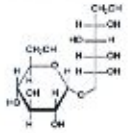
- In recent years, major events such as China-US economic and trade frictions, COVID-19, and the conflict between Russia and Ukraine have induced significant effect on global trade activities. The tightening global trade policies, including expanding Entity List, extending trade restriction orders, and imposing sanctions has posed challenges for Chinese companies as companies face regulatory uncertainty on global trade. Under this circumstance, Chinese companies poised to mitigate risk by constructing worldwide product supply system, diversifying their export destinations beyond traditional markets, building compliance and risk management systems, and collaborating with international partners.
- Specifically, the anti-dumping order implemented by the U.S. International Trade Commission on imports of glycine from China caused the price differences between overseas price and domestic/export price. The anti-dumping duty rate for glycine subject to the China-wide rate for this order is a general tariff rate of 4.2%, with additional (i) anti-dumping duty rate of 155.89%; (ii) countervailing rate of 144.01%; and (iii) section 301 of Trade Act of 1974 rate of 25%.Regulations, such as antidumping duty order, induces the global trade risks for Chinese businesses and leads to the price difference between domestic product sales and expert product sales. Chinese glycine manufacturers that build oversea factories and sales networks can avoid the trade restrictions set by the order by exporting glycine from no subject countries. Such Chinese glycine manufacturers then possess the capability of mitigating risks in global market, driving more stable business operations comparing with other Chinese glycine manufacturers with solely domestic factories.

Source: China Insights Consultancy

Contents

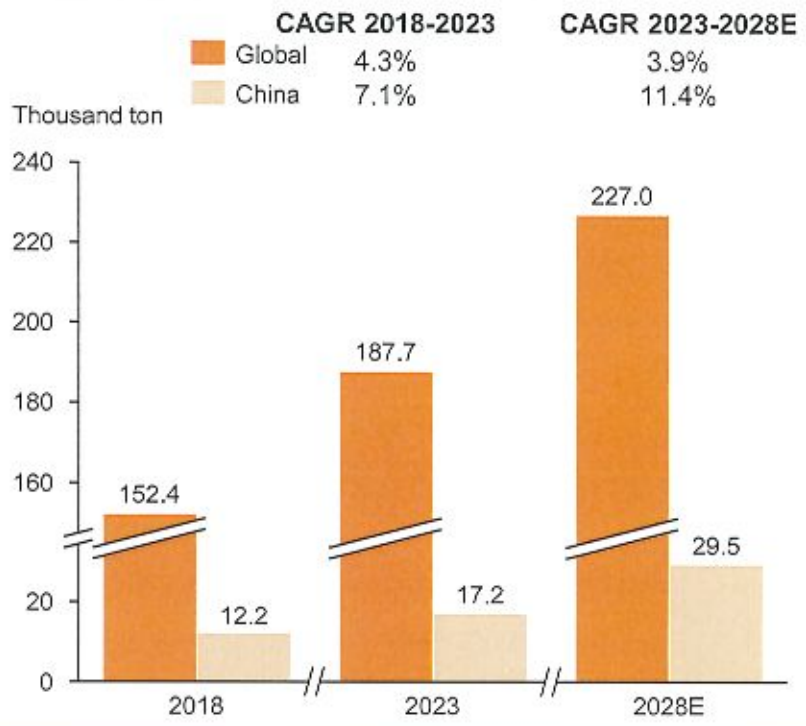
Isomalt is a low-intensity sweetener with low-GI and low-calorie. Meanwhile, isomalt is also have health benefits for human bodies, such as oral and gut

Overview

Definition	• Isomalt is a sugar alcohol sweetener derived from the enzymatic conversion of sucrose.
Chemical formula	• The chemical formula of isomalt $C_{12}H_{24}O_{11}$ 
Characteristics	• Isomalt is a **low-intensity sweetener**, which is approximately 0.6 times greater than the sweetness of sucrose.
Health benefits	• **Low glycemic index (GI):** Isomalt is absorbed and digested slowly, so it has less impact on blood glucose level, making it suitable for diabetics. • **Low-calorie:** Isomalt has about half the caloric value of sucrose, providing only 2 kilocalories per gram. • **Oral health:** Isomalt could prevent changes in pH on tooth surfaces, helping to prevent cavities. • **Gut health:** Isomalt could act as a nutrient for beneficial gut bacteria, softening stools and relieving constipation.
Downstream usage	• Isomalt is widely used in the production of various foods, such as hard candies, soft candies, chewing gum, chocolate, jelly, refreshing drinks, ice cream, baked goods, tablets, etc. • Isomalt could also be used as a substitute of sucrose in the production of sugar-free foods, health products and pharmaceuticals.
Manufacturing method	• Isomalt is produced by enzymatic conversion of sucrose into isomaltose (异麦芽酮糖), followed by hydrogenation to form isomalt and subsequent purification to obtain high purity.

Source: China Insights Consultancy

Market size of the isomalt, global and China by sales volume, 2018-2028E



- Driven by the increasing health awareness of the consumers and widely acceptance of food and beverage manufacturers, the global isomalt sales volume increased from 152.4 thousand tons in 2018 to 187.7 thousand tons in 2023 with a CAGR of 4.3%, and is expected to further reach 227.0 thousand tons by 2028, representing a CAGR of 3.9% from 2023 to 2028. , The isomalt sales volume in China increased from 12.2 thousand tons in 2018 to 17.2 thousand tons in 2023 with a CAGR of 7.1%, and is expected to further reach 29.5 thousand tons by 2028, representing a CAGR of 11.4% from 2023 to 2028.
- At present, the average price of domestic isomalt was approximately RMB25/kg.

The dietary fiber is classified as the seventh nutrients that support human health; dietary fiber with multifunctional properties, such as seaweed dietary fiber, is expected to gain a higher market growth as it not only promotes health, but also enhances the taste and the perception of food

Definition

- According to the "Fundamental Terminology and Definition of Nutritional Component in Foods", the dietary fiber is a carbohydrate polymer that naturally existed in plant, extracted or synthesized with a degree of polymerization(DP) of at least 3 that cannot be digested and absorbed by the human small intestine, showing a health significance to the human body. The dietary fiber include cellulose(纤维素), hemicellulose(半纤维素), pectin(果胶), inulin(菊粉) and other dietary fiber monomer components. Apart from dietary fibers that naturally existed in plant, the market size below includes only dietary fiber that produced as food ingredients.
- According to World Health Organization, the dietary fiber is classified as the seventh nutrients that support human health, together with protein, fat, carbohydrates, vitamins, minerals and water.

Classification of dietary fiber

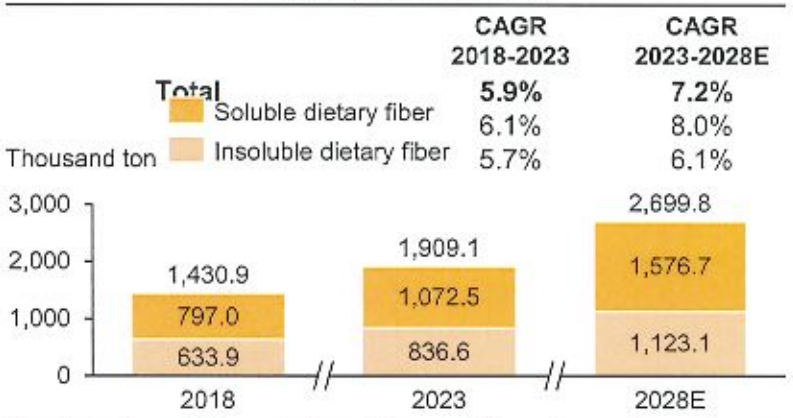
Soluble dietary fiber

- **The soluble dietary fiber is the dietary fiber that is soluble in water.** Soluble dietary fiber mainly refers to plant cell wall memory and secretions, as well as polysaccharides (多糖) and synthetic polysaccharides (合成多糖) decomposed by microorganisms. The main components of soluble dietary fiber are gums and sugars, which can be digested and absorbed in the small intestine.

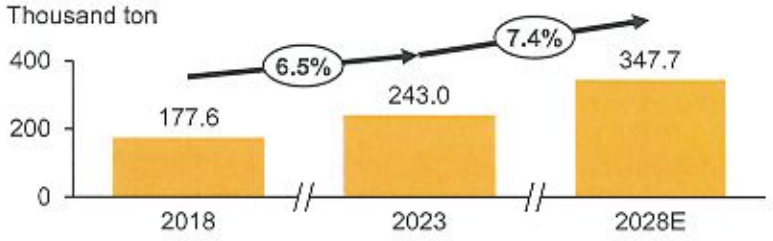
Insoluble dietary fiber

- **The insoluble dietary fiber is the dietary fiber that is insoluble in water.** Insoluble dietary fiber mainly refers to cellulose (纤维素), hemicellulose (半纤维素) and lignin (木质素), etc., being merely absorbed and metabolized in the small intestine.

Market size of the dietary fiber, global, by sales volume, 2018-2028E



Market size of the dietary fiber, China, by sales volume, 2018-2028E



- As a minor food ingredient, dietary fiber is widely used in the production of various foods, such as bakery products, staple foods, beverages, and dairy products. As consumer demand for clean labels and precise information on daily values (DV%) influences food labeling, dietary fiber has gained preference over food additives these years.
- Among all dietary fibers markets, markets of dietary fiber with multifunctional properties are expected to gain a higher growth as they not only promote health, but also enhance taste, increase the perception of food, etc. Specifically, seaweed dietary fiber, as a soluble dietary fiber, has gained popularity among consumers. Seaweed dietary fiber is a group of edible carbohydrate polymers derived from seaweed, which is resistant to the digestive enzymes and is non-absorbable in the small intestine, thus can directly interact with gut microbes and lead to the productions of beneficial metabolites. The seaweed dietary fiber has been reported to prevent blood sugar surges and control appetite by slowing digestion, prolonging gastric emptying, and enhancing satiety as well as enhance taste by working as a thickener. As a multifunctional minor food ingredient of dairy products, bakery products and functional foods, seaweed dietary fiber is expected to achieve higher market growth comparing with other soluble dietary fiber.
- Driven by the increasing consumer demand for clean labels and precise information on daily values (DV%) influences food labelling, dietary fibre has gained preference these years. The global dietary fibre sales volume increased from 1,430.9 thousand tons in 2018 to 1,909.1 thousand tons in 2023, with a CAGR of 5.9%, and is further expected to reach 2,699.8 thousand tons by 2028, with a CAGR of 7.2% from 2023 to 2028.

Source: Journal of Food Safety and Quality, China Insights Consultancy

Alginate is a high-quality seaweed dietary fiber, as a food additive with strong health attributes, the future is expected to replace part of the hydrocolloid market in the future

Hydrocolloids

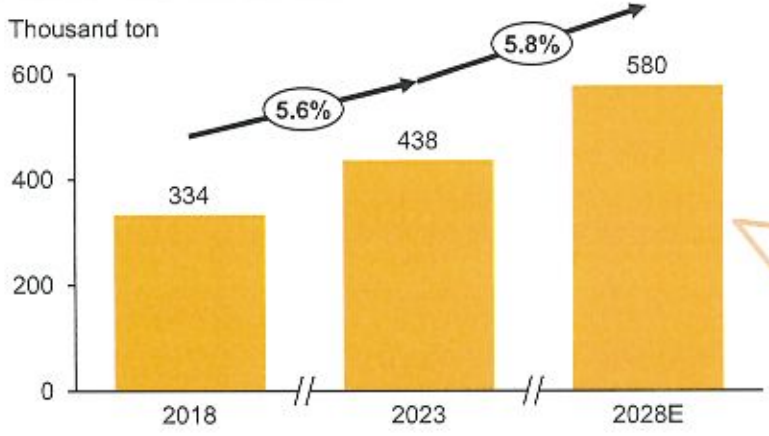
- In the food industry, **natural hydrocolloids are highly favoured over semisynthetic and synthetic hydrocolloids**. This preference is due to their numerous distinct advantages, which contribute to enhancing the stability, functionality, quality, safety, and nutritional value of various products.
- Natural hydrocolloids possess several notable benefits compared to their counterparts, including being extracted from renewable sources, readily available and easy to work with, biocompatible, nontoxic, capable of physical and chemical modification, environmentally friendly, cost-effective, and widely accepted by the public due to the multitude of health benefits they offer.

Natural hydrocolloids

- ✓ Xanthan Gum
- ✓ Carrageenan
- ✓ Agar
- ✓ Gelatin
- ...

Synthetic hydrocolloids

Market size of the hydrocolloids, global, by sales volume, 2018-2028E



If alginates can replace 10%-15% market share in the hydrocolloid market in the future, its market size will realize a significant increase.

Source: China Insights Consultancy

- Alginate (also known as sodium alginate) is a polysaccharide carbohydrate extracted from brown algae plants with the molecular formula (C6H7O6Na)n and a relative molecular weight of about 32,000 to 200,000.
- Alginate has a variety of applications in the food industry, especially when used as a food additive, where it is widely used as a thickener, stabilizer, emulsifier and viscosity modifier due to its unique physical and chemical properties.
- **Alginates offer more health benefits and a wider range of applications than commonly used food additives such as carrageenan and agar**. Carrageenan and agar are mainly used as thickeners and gelling agents, but they are not usually regarded as providing nutritional value.
- Alginate is identified in its properties as **dietary fibre**, which is not only not harmful to the human body, but is a nutrient for the human body. Alginates are unique in their ability to provide similar food processing functions, but also act as a source of nutritional supplementation, adding health value to food products.

Prebiotics, as an important food ingredients, are widely adopted in various types of food, such as dairy products, juice products, baked goods, staple foods, infant formula, etc.

Definition

- Updated by the International Scientific Association of Probiotics and Prebiotics (ISAPP), the prebiotic (益生元) is a substrate that is selectively utilized by host microorganisms, conferring a health benefit. In simpler terms, prebiotics are nondigestible food ingredients that promote the growth of beneficial microorganisms in the gut, contributing to overall health. Examples of prebiotics include some starches, oligosaccharides (低聚糖), inulin (菊粉), and pectin (果胶). Apart from prebiotics that naturally existed in plant, the market size below includes only prebiotics that produced as food ingredients.

Biological function of prebiotics

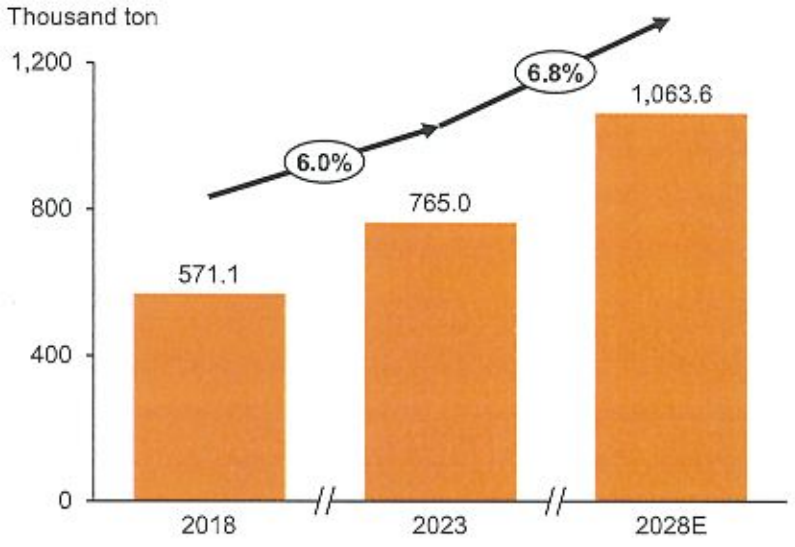
Improved Intestinal Absorption of Dietary Calcium:
- Prebiotics can enhance the absorption of calcium in the gut, contributing to bone health.

Better Blood Sugar Control:
- Consuming prebiotics may help regulate blood sugar levels, which is beneficial for individuals with diabetes or those at risk.

A Well-Functioning Immune System:
- Prebiotics support a healthy gut microbiome, which plays a crucial role in immune function.

Reduced Risk of Colorectal Cancer:
- By promoting the growth of beneficial gut bacteria, prebiotics may contribute to a lower risk of colorectal cancer.

Market size of the prebiotics, global, by sales volume, 2018-2028E



- Prebiotics, as an important minor food ingredients, are widely adopted in various types of food, such as dairy products, juice products, baked goods, staple foods, infant formula, etc. In recent years, functional foods, functional beverages, and functional dairy products has experienced a rapid development, promoting the demand of healthy minor food ingredients. As increasing number of scientific data are reported to support the idea of prebiotics promoting intestinal health, the market for prebiotics is expected to present a high growth. Besides, prebiotics are also used in dietary supplement, medicine, feed, and other aspects.

Source: ISAPP, Harvard Health Publishing, China Insights Consultancy

Considering the increasing demand in curcumin adopted in dietary supplements, medicines and cosmetics, the global curcumin market is expected to further reach 8.5 thousand tons by 2028, representing a CAGR of 13.0% from 2023 to 2028

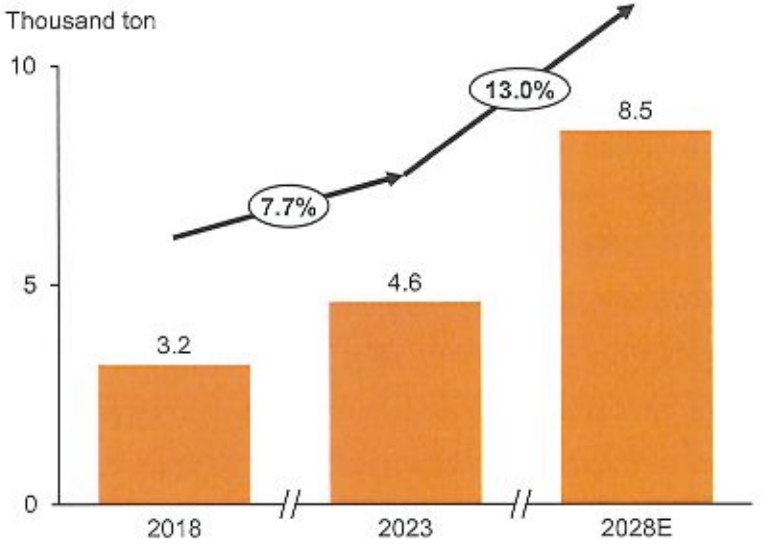
Definition

- Curcumin (薑黃素) is the biologically active compound in turmeric (薑黃), which is a bright yellow spice that is derived from the underground stems, or rhizomes, of the curcuma longa plant. Chemically, curcumin is a polyphenol, more particularly a diarylheptanoid, belonging to the group of curcuminoids, which are phenolic pigments responsible for the yellow color of turmeric. Apart from curcumins that naturally existed in plant, the market size below includes only curcumins that are extracted from turmeric as food additives.

Downstream usage of curcumin

Food	• Curcumin is used in cooking and food coloring due to its yellow polyphenolic pigment. • Curcumin has become a popular dietary supplement promoted to benefit a variety of conditions including arthritis, digestive disorders, depression, and allergies.
Medication	• Curcumin has a wide range of beneficial properties, including anti-inflammatory, antioxidant, chemo preventive and chemotherapeutic activity and is currently in human clinical trials for a variety of conditions.
Cosmetic	• Curcumin is widely adopted by therapeutic cosmetics on the purpose of anti-inflammation. It is used in skin repair cosmetics as a natural ingredient, particularly for conditions like acne, blemishes, dark spots, and hyperpigmentation.
Others	• Curcumin is an excellent feed additive contributing to poultry and livestock animal growth and disease resistance. • Curcumin is used as a natural dye in textile industries. It imparts a yellow color to the fabrics.

Market size of curcumin, global, by sales volume, 2018-2028E



- The global sales volume of curcumin increased from 3.2 thousand tons in 2018 to 4.6 thousand tons in 2023 with a CAGR of 7.7%. Considering the increasing demand in curcumin adopted in dietary supplements, medications and cosmetics, the global curcumin market is expected to further reach 8.5 thousand tons by 2028, representing a CAGR of 13.0% from 2023 to 2028.

Source: Harvard Health Publishing, China Insights Consultancy

Contents

Downstream companies' information

Company		Description
	Coca-Cola Company	Established in 1892 with headquarters in Atlanta, Georgia, the U.S. Coca-Cola Company is a listed company in NYSE with main business in manufacturing RTD beverages.
	Mondelez International	Split from Kraft Food in 2012 with headquarters in Deerfield, Illinois, the U.S. Mondelez Internationalis a listed company in NASDAQ with main business in manufacturing snacks, biscuits, chocolates, gum, etc..
	Nestlé S.A.	Established in 1867 with headquarters Vevey, Vaud, Switzerland. Nestlé S.A. is a listed company in SWX with main business in manufacturing baby food, medical nutrition, pet food, packaged drinking water, coffee, etc.
	Colgate-Palmolive Company	Established in 1806 with headquarters in New York City, New York, the U.S. Colgate-Palmolive Company is a listed company in NYSE with main business in manufacturing oral care products, personal care products, home care products, pet care products, etc.
	Mars Inc.	Established in 1911 with headquarters in McLean, Virginia, the U.S. Mars Inc. is a private company with main business in manufacturing pet care products, snacks, food and nutrition.

Source: China Insights Consultancy

Verifications

- It is common practice that sucralose manufactures and glycine manufactures cooperate with designated wholesalers, who are wholesalers designated by certain manufacturers to place purchase orders on behalf of such manufacturers. Other wholesalers are wholesalers which are not designated wholesalers.
- According to the CIC Report, since Other Wholesalers generally have conducted businesses with local manufacturers in their respective regions for many years, they usually have more bargaining power when dealing with local manufacturers and know how to sell products in a better way. As such, it would be a good solution for manufacturers to sell their products to Other Wholesalers if they want to enter into new markets quickly.
- According to the CIC Report, it is common for multinational corporations to engage Designate Wholesalers to make purchase orders on their behalf as these Designated Wholesalers provide [logistics] services such as warehouse services and customs clearance services for them.
- As advised by CIC, there is a huge demand of glycine in the US, taking into account of the extra tariff on food-grade glycine produced in the PRC and imported to the US, glycine manufacturers located in places outside the PRC may have a bargaining power to set higher selling prices for sale of glycine to clients in the US in order to have higher gross profit margin.
- As advised by CIC, top sucralose manufacturers are diversifying their product portfolio by developing new products in order to mitigate the impact imposed by the Sucralose Price War.
- According to the CIC Report, DDP delivery terms can only be provided by leading food additive manufacturers with risk control measurements.
- In the first half of 2024, some sucralose manufacturers' cost of sales increased due to reasons of (i) the shipment route of their products to overseas customers may required to change; and (ii) there was an increase in tariff in many countries that their customers located in, both as a result of the Palestinian-Israeli conflict occurred in late 2023.
- In the first half of 2024, some food-grade glycine manufacturers' cost of sales increased due to reasons of (i) the shipment route of their products to overseas customers may required to change; and (ii) there was an increase in tariff in many countries that their customers located in, both as a result of the Palestinian-Israeli conflict occurred in late 2023.
- The hydrochloric acid is a strong acid, it must be handled properly before it is discharged.
- The Company maintains various insurance policies, including work safety liability insurance and property insurance, which is in line with the market practice, according to CIC.
- As advised by CIC, as a supply chain diversification strategy, international Manufacturer customers tend to diversify their locations of supply by resource distribution and by jurisdiction areas to ensure more resilience and agility in their business. Given that China has become the main producer of sucralose in terms of sales volume, accounting for over 80% of the overall global sales volume in 2023, and is expected to reach close to 90% by 2028, it is crucial for international manufacturer customers to procure sucralose from manufacturers outside of China to avoid reliance or supply in one location, so as to mitigate the risk of tariffs and international trade policies and to ensure the stability of supply. Accordingly, with the limited supply of sucralose produced outside of China and the demand for supply chain diversification, the average selling price of sucralose produced and sold outside of China is generally higher. Sourcing from overseas plants allows customers to mitigate the potential impacts of trade frictions and balance the risks associated with a single-source supply. With the (i) increased possibility of more tariffs being imposed on sucralose exported from the PRC going forward; (ii) the long-term partnership between the Group and its existing customers which build a foundation of trust in its product quality; and (i) expected incurrence of switching costs and uncertainty in quality of products in the event of sourcing sucralose from other sucralose manufacturers with overseas plants, despite of the differences in selling price of sucralose produced in and outside of China, in order to ensure (a) their high geographical concentration of sucralose can be mitigated; and (b) product.consistency, it is reasonable for its customers to start procuring sucralose produced at its Thailand Plant as a means for supply chain diversification.

Source: China Insights Consultancy

Verifications

- The alternatives of sucralose include aspartame and other artificial sweeteners. Artificial sweeteners are high-intensity sweeteners that could provide sweetness to food and beverages. However, due to the safety concern, most downstream manufacturers turn to sucralose over aspartame or cyclamate. Furthermore, Acesulfame K, like sucralose, is considered a safe sweetener, but its taste is not as good as sucralose and is not expected to threaten the development of the global sucralose industry. The new generation products such as neotame may have potential impact on the overall sucralose market. However, the sweetness of neotame is over 8,000 times of sucrase, making it difficult for downstream manufacturers to balance the taste of food or beverage. As a result, the neotame is not in large-scale commercial use as at present.
- Sucralose is considered as a safety sweetener by most food regulatory bodies. Regarding the potential side effects and risks of overdose/improper use of sucralose, there are very few reports of adverse reactions to sucralose such as headaches and allergic reactions.
- Glycine plays a key role in the creation of several other important bio-compounds and proteins. Glycine is the simplest amino acid and one of the most important amino acids, and there is currently no complete alternatives to glycine. Food-grade glycine can act as feed attractants, condiments/flavour enhancers, surfactants and stabilisers/preservatives in pet food, daily consumer goods, soy sauces, fish paste, etc. National Food Safety Standard of Food Additives (《食品安全国家标准食品添加剂使用标准》) (GB2760-2024) lists food-grade glycine as a flavour enhancer, and monosodium glutamate, disodium 5'-inosinate, disodium 5'-guanylate are also common flavour enhancers. Glycine is generally considered safe. Regarding the potential side effects and risks of overdose/improper use of glycine, there are rare reports of adverse reactions to glycine such as diarrhea, nausea, stomach and vomiting.
- There will be customer demand for isomalt in the food and beverage, pharmaceutical and cosmetics industries globally and in the PRC.
- There will be customer demand for serine in the pet food and daily consumer goods industries globally and in the PRC.
- the Sucralose Price War has ended since August 2024 with three major sucralose manufacturers the PRC, together with the Group ,raised the price of sucralose several times August and September.
- Splenda is a global leader in the production of low-calorie sweetener products, with one of its products containing sucralose being manufactured by Tate & Lyle, which is the one of the Group's sucralose competitors headquartered in the United Kingdom.
- Byproducts of the Group's products are required to be disposed of.
- The market price of sucralose in the PRC increased from approximately RMB105,789.5 per ton in June 2024 to approximately RMB191,333.3 per ton in September 2024, which indicated the end of the Sucralose Price War.
- In particular, compared to traditional stabilisers used in yoghurt, beverages, ice-cream and other food products such as hydrocolloid, carrageenan and agar powder, seaweed dietary fibre can act as a stabilizer with extra nutritional value by slowing digestion, prolonging gastric emptying, enhancing satiety, etc..
- Unlike the traditional manufacturing industry, the food additives industry is a specialized and technology-intensive sector, involving cutting-edge fields such as fine chemicals, synthetic biology, food science and food engineering.
- The production process of seaweed dietary fibre requires the alkaline environment and participation of biological enzymes.
- The Company's new products are expected to be complements to the existing products, which can better promote the development of the existing products' business. For example, isomalt and the Company's sugar substitute products are low-intensity sweeteners that can be combined with sucralose to achieve a balanced taste. Furthermore, most existing clients of the Company's sucralose product may also need other types of food additives, which provide cross-selling opportunities for the Company's new products, such as seaweed dietary fibre and curcumin. In addition, glycine could be used as the raw material to produce serine, which can further promote the further development of its glycine business.

Source: China Insights Consultancy

Verifications

- According to CIC, technology enterprises are not limited solely to those engaged in technological innovation or classified as high-tech enterprises, but could also be identified through multiple dimensions. Currently, there is no unified national standard for identifying technology enterprises and there are also no restrictions regarding the inclusion of the term "technology" in an enterprise's name. Based on industry practices and standards from various institutions, including MOST (Ministry of Science and Technology of PRC), CSRC (China Securities Regulatory Commission), and listing rules for Specialist Technology Companies (Chapter 18C), it is considered that if an enterprise possesses usually three or more of the following key elements, it can be considered to have technological attribute.

  1.The enterprise or employees have received national or provincial-level technology awards or participated in national or provincial-level technology projects, according to CSRC's guidelines.

  2.The enterprise owns a certain number of valid intellectual property rights, for instance, CSRC required enterprises listed on STAR Market (科創板) owning at least seven patents for their core businesses.

  3.The enterprise has shown leadership in technology and processes of production, and product quality in the industry, leading to unique competitive advantages to its peers.

  4.The processes of core business are supported by information system.

  5.R&D (research and development) expenditure as percentage of total revenue is no less than 3-5%, or as percentage of total operating expenditure is no less than 10-15% according to the standards of MOST's Evaluation Methods for Technology-Based SMEs (科技型中小企業評價方法) and Administrative Measures for the Accreditation of High-Tech Enterprises (高新技術企業認定管理辦法), and CSRC's Guidelines for Enterprises with Technological Innovation Attributes (科創屬性評價指引)

  6.The proportion of R&D personnel engaged in the most recent year is no less than 10% of the total number of employees for that year, according to CSRC's guidelines for enterprises with technological innovation.

  7.The enterprise has established a R&D institution that meets a certain level standard such as the R&D facility's area and the value of equipment utilised, etc..

  8.The enterprise emphasises on digital and green development for the improvement of efficiency and environmental protection in their daily operation, such as intelligent production lines and zero-carbon factories.

  9.The enterprise's business nature is within a specific scope of industries. For instance, new food technology is one of the five acceptable sectors defined by "Chapter 18C" for Specialist Technology Industries, involving synthetic biology which is utilised in production of isomalt (異參芽醇糖醇), a new generation sweetener as a food additive.

- According to the Chinese Standards for Food Additives (GB2760-2014), and as confirmed by CIC, glycine can be consumed as synthetic spice for protein powder without any maximum amount of consumption specified.
- As advised by the CIC, given glycine's unique combination of flavor enhancement, nutritional support and functional roles, it is difficult to fully substitute glycine's wide-ranging applications with other alternative food ingredients.
- In August and September 2024, several major sucralose manufacturers in the PRC increased their respective selling price of sucralose in the PRC (with market price of sucralose in the PRC increased from approximately RMB105,789.5 per ton in June 2024 to approximately RMB191,333.3 per ton in September 2024), which indicated the end of the Sucralose Price War, The market price of sucralose gradually resume back to normal after the end of the Sucralose Price War.

Source: China Insights Consultancy

Verifications

- As advised by CIC, as a supply chain diversification strategy, it is common for overseas manufacturer customers to diversify their locations of supply by resource distribution and by jurisdiction areas to ensure more resilience and agility in their business.
- As advised by CIC, given glycine's unique combination of flavor enhancement, nutritional support and functional roles, it is difficult to fully substitute glycine's wide-ranging applications with other alternative food ingredients.
- The average export market price of sucralose dropped significantly from approximately RMB386,261.6 per ton in 2022 to approximately RMB186,491.0 per ton in 2023, whereas the average domestic market price of sucralose dropped from approximately RMB378,556.0 per ton in 2022 to RMB169,537.3 per ton in 2023.
- The Sucralose Price War, which took place within the PRC, did not have material impact on the overseas market price of sucralose, whereby the overseas market price of sucralose remained at approximately RMB529,937.3 per ton, RMB566,338.8 per ton and RMB623,000.0 per ton in 2021, 2022 and 2023, respectively.
- Sucralose and isomalt can be used together to achieve a balanced taste in confectionary and snacks; sucralose and seaweed dietary fibre can be applied together in yoghurt and other beverages to act as sweetener and stabiliser respectively; food-grade glycine and serine can both be utilised in pet food and daily consumer goods, where food-grade glycine can act as feed attractants in pet food and surfactants in daily consumer goods, and serine can provide nutrients in pet food and moisture retaining and antioxidant properties in daily consumer goods.
- Calcium carbonate is alkaline in nature to neutralise hydrochloric acid.
- Certain manufacturer customers of the Company would be from time to time willing to pay a higher price having considered (1) their respective long-term relationship with the Company whereby trust and loyalty are reflected in the pricing; and (2) it is important for such customers to mitigate the risk of tariffs and international trade policies in order to ensure the stable supply of food-grade glycine from their manufacturer suppliers.
- The bill of lading was provided, which evidences ownership transfer and indicated the goods were passed to the carrier for the delivery from the local customs (i.e. Indonesia and the China customs, respectively) to the customer's port.
- There is increasing demand in sucralose produced overseas.
- With respect to sucralose, since the last quarter of 2022, leading companies selling sucralose have expanded their respective production volume, which resulted in market supply of sucralose exceeding demand. Thus, leading companies have been willing to sell products at extreme low price to reduce their storage, with an attempt to undercut other industry players to expand a greater market share, triggering the Sucralose Price War. The Sucralose Price War among industry players may largely reduce the industry profit margin.
- As advised by CIC, it is common for international manufacturer customers to procure sucralose produced in and outside of China at the same time, despite of the differences in selling price of sucralose produced in and outside of China, in order to ensure their high geographical concentration of sucralose can be mitigated.
- The average market price of glycine in the PRC remained stable in 2024, where it ranged within RMB10,541.9 per ton and RMB14,318.1 per ton.
- Subsequent to the Track Record Period and as at the Latest Practicable Date, the US government introduced a tariff on goods from Canada, Mexico and the PRC, among which, all goods imported from the PRC to the US would be subject to an additional 10% tariff, with a few exceptions.

Source: China Insights Consultancy

Verifications

- Whether the Company's customers in the US or the Company are/is responsible for paying for the additional tariff for its overseas sales of sucralose would depend on the commercial negotiation agreed between the relevant customer and us. According to CIC, the sales volume of sucralose produced in the PRC accounted over 80% of the global sales volume of sucralose in 2023. As such, customers in the US face limited options for alternative sucralose suppliers.
- According to the CIC Report, the Company were the only PRC food-grade glycine manufacturer and the only PRC sucralose manufacturer with overseas production plant among the top five PRC food-grade glycine manufacturers and the top five PRC sucralose manufacturers as at 31 December 2024.
- During the Track Record Period, the average selling price of food-grade glycine produced at the Company's Indonesia Plant ranged from approximately RMB32,379 per ton to RMB42,975 per ton, which is lower than that of food-grade glycine produced by our major overseas competitors ranging from approximately RMB40,000 per ton to RMB70,000 per ton, as confirmed by the CIC. On the other hand, the average selling price of sucralose produced at the Company's Thailand Plant for the year ended 31 December 2024 was approximately RMB317,932 per ton, which is also lower than that of sucralose produced by our major overseas competitors ranging from approximately RMB550,000 per ton to RMB650,000 per ton, as confirmed by the CIC.
- During the three months ended 31 March 2025, the market price of sucralose in the PRC ranged from approximately RMB180,000 per ton to approximately RMB200,000 per ton. As confirmed by CIC, such price is stable during 2025, and the Sucralose Price War has ended.
- The Company is responsible for export clearance and associated costs including tariffs, such as the US 2025 IEEPA Tariff and/or the US Reciprocal Tariff, only if DDP terms are offered to its customers in the US, where the price for its products would have taken into account the effect of tariffs, whereas the same is borne by the relevant customer if other delivery terms, such as FOB and CIF, are offered.
- The demand for the Company's products is relatively stable, given that (i) its customers are mostly manufacturers in industries such as food and beverages, pet food and confectionery and snacks, which use its products as part of the raw materials for the production of their own products, which are consumer goods with a solid demand.

Source: China Insights Consultancy

China Insights Consultancy

Thank you!

May 2025