The information and statistics set out in this section and other sections of this document were extracted from the industry report commissioned by us and independently prepared by Frost & Sullivan, in connection with the **[REDACTED]**. *In addition, certain information is based on, derived or extracted from, among other sources, publications of different government authorities and internal organizations, market statistics providers, communications with various PRC government agencies or other independent third-party sources unless otherwise indicated. We believe that the sources of such information and statistics are appropriate and have taken reasonable care in extracting and reproducing such information. We have no reason to believe that such information and statistics are false or misleading or that any fact has been omitted that would render such information and statistics false or misleading. The information and statistics from official government sources have not been independently verified by us, the Sole Sponsor, Overall Coordinator,* **[REDACTED]**, **[REDACTED]**, **[REDACTED]**, *and* **[REDACTED]** *or any of their respective directors, advisors and affiliates, or any other person or parties involved in the* **[REDACTED]**, *and no representation is given as to their accuracy.*

1. OVERVIEW OF FLOTATION REAGENTS INDUSTRY

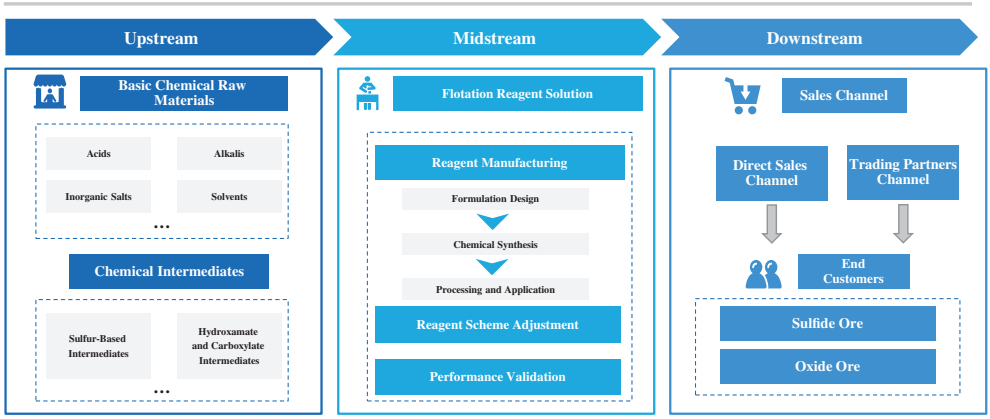
1.1 Definition

Flotation reagents are a class of chemical reagents within the mineral processing reagents system. They are added to the slurry during the flotation process to regulate the surface properties of minerals and the flotation environment. Their primary function is to modify the interactions between mineral particles and air bubbles, enabling the selective separation of valuable minerals from gangue, thereby improving mineral recovery and concentrate grade. As a key branch of mineral processing reagents, flotation reagents typically include collectors, frothers, and modifiers, which serve to impart hydrophobicity to target minerals, form and stabilize the froth, and adjust the slurry chemistry to enhance separation selectivity, respectively. Flotation reagents are an indispensable input in modern mineral processing, and their performance and formulation critically influence flotation efficiency, process economics, and the overall utilization of resources.

1.2 Value Chain

The upstream segment primarily comprises basic chemical raw materials, specialty chemical intermediates, and energy inputs. Basic raw materials such as acids, bases, inorganic salts, solvents, and various organic compounds form the core material foundation for the production of mineral processing reagents. Sulfur-containing, hydroxamic acid, and amine intermediates provide key support for the synthesis of functional reagents. The midstream segment covers the manufacturing process of mineral processing reagents, including formulation design, chemical synthesis, and subsequent processing. Producers integrate upstream raw materials to develop a series of products such as collectors, frothers, depressants, modifiers, and flocculants, and provide downstream clients with reagent optimization and performance validation through laboratory testing and on-site technical support. The downstream segment mainly consists of mining companies and concentrators, which procure and utilize mineral processing reagents via direct sales or trading partners channels. Mineral processing reagents are widely applied in the

beneficiation of sulfide ores (e.g., copper, lead, zinc, gold, silver, molybdenum, etc.) and oxidized ores (e.g., tin, tungsten, lithium, phosphorus, etc.). They play a critical role in flotation and other processing steps, directly affecting metal recovery, concentrate quality, and overall beneficiation efficiency.



Source: Frost & Sullivan

1.3 Market Size of Flotation Reagents Industry

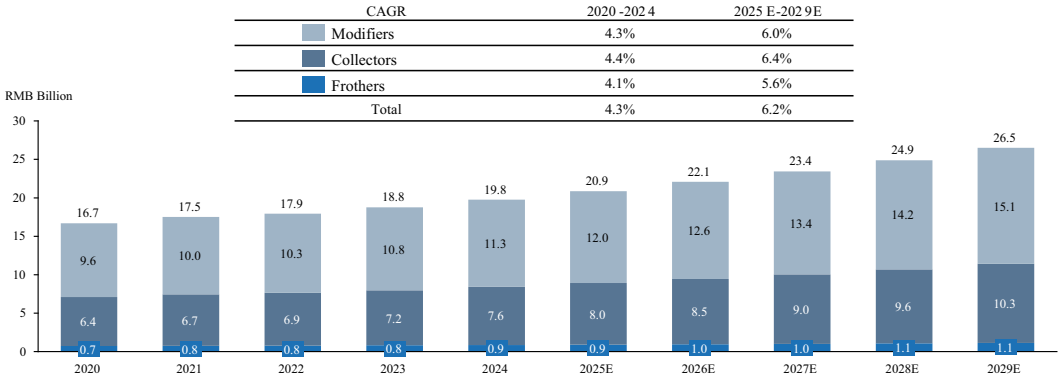
Between 2020 and 2024, the PRC flotation reagent market expanded from RMB16.7 billion to RMB19.8 billion, representing a CAGR of 4.3%. This growth during the period was primarily driven by the stable operation of domestic non-ferrous metal mines and sustained beneficiation demand for major ores such as copper, lead, zinc, and gold. In addition, requirements under the 'three-rate' targets for mineral resource development and continuous upgrades in beneficiation processes, including reagent regime optimization and efficiency-driven plant modifications, supported steady increases in flotation reagent consumption and performance, thereby contributing to the upward trend in market revenue.

From 2025 to 2029, the market is projected to increase from RMB20.9 billion to RMB26.5 billion, corresponding to a forecast CAGR of 6.2%. Future growth will be primarily fueled by continued investment in domestic mineral resource development, particularly the increasing proportion of deep, complex, and low-grade ore development, which drives higher reagent intensity to achieve improved recovery rates. Moreover, under the combined effects of resource security policies, ongoing capacity consolidation in the mining sector, and accelerated adoption of high-performance and environmentally friendly flotation reagents, market demand is expected to be further unleashed. Overall, China's flotation reagents market is anticipated to maintain steady expansion over the forecast period, further consolidating its revenue base.

In terms of product composition, modifiers consistently accounted for the largest share of the market throughout the period, followed by collectors, while frothers represented a relatively smaller portion.

In 2024, the market size of flotation reagents industry in the PRC was approximately RMB19.8 billion, of which flotation reagents for oxidized ores accounted for approximately RMB13.4 billion and flotation reagents for sulfide ores accounted for approximately RMB6.4 billion. By ore type, oxidized ore flotation reagents represented approximately 68% of the total market, while sulfide ore flotation reagents accounted for approximately 32%.

Market Size of Flotation Reagents Industry in the PRC, Breakdown by Product Types, by Revenue, 2020-2029E

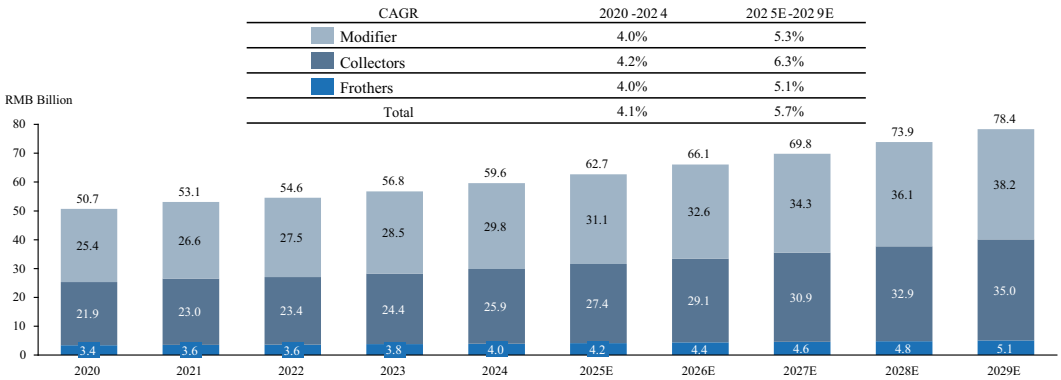


Source: Frost & Sullivan

Between 2020 and 2024, the global flotation reagent market expanded from RMB50.7 billion to RMB59.6 billion, reflecting a CAGR of 4.1%. This growth was underpinned by resilient mining demand across major resource-producing regions, supported by stable output of base metals and continued flotation reagent consumption in large-scale concentrator operations. In addition, broader adoption of process optimization and reagent schemes to improve recovery rates helped sustain a steady increase in market revenue.

From 2025 to 2029, the market is projected to increase from RMB62.7 billion to RMB78.4 billion, corresponding to a forecast CAGR of 5.7%. The faster growth trajectory is expected to be driven by rising global investment in mineral development, increasing beneficiation intensity for complex and lower-grade ore bodies, and higher reagent usage associated with tighter environmental and performance requirements. Over the forecast horizon, the global flotation reagent market is expected to maintain solid expansion momentum, supported by both volume growth and continued upgrading toward higher-value, performance-enhancing formulations.

Market Size of Global Flotation Reagents Industry, Breakdown by Product Types, by Revenue, 2020-2029E

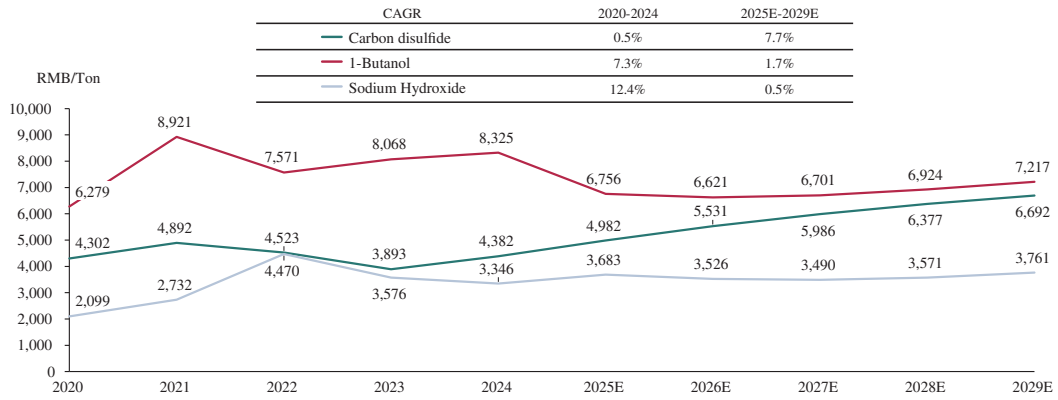


Source: Frost & Sullivan

1.4 Cost Analysis

Chemical raw materials are subject to typical commodity chemical cycles and may experience periodic price fluctuations, which may affect the production costs of flotation reagents. In particular, 1-butanol is commonly used as a solvent or intermediate in certain organic synthesis processes, and changes in its price may affect the production costs of certain organic flotation reagents and related intermediates. Carbon disulfide is a key raw material in the synthesis of sulfur-based collectors, including xanthate products, and its price fluctuations may directly influence the cost structure of such collectors. Sodium hydroxide is widely used in alkaline reactions and neutralization processes during flotation reagent production, and changes in its price may affect overall manufacturing costs. When raw material prices increase, flotation reagent manufacturers may face higher production costs, which could affect profitability if such cost increases cannot be fully passed on to customers, while decreases in raw material prices may help alleviate cost pressures. As a result, manufacturers typically emphasize procurement management, inventory planning and process optimization in order to manage potential cost fluctuations.

Cost Analysis, 2020-2029E



Source: Zhengzhou Commodity Exchange (ZCE), Frost & Sullivan

1.5 Market Drivers

Reagent System Upgrades: The gradual depletion of high-quality mineral resources has increased the difficulty of ore flotation separation. At the same time, the mineral composition of ores has become increasingly complex and the liberation particle size continues to become finer, driving growing demand for high-performance flotation reagent systems. In this context, mining companies are increasingly reliant on high-selectivity collectors, stable frothers, and formulated depressants and dispersants to ensure separation efficiency and recovery rates. In minerals such as lithium, rare earths and phosphate, fatty acid–hydroxamic acid collectors and customized formulated reagents are emerging as key drivers of demand growth. The upgrading of reagent systems not only increases reagent consumption and value per unit of processed ore, but also makes R&D capabilities and technical service capabilities critical factors for flotation reagent companies to establish competitive advantages.

Environmental Regulations: Tighter environmental standards limit the use of high-toxicity, high-pollution, and non-biodegradable reagents. Mining companies now prioritize environmentally compliant reagents, accelerating adoption of low-toxicity and biodegradable products. Regulatory pressure encourages suppliers to provide safer and more efficient solutions, supporting industry growth while promoting the shift toward green and high-performance reagents.

New Project Demand: Expansion in new energy and strategic mineral sectors, including lithium for batteries, rare earth permanent magnets, and phosphate, drives additional flotation reagent consumption. New mine construction and plant upgrades create incremental demand, especially for high-value customized collectors, blended depressants, and specialized frothers. The growing share of strategic ores ensures long-term, stable growth for reagent demand.

Flotation Capacity Expansion: Metal price cycles directly affect mining operating rates and flotation throughput. Rising prices of copper, gold, lithium, and rare earths encourage higher capacity utilization, extended operations, and new production lines, increasing reagent consumption. Expanded capacity supports demand for both conventional and high-value reagents, while adoption of blended programs and automated dosing enhances reagent value and supplier stickiness.

1.6 Future Trends

Customized Reagents: In the future, the flotation reagents industry is expected to rely increasingly on customized solutions. As ore grades decline, mineral structures become more complex, and fine particles account for a larger proportion, traditional generic reagents will no longer fully meet the requirements for recovery and flotation efficiency. Mining operations will place greater emphasis on customized collectors, blended reagents, and specialized depressants and dispersants tailored to specific ores and processes. In lithium, rare earth, low-grade polymetallic, and oxidized ores, the use of customized reagents and per-ton consumption is expected to grow steadily. Suppliers providing formulation optimization, process simulation, and on-site technical support will enhance reagent value and customer loyalty. Over time, the industry is likely to shift from simple reagent sales toward an integrated reagent-plus-service model, supporting sustained growth in customized solutions.

Green and Environmentally Friendly Reagents: Environmental regulations and sustainability considerations will increasingly shape the future of the flotation reagent market. Traditional high-toxicity, high-pollution, and non-biodegradable reagents will face stricter restrictions or gradual phase-out. Mining companies are expected to prioritize low-toxicity, biodegradable, and environmentally compliant reagents in procurement decisions. At the same time, reagent formulations will continue to evolve to achieve both environmental compliance and flotation efficiency, through modified chemical structures or blended compositions that improve selectivity and recovery. Over time, green reagents are expected to capture a growing market share and become an industry standard, as regulatory pressures and market acceptance reinforce the transition toward sustainable flotation solutions.

2. OVERVIEW OF COLLECTORS INDUSTRY

2.1 Definition

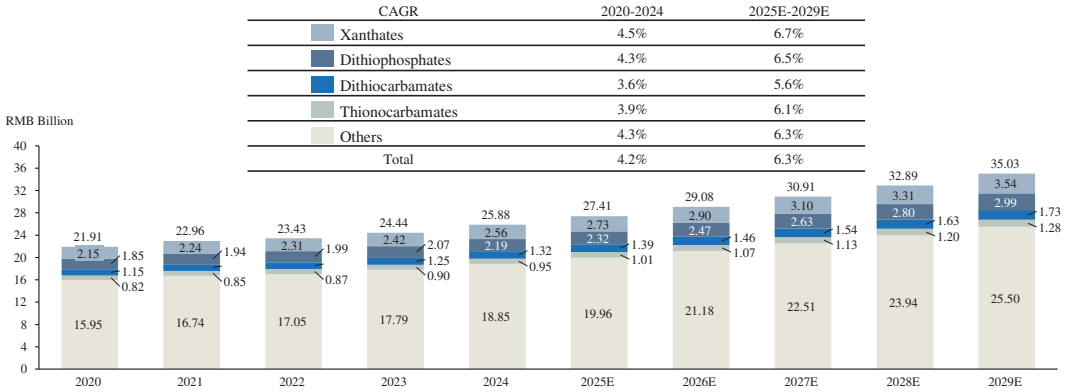
Collectors are a class of flotation reagents primarily used to selectively modify the surface properties of target minerals. Their core function is to enhance the hydrophobicity of mineral particles, enabling them to attach to air bubbles and rise with the bubbles, thereby achieving effective separation from gangue minerals during flotation. In flotation operations, collectors typically adsorb onto mineral surfaces through chemical or physical interactions between polar functional groups in their molecules and active sites or metal ions on the mineral surface, while the non-polar hydrocarbon chains orient outward, imparting hydrophobic characteristics to the mineral surface. Due to this amphiphilic structure, collectors play a critical role in the flotation of sulfide ores and certain oxidized ores, and are considered one of the key factors influencing flotation selectivity, recovery efficiency, and concentrate grade.

2.2 Market Size of Collectors Industry

From 2020 to 2024, the global collectors market expanded from RMB21.91 billion in 2020 to RMB25.88 billion in 2024, representing a CAGR of 4.2%. Xanthates, increased from RMB2.15 billion to RMB2.56 billion, supported by their wide applicability in sulfide ore flotation. Dithiophosphates rose from RMB1.85 billion to RMB2.19 billion, reflecting consistent demand in complex polymetallic beneficiation. Dithiocarbamates and thionocarbamates expanded from RMB1.15 billion to RMB1.32 billion and from RMB0.82 billion to RMB0.95 billion, respectively, benefiting from their enhanced selectivity in fine-particle flotation. The others category also grew steadily, reaching RMB18.85 billion in 2024, indicating continued diversification of reagent formulations globally.

By 2029, the global collectors market is projected to reach RMB35.03 billion, implying an expected compound annual growth rate of 6.3% from 2025 to 2029. Growth is anticipated to accelerate as ore grades decline worldwide, driving higher reagent consumption and increased adoption of tailored, high-performance collector systems. Xanthates are forecast to reach RMB3.54 billion, while dithiophosphates and dithiocarbamates are projected to grow to RMB2.99 billion and RMB1.73 billion. Thionocarbamates are expected to reach RMB1.28 billion, supported by broader application in selective flotation scenarios. The others segment is projected to expand to RMB25.50 billion, reflecting the industry's shift toward environmentally aligned and specialty collector products. Overall, the market is set to benefit from both structural reagent upgrading and rising flotation intensity across global mineral processing operations.

Market Size of Global Collectors Industry, Breakdown by Segments, by Revenue, 2020-2029E

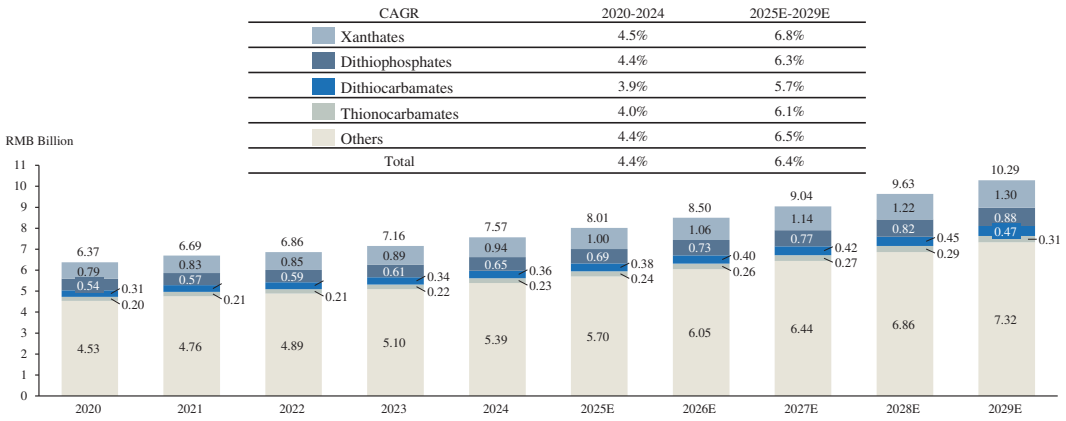


Note: Others include fatty acids and alcohols, esters, thiol/thiol-ether derivatives, amines, etc.

Source: Frost & Sullivan

Between 2020 and 2024, the market size of the collectors industry in the PRC increased from RMB6.37 billion in 2020 to RMB7.57 billion in 2024, reflecting a CAGR of 4.4%. Over this period, the xanthates segment expanded from RMB0.79 billion to RMB0.94 billion, dithiophosphates from RMB0.54 billion to RMB0.65 billion, dithiocarbamates from RMB0.31 billion to RMB0.36 billion, thionocarbamates from RMB0.20 billion to RMB0.23 billion, and other collectors from RMB4.53 billion to RMB5.39 billion. By 2029, the market size of the collectors industry is projected to reach RMB10.29 billion, representing a CAGR of 6.4% from 2025 to 2029. During this period, xanthates are expected to grow to RMB1.30 billion, dithiophosphates to RMB0.88 billion, dithiocarbamates to RMB0.47 billion, thionocarbamates to RMB0.31 billion, and other collectors to RMB7.32 billion.

Market Size of Collectors Industry in the PRC, Breakdown by Segments, by Revenue, 2020-2029E



Note: Others include fatty acids and alcohols, esters, thiol/thiol-ether derivatives, amines, etc.

Source: China Gold Association, Frost & Sullivan

2.3 Market Drivers

Resource Development and Ore Throughput Expansion: With the global energy transition and rapid development of emerging technology industries, the demand for critical metal resources has continued to grow. Upgrades to China's power infrastructure, the expansion of new energy industries such as electric vehicles and energy storage, and the advancement of artificial intelligence and data center construction have significantly increased the demand for metals such as copper and lithium. In this context, mining companies are accelerating the development of new ore types and expanding the extraction and beneficiation capacities of existing mines. At the same time, periodic increases in metal prices have enhanced the economic viability of mining projects, encouraging the development of lower-grade or more complex ore resources. As collectors are key reagents for achieving the separation of valuable minerals during flotation, their demand is closely linked to ore processing volumes and flotation operations. Therefore, increased mining activities and higher processing throughput are expected to continue driving growth in the collectors market.

Increasing Ore Complexity and Process Upgrading: As the overall grade of mineable ores declines and the proportion of complex, associated, and difficult-to-process ores increases, merely expanding processing volumes is no longer sufficient to maintain economic viability. Mines are increasingly relying on optimization of flotation processes and reagent systems to improve metal recovery. In this context, the demand logic for collectors is gradually shifting from increasing per-ton usage to the adoption of high-performance, customized, and blended solutions. Collectors with higher selectivity and greater adaptability can improve concentrate quality while minimizing impurity entrainment, and their value contribution often exceeds the effect of increased usage alone, driving the industry toward technology- and service-driven growth.

Regulatory and Supply Chain Considerations: Tighter environmental, safety, and chemical regulations have increased the compliance costs of collector production and application, creating an extrusion effect on small- and medium-sized companies with weaker technical and management capabilities, which in turn supports higher industry concentration. At the same time, the rising proportion of centralized procurement by large mining groups has led clients to place greater emphasis on supply stability, product consistency, and ongoing technical support, prompting collector suppliers to transition from single-product providers to comprehensive solution providers. In this process, companies with large-scale production capacity, robust quality control systems, and strong on-site service and R&D capabilities are better positioned to establish long-term partnerships with core mining clients, thereby achieving higher customer stickiness and competitive barriers.

2.4 Future Trends

Compound Formulations and Functional Synergies: As ore characteristics become increasingly complex and flotation process windows continue to narrow, a single collector can no longer simultaneously achieve high recovery, selectivity, and process stability. The development of collectors is accelerating toward blended formulations and functional synergy. Through the synergistic design of multiple collectors, as well as collectors combined with frothers, depressants, activators, and other reagents, a more stable and adaptable overall flotation reagent system can be established. In polymetallic ores and fine separation scenarios, blended collectors can enhance selectivity while maintaining recovery capacity and reduce sensitivity to variations in ore composition and operating conditions. This trend is driving collectors from being standalone chemicals to becoming integrated system solutions, thereby increasing product value and technological barriers.

Expansion of Oxide and Mixed Ore Applications: As the grade of high-quality mineral resources gradually declines and ore characteristics become increasingly complex, mining companies are placing higher demands on flotation reagent performance while expanding beneficiation capacities. In this context, the development of oxidized ores and sulfide–oxidized mixed ores continues to increase, driving simultaneous growth in both the demand and technical requirements for collectors. Compared with sulfide ores, oxidized ores exhibit more complex surface chemistry, and conventional collectors often require additional processes such as activation or sulfidization to achieve effective separation, placing higher demands on reagent system adaptability and selectivity. With the continuous introduction of specialized collectors for oxidized ores and the gradual maturity of comprehensive reagent solutions for mixed ores, the application of collectors is gradually extending from primarily sulfide ores to more complex ore types. This expansion not only enhances beneficiation efficiency but also further stimulates collector market demand and creates new structural growth opportunities for the industry.

3. COMPETITIVE LANDSCAPE

3.1 Ranking of PRC-based Flotation Reagents Companies, by Market Share Measured by Revenue Generated in the PRC (2024)

Ranking	Company Name	Listing Status	Market Share
1	Company A[1]	Not Listed	1.55%
2	***The Company***	***Not Listed***	***1.05%***
3	Company B[2]	Not Listed	1.04%
4	Company C[3]	Not Listed	1.00%
5	Company D[4]	Not Listed	0.95%
Top 5 Subtotal			***5.59%***

Note: (1) Founded in 1942 and headquartered in China, it is a leading domestic company specializing in the research, production, and sale of flotation reagents. Its comprehensive product portfolio includes collectors, frothers, depressants, and modifiers, serving copper, lead, zinc, gold, silver, nickel, cobalt, and rare earth ores.

(2) Founded in 2003 and headquartered in China, it is a mineral processing reagent manufacturer. It focuses on the research, production and sale of flotation reagents, primarily including xanthates, dithiophosphates and thiourethane-based collectors, as well as frothers and activators, serving copper, lead, zinc, gold and other mineral beneficiation processes. Its products are widely supplied to both domestic and international mining markets.

(3) Founded in 2009 and is headquartered China. Its product portfolio includes xanthate collectors, dithiophosphate collectors, frothers, and xanthate ester reagents, serving copper, lead-zinc, gold, and other non-ferrous and complex ores. The company maintains long-term and close cooperative relationships with non-ferrous metal producers and mineral processing reagent distributors across dozens of countries and regions worldwide.

(4) Founded in 2017 and headquartered in China, it is a leading domestic supplier of mining-chemical reagents, providing comprehensive solutions for mineral processing. Its product portfolio includes flotation reagents, densification agents, antifoaming agents, dust suppressants, and water-treatment chemicals, serving copper, lead-zinc, molybdenum, tungsten, lithium, rare earth, and other complex ores.

Source: Annual reports, Frost & Sullivan

3.2 Ranking of PRC-based Xanthates Companies, by Market Share Measured by Revenue Generated in the PRC (2024)

Ranking	Company Name	Listing Status	Market share
1	***The Company***	***Not Listed***	***15.57%***
2	Company C	Not Listed	10.88%
3	Company B	Not Listed	10.48%
4	Company A	Not Listed	9.77%
5	Company E[5]	Not Listed	9.58%
Top 5 Subtotal			**56.28%**

Note: (5) Founded in 2006 and is headquartered in China. It is a domestic chemical manufacturer specializing in the production and sale of mineral processing reagents such as xanthate and dithiophosphate flotation collectors, serving the non-ferrous mining industry. The company was established as a joint venture and has developed a product portfolio focused on flotation collectors.

Source: Annual reports, Frost & Sullivan

3.3 Entry Barriers of Flotation Reagents Industry

Technical Barrier: The core barrier in the flotation reagents industry lies in research and development as well as technical capabilities. Reagents must be tailored to different ore types, mineral compositions, and increasingly complex ore body characteristics, while ensuring high recovery, process stability, and environmental compliance. As ore grades decline, gangue content rises, and mining depth increases, conventional reagents are increasingly unable to meet the requirements for efficient flotation, driving demand for high-performance and customized solutions. In addition, stricter environmental regulations necessitate the development of low-toxicity, biodegradable, and environmentally friendly reagents, as well as safe production and application processes. Technological barriers extend beyond chemical synthesis to laboratory testing, formulation optimization, performance evaluation, and on-site technical support, creating high entry thresholds that are difficult for new entrants to overcome in the short term.

Brand Barrier: The brand barrier in the flotation reagents industry mainly arises from customer trust, accumulated experience, and long-term cooperation. When selecting reagents, mining companies not only consider product performance but also value a company's capabilities in service experience, accumulated mine experiment data, and collaborative networks. Established companies build brand reputation through long-term mining application experience, systematic experimental validation data, and robust mine collaboration networks, resulting in high customer loyalty. Such trust and brand recognition are difficult to replicate in the short term, making it challenging for new entrants to quickly gain mining companies' confidence or secure large-scale orders. As demand for high-performance and customized reagents increases, advantages in service experience, experimental data accumulation, and mine collaboration networks further reinforce the brand barrier, allowing existing companies to maintain a stable competitive position in the market.

Capital Barrier: The capital barrier in the flotation reagents industry is primarily reflected in the high costs and long-cycle investments required for R&D, experimentation, and production. From laboratory formulation design to on-site validation at mines, and finally to industrial-scale production, the entire process typically takes several months to over a year, involving extensive consumable experiments, raw material procurement, and field-testing expenses. Mining companies are highly cautious when adopting new products, and any failure in experiments or on-site application can result in financial losses and reputational risks. In addition, reagent production involves large-scale chemical equipment, raw material inventories, quality control, and environmental protection facilities, leading to significant upfront capital expenditures and high operational costs. For new entrants, the combination of long-term capital commitment and trial-and-error risks makes it difficult to achieve scale and profitability in the short term, making the sustained capital accumulation of existing companies a significant barrier.

SOURCE OF INFORMATION

In connection with the **[REDACTED]**, we have engaged Frost & Sullivan to conduct a detailed analysis and prepare a market research report on flotation reagents industry. Frost & Sullivan is an independent global market research and consulting company which was founded in 1961 and is based in the U.S. Services provided by Frost & Sullivan include market assessments, competitive benchmarking, and strategic and market planning for a variety of industries. The agreed fee paid to Frost & Sullivan for the preparation and use of the Frost & Sullivan Report is RMB381,600. The payment of such amount was not contingent upon our successful **[REDACTED]** or on the results of the Frost & Sullivan Report. Except for the Frost & Sullivan Report, we did not commission any other market research report in connection with the **[REDACTED]**. We have included certain information from the Frost & Sullivan Report in this document because we believe such information facilitates an understanding of the flotation reagents industry. Unless otherwise indicated, market estimates or forecasts in this section represent Frost & Sullivan's view on the future development of the flotation reagents industry. In preparing the Frost & Sullivan Report, Frost & Sullivan has relied on its in-house database, independent third-party reports, and publicly available data from reputable industry organizations. Where necessary, Frost & Sullivan contacts companies operating in the industry to gather and synthesize information in relation to the market, prices, and other relevant information. Frost & Sullivan has exercised due care in collecting and reviewing the information so collected and believes that the basic assumptions used in preparing the Frost & Sullivan Report, including those used to make future projections, are factual, correct, and not misleading. Frost & Sullivan has independently analyzed the information, but the accuracy of the conclusions of its review largely relies on the accuracy of the information collected. In compiling and preparing the research, Frost & Sullivan assumed that the social, economic, and political environments in the relevant markets are likely to remain stable in the forecast period, which ensures the stable and healthy development of the flotation reagents industry.

In addition, Frost & Sullivan has developed its forecast on the following bases and assumptions: (i) the economy in the global range is likely to maintain stable growth in the next decade, and (ii) the flotation reagents industry is expected to grow based on the macroeconomic assumptions of the economy. Frost & Sullivan's research may be affected by the accuracy of these assumptions and the choice of these primary and secondary sources. Except as otherwise noted, all data and forecasts in this section come from the Frost & Sullivan Report. Our Directors confirm to the best of their knowledge and that after taking reasonable enquiries, that there have been no material adverse changes in the overall market information since the date of the Frost & Sullivan Report that would materially qualify, contradict or have an impact on such information.