The Core Status and Core Competitive Advantages of China's Mannitol in the Global Supply Chain

I. Core Status: China as the Main Pillar of the Global Supply Chain

China has become the **absolute core supplier**, technological innovation highland and industrial stability hub of the global mannitol supply chain. It has built an industrial ecosystem featuring **world-leading production capacity, full-industry-chain independent control, global export coverage and efficient cluster collaboration**. It has fostered a stable global industrial pattern of **China leading with global supporting capacity**, serving as an indispensable pillar supply force for the global pharmaceutical & healthcare, functional food, daily chemical and chemical industries.

1. Production Capacity Scale and Supply Capacity

- **Absolute Global Leadership in Production Capacity**

By the end of 2025, China's total mannitol production capacity reached **520,000 tons**, accounting for over **61%** of the global total capacity (approximately 850,000 tons), ranking first worldwide. The capacity is expected to expand to **580,000 tons** in 2026, covering full-specification products including **food grade (purity ≥98.5%)**, **pharmaceutical grade (purity ≥99.5%)**, **injection grade (purity ≥99.9%)**, as well as crystalline, powder and liquid forms. It fully meets global rigid demand and maintains a reserve capacity of over **25%**, leading the world in supply flexibility.

- **Strong Leadership of Leading Enterprise Clusters**

Top enterprises including **Shandong Tianli Pharmaceutical (150,000 tons capacity, 28.5% domestic market share)**, **Shouguang Fumaixi (120,000 tons)**, **Zhucheng Xingmao (80,000 tons)**, **Hebei Chengxin Group (60,000 tons)** and **Zhejiang Huakang Pharmaceutical (40,000 tons)** have built ten-thousand-ton intelligent production lines. The combined capacity of the top five manufacturers accounts for over **65%** of China's total capacity. Four major industrial clusters in Shandong, Hebei, Jiangsu and Zhejiang occupy **78%** of the national capacity. Among them, Shandong Province alone exceeds **250,000 tons**, boasting the highest industrial agglomeration degree globally.

- **World's Strongest Supply Chain Resilience**

Relying on functional sugar agglomeration areas such as Yucheng (Shandong), Cangzhou (Hebei), Suzhou (Jiangsu) and Quzhou (Zhejiang), China has formed a **closed-loop industrial chain**: corn starch → glucose → catalytic hydrogenation → membrane separation → crystallization & drying → finished product packaging, with a raw material self-sufficiency rate exceeding **85%**. The clusters realize raw material mutual supply, energy sharing, logistics coordination and technology exchange, ensuring **365-day continuous bulk stable delivery** for global clients and leading the world in resisting raw material price fluctuations and trade risks.

2. Global Market and Export Pattern

- **World's Largest Export Volume**

China's mannitol export volume reached **112,000 tons** in 2025, a year-on-year increase of **8.5%**; export value exceeded **210 million US dollars** (approximately 1.49 billion RMB), with a year-on-year growth of **12.3%**, accounting for over **32%** of global mannitol trade volume, making China the world's largest mannitol exporter.

- **Widest Global Market Coverage**

Products are sold to **more than 110 countries and regions** including the European Union (26.8%), North America (21.5%), Southeast Asia (24.3%), Japan and South Korea, the Middle East, Latin America and Africa. Southeast Asia stands as the largest export market (mainly Thailand, Indonesia and Malaysia); the EU and North America serve as core high-end pharmaceutical markets; the Middle East and Africa are high-growth emerging markets, achieving in-depth full-regional coverage of international channels.

- **Comprehensive Completion of International Qualifications**

100% of leading enterprises have passed mainstream global regulatory certifications including **US FDA GRAS, EU EFSA, Japan PMDA, JECFA, Halal/Kosher, USP/EP Pharmacopoeia and FSSC 22000**. Indicators such as heavy metals (Lead ≤0.5mg/kg, Arsenic ≤0.3mg/kg), microorganisms and endotoxins are comprehensively superior to international standards, enabling **global high-end market access with a single certification**.

3. Domestic Industrial Policy Support

- **Strong Support from National Strategies**

Mannitol is included as a key supported sector in the **14th Five-Year Plan for Bioeconomic Development**, **Healthy China 2030 Outline** and **Special Action Plan for High-Quality Development of Pharmaceutical Excipients (2025–2027)**. The National Health Commission has designated mannitol as a safe and legal food additive under **GB 2760-2024**, expanding its application to 18 food categories. The **2025 Edition of Chinese Pharmacopoeia** has upgraded standards for pharmaceutical-grade mannitol, driving industrial high-end upgrading. The **13% export tax rebate rate** is maintained to assist enterprises in expanding international markets.

- **Independent Formulation of Industrial Standards**

China leads the formulation of 12 national and industrial standards including **GB/T 34466-2017 Mannitol** and pharmaceutical-grade standards in Chinese Pharmacopoeia, and participates in drafting international standards such as JECFA and USP, holding world-leading standard discourse power. It has established a full-chain standard system covering raw materials, production, testing and application, promoting Chinese standards to become global benchmarks.

- **Driving Force of Green and Low-Carbon Policies**

Included in the **Dual Carbon Work Plan** and **Green Manufacturing Project Implementation Guidelines**, supporting enterprises in energy-saving technological

transformation, clean production and resource recycling. The penetration rate of MVR evaporation and membrane separation technology among leading enterprises exceeds **70%**, reducing energy consumption per ton of product by **35%** and carbon emissions by **40%** compared with traditional processes, ranking top globally in green manufacturing level.

II. Core Competitive Advantages: Seven Advantages Building Global Barriers

1. Complete Industrial Chain Advantage: Full Closed Loop with Optimal Cost

- **Self-Sufficient Upstream Raw Materials**

Relying on China's world-leading corn starch capacity (accounting for 45% of global output), the self-sufficiency rate of glucose raw materials exceeds **90%**, with costs **18%-22%** lower than international peers. It eliminates reliance on imported raw materials and boasts the world's strongest capability to resist global grain price fluctuations and supply chain disruption risks.

- **World-Leading Midstream Production Technology**

The integrated process of **catalytic hydrogenation + membrane separation + continuous crystallization** achieves 100% maturity, with a conversion rate of **93.6%** and yield of **75%-80%**, 8-12 percentage points higher than international counterparts. The purity of pharmaceutical-grade products remains stably ≥99.5%, injection-grade ≥99.9%, with endotoxin ≤0.5EU/mg, complying with the world's strictest pharmacopoeia standards.

- **Collaborative Expansion of Downstream Applications**

Covers full-scenario applications: **Pharmaceuticals (60%)**, **Food (27%)**, **Daily Chemicals (8%)** and **Chemical Industry (5%)**. It maintains in-depth strategic cooperation with global pharmaceutical and food giants, forming a collaborative system of **raw material – application – R&D**. The full-chain cost is **25%-30%** lower than decentralized overseas production.

2. Technological Innovation Advantage: Independent Control and Global Leadership

- **Independent Breakthrough in Core Technologies**

China has conquered four core technologies: high-activity nickel-based catalysts, continuous hydrogenation, membrane refining and aseptic crystallization, with over **200 patents** including 86 invention patents and 23 PCT international patents. It has broken European and American technological monopolies and achieved a leap from **following** to **leading** the industry.

- **Global Pioneering Green Technologies**

Green technologies such as bio-enzymatic catalysis, whole-cell transformation, MVR evaporation and supercritical extraction have been industrialized. Compared with traditional hydrogenation methods, the enzymatic process reduces energy consumption by **30%**, wastewater discharge by **45%** and production costs by **23%**, leading the global green manufacturing revolution of mannitol.

- **Precise Iteration of High-End Technologies**

Mature technologies for high-purity injection-grade products, lyophilization protectants, sustained-release preparation-specific and orally disintegrating tablet-specific mannitol. Leading technological layout in emerging fields such as mRNA vaccine lyophilization excipients, 3D printing biomaterials and new energy electrolyte materials, seizing the commanding height of the global industry.

3. Quality Compliance Advantage: Global Certification and Ultimate Quality

- **World-Top Quality System**

100% of leading enterprises have obtained GMP, FDA, EP, USP and JECFA certifications. A full-process quality traceability system covering **raw materials – production – testing – warehousing – logistics** is established, with batch-to-batch difference controlled within **≤0.1%**, achieving the world's optimal product stability and consistency.

- **Indicators Superior to International Standards**

Pharmaceutical-grade mannitol features purity ≥99.5%, heavy metals ≤0.5ppm, chlorides ≤0.01% and compliant microbial limits. Injection-grade products are pyrogen-free, endotoxin-free with high dissolution rate, meeting the demands of high-end European and American formulations, with an import substitution rate exceeding **85%**.

- **First-Class Global Compliance Services**

Professional teams for global registration, compliance and testing are established to provide one-stop services including DMF, COS, REACH and FDA registration. It completes compliance documents within 72 hours and responds to customer inquiries within 48 hours, boasting the fastest global compliance response speed.

4. Cost and Scale Advantage: Ultimate Cost Performance with Global Competitiveness

- **Lowest Cost via Scale Effect**

Ten-thousand-ton production lines reduce unit investment, energy consumption, labor and packaging costs by **30%-40%** compared with small and medium-sized lines. The capacity concentration of the top five enterprises exceeds **65%**, forming the world's strongest scale effect with comprehensive costs **15%-20%** lower than international giants such as Roquette and SPI Pharma.

- **Cost Reduction and Efficiency Improvement via Full-Chain Collaboration**

Resource sharing within industrial clusters cuts procurement costs by **12%**, logistics costs by **18%** and energy costs by **15%**. The penetration rate of digital intelligent factories exceeds **80%**, boosting production efficiency by **40%** and cutting labor costs by **50%**.

- **Remarkable Global Price Advantage**

The price of pharmaceutical-grade mannitol is **22,000-28,000 RMB/ton**, and food-grade **16,000-19,000 RMB/ton**, **12%-18%** lower than international peers. Its high cost performance accelerates global market penetration, making Chinese suppliers the first choice for global clients.

5. Application Expansion Advantage: Full Scenario Coverage and Leading Customization

- **Irreplaceable Core Applications**

🔵 **Pharmaceutical Sector (60%)**: Used as injection dehydrant, tablet excipient, lyophilization protectant, sustained-release preparation, contrast agent and diabetic special dietary raw material, with world's optimal biocompatibility, stability and safety.

🔵 **Food Sector (27%)**: Widely applied in sugar-free confectionery (30%), baked food (20%), functional beverages, chewing gum and health food, featuring low calorie, anti-caries effect, moisturizing and sweetening properties.

🔵 **Daily Chemical Sector (8%)**: Core raw material for toothpaste, skin care products and shampoo with moisturizing, mild and cool taste characteristics.

🔵 **Emerging Sector (5%)**: Applied in new energy battery electrolyte, electronic chemicals, animal feed and bio-based materials, presenting high growth and high added value.

- **Leading Customized Solution Capability**

It provides one-stop customized services including purity customization (98.5%-99.9%), form customization (crystalline/powder/liquid), compound formula design, stability optimization and cost optimization tailored to different regions, clients and scenarios. Samples are delivered within 72 hours and mass production realized within 30 days, achieving the world's strongest customer loyalty.

6. Capacity Expansion Advantage: Continuous Capacity Expansion for Global Supply

- **Strong Capital Strength of Leading Enterprises**

Listed and leading enterprises such as Tianli Pharmaceutical, Huakang Pharmaceutical and Luwei Pharmaceutical enjoy sufficient capital and low asset-liability ratio. A total investment of over **800 million RMB** was injected in 2025 for capacity expansion, technological upgrading and intelligent green manufacturing. An additional **100,000 tons**

of new capacity will be added during 2026-2027, further consolidating its global dominant position in production capacity.

- **Accelerated Capacity Integration and Concentration**

Industry M&A integration is speeding up, with the capacity proportion of the top five enterprises rising from **58% to 67%**. Small and medium-sized enterprises are phasing out rapidly, with the number of industrial enterprises above designated size dropping from 38 to 23, continuously improving industrial concentration and competitiveness.

- **Precise Matching Between Capacity and Demand**

The global mannitol market will maintain a **CAGR of 6.5%-7.5%** from 2025 to 2030. China's production capacity releases steadily with a rising proportion of high-end products, forming a benign supply-demand cycle and dominating global supply in the long run.

7. International Layout Advantage: Global Channels and Brand Leadership

- **In-Depth Development of Global Channels**

Leading enterprises have established **over 15 overseas offices/subsidiaries** in North America, Europe, Southeast Asia, the Middle East and Latin America. Localized teams for sales, technology, compliance and logistics are built to provide full-chain localized services including raw material supply, application support, compliance services and logistics distribution.

- **In-Depth Deepening of International Cooperation**

Long-term strategic supply chain partnerships of over 10 years have been established with global Fortune 500 enterprises including Nestlé, Danone, Pfizer, Bayer and Novartis. Joint R&D and capacity cooperation are carried out with Roquette and ADM, realizing global technological collaboration and standard mutual recognition.

- **Highlighted International Brand Influence**

By participating in world-top exhibitions such as CPHI, Fi Europe, IFT, FIC and Anuga, China showcases its technology, products and services. It has built an international brand image of **Intelligent Manufacturing in China, High Cost Performance, Compliance & Reliability, Green & Low-Carbon**, with continuously improving global recognition and brand premium capability.

III. Global Supply Chain Value: Four Core Contributions of China

1. Global Supply Stabilizer

With over **61%** of global production capacity, China meets more than **55%** of global demand. It stabilizes supply, regulates market prices and avoids supply shortages, safeguarding the supply chain security of global pharmaceutical, food and daily chemical industries and acting as an irreplaceable cornerstone of global supply.

2. Global Price Anchor

Driven by technological cost reduction, scale effect and full-chain collaboration, China promotes rational pricing of global mannitol. Its price is **15%-20%** lower than international peers, accelerating the global popularization of healthy sugar substitutes, reducing costs for downstream enterprises and benefiting global consumers.

3. Global Technology Empowerer

China exports independent catalytic technology, green manufacturing technology, high-end purification technology, compliance systems and application solutions to the world, driving global industrial technological upgrading, efficiency improvement and green transformation, and boosting the high-quality development of the global mannitol industry.

4. Global Market Pioneer

Through export business and overseas industrial layout, China further explores emerging markets including Southeast Asia, the Middle East, Latin America and Africa. It expands application scenarios, promotes industrial capacity expansion, boosts the development of global health, pharmaceutical and sugar reduction causes, and contributes Chinese strength to the world.

IV. Summary and Outlook

Supported by seven core advantages – complete industrial chain, technological innovation, quality compliance, cost scale, application expansion, capacity expansion and international layout – **China's mannitol industry** has become the absolute core supplier, technology leader, standard-setting participant and market dominator in the global supply chain.

In the future, with continuous domestic capacity expansion, the proportion of pharmaceutical and injection-grade products rising to **45%**, implementation of overseas capacity layout, comprehensive upgrading of green and low-carbon technologies, improvement of global compliance systems and accelerated penetration in emerging fields, China will further consolidate its global leading position. It will promote mannitol to become a mainstream pharmaceutical excipient and functional sugar alcohol worldwide, provide **Chinese solutions, Chinese standards and Chinese strength** for the global health industry, pharmaceutical development and sugar reduction cause, and lead the global mannitol industry into a new era of high-quality, sustainable, green and low-carbon development.