Core Competitive Advantages of Nucleotides and Global Market Development Outlook

Core Summary

As the basic building blocks of nucleic acids (DNA/RNA), nucleotides have evolved into the most high-growth core bio-based materials by virtue of excellent functional properties, wide application adaptability, stringent industry barriers and global compliance advantages. The global market features an **oligopolistic concentration pattern with China taking the lead**, maintaining steady and rapid growth from 2024 to 2035. High-end orientation, green development, intelligent manufacturing and diversified application have become the core development trends of the industry. Leveraging superior production capacity, advanced technology, cost edges and complete industrial chain layout, Chinese enterprises are poised to gradually dominate the global nucleotide supply chain and achieve leapfrog development from leading the food-grade segment to making breakthroughs in high-end pharmaceutical-grade products.

I. Core Competitive Advantages of Nucleotides

With the general chemical formula: \(\boldsymbol{C_5H_{10}N_5O_5·H_3PO_4}\), nucleotides stand as benchmark bio-based materials. Their core competitive edges derive from physical and chemical properties, functional values, processing adaptability and industrial entry barriers, forming distinct core competitiveness different from traditional food additives and common pharmaceutical raw materials, which are reflected in five major dimensions:

1. Functional Value Barriers: Irreplaceable in Multiple Scenarios to Meet Full-field Demands

Nucleotides integrate multiple core functions including flavor enhancement, nutritional supplementation and medical support. Their unique functional attributes establish irreplaceable competitive strengths across various fields, leading traditional peer raw materials in both functional diversity and substitutability resistance:

- **Outstanding flavor-enhancing effect**:

  The umami intensity of food-grade compound nucleotides (I+G) is 50-100 times that of monosodium glutamate. Compared with traditional flavor enhancers such as disodium succinate and disodium 5'-ribonucleotide, it delivers synergistic freshness enhancement, odor suppression and richer taste layers, serving as the core flavoring raw material for compound seasonings and meat products.

- **Definite nutritional value**:

  As essential nutrients for human bodies, nucleotides facilitate intestinal development and immunity improvement in infants and boost intellectual growth. They are legally mandatory additives in infant formula milk powder with no effective substitutes available. Meanwhile, they are widely adopted as health care product raw materials to satisfy nutritional supplementation needs of sub-health groups and sports enthusiasts.

- **Core medical value**:

  Modified nucleotides act as key raw materials for mRNA vaccines, oligonucleotide drugs, antiviral and anti-tumor medicines. Specifically, modified products such as N1-methylpseudouridine and phosphorothioate directly determine drug stability and therapeutic efficacy, featuring extremely high technical barriers and great substitution difficulties.

- **Remarkable antibiotic replacement effect**:

  As vital alternatives to antibiotics, nucleotides can improve growth performance and immunity of livestock and poultry when applied in feed industry, complying with the global antibiotic ban trend. They are superior to alternative raw materials like probiotics and plant extracts in lower cost and stable efficacy.

2. Technological & Process Barriers: Dual Core of Fermentation and Purification with Hard-to-break Thresholds

The nucleotide industry is a high-tech track integrating biological fermentation and fine chemical engineering, with core technologies monopolized by leading enterprises. The complexity and precision of production processes have formed insurmountable technical barriers, mainly reflected in three aspects: process monopoly, strict purification precision and green upgrading.

- **Mainstream process monopoly**:

  Food-grade nucleotides are mainly produced via microbial fermentation combined with nuclease P1 enzymatic hydrolysis (statutory process specified in GB 1886.170-2016). Core technical difficulties lie in high-conversion strain breeding, continuous fermentation control and targeted enzymatic hydrolysis, which require 10-15 years of technological accumulation for traditional manufacturers to master. Pharmaceutical-grade and modified nucleotides adopt combined technologies including chemical synthesis, enzymatic catalysis and semi-synthesis, whose core technologies are monopolized by global top-tier enterprises.

- **Stringent purification standards**:

  Food-grade nucleotides require a purity of ≥98% and single impurity content ≤0.5%; pharmaceutical/GMP-grade nucleotides demand purity ≥99.5%, endotoxin-free

status, zero animal-derived residues and single impurity content ≤0.05%. The production relies on high-end complete sets of technologies such as ceramic membrane ultrafiltration and anion exchange chromatography, with equipment investment exceeding 100 million RMB, which is inaccessible for small and medium-sized manufacturers.

- **Green process upgrading**:

  Current mainstream production technologies include continuous-flow microreaction, immobilized enzyme technology and aqueous-phase synthesis, which need to meet environmental protection indicators such as VOCs ≤20mg/m³, solvent recovery rate ≥92% and energy consumption ≤1.8tce/t. Traditional high-pollution processes are being phased out, forcing technically backward enterprises out of the market and further raising industrial entry thresholds.

3. Processing Adaptability Barriers: Stable Physicochemical Properties for Multi-industry Production

Nucleotides possess stable physicochemical properties and dual advantages of functional performance and processing compatibility, which can be widely applied in the production processes of food, medicine, feed and health care products without extra production flow adjustment, effectively cutting application costs for downstream enterprises and building differentiated processing advantages.

- **Excellent water solubility**:

  The solubility of food-grade I+G and single nucleotides reaches ≥20g/100mL at 25℃, enabling rapid dissolution in water, beverages, oral liquids and other systems without precipitation or layering, suitable for the production of liquid and powder products.

- **Superior thermal stability**:

  They can withstand high-pressure sterilization at 121℃, high-temperature baking at 200℃ and acidic environments, retaining complete functional activity during processing, thus applicable to high-temperature processed products such as canned food, baked goods and infant formula powder.

- **Strong compound compatibility**:

  Presenting as odorless white crystalline powder with fresh taste, nucleotides can be compounded with monosodium glutamate, vitamins, minerals, probiotics and pharmaceutical excipients without affecting product taste, flavor and appearance.

- **Diversified functions**:

  Integrating four core functions including flavor enhancement, nutritional fortification, pharmaceutical raw material application and feed additive usage, nucleotides

can satisfy production demands of different industries in one stop, reducing raw material procurement and R&D costs for enterprises.

4. Quality & Compliance Barriers: Stringent Global Certifications with High Access Thresholds

The nucleotide industry features strict quality requirements and a sound compliance system. Authoritative certifications and standard supervision across global regions have set high entry barriers for new entrants and further consolidated the competitive edges of leading enterprises.

- **Full coverage of global compliance**:

  Food-grade nucleotides are included in mainstream global regulations such as China GB 2760, GB 14880, US FDA GRAS, EU EFSA, JECFA and CAC. Pharmaceutical-grade nucleotides need to obtain qualifications including FDA DMF, EMA CEP and GMP, with a long certification cycle of 3 to 5 years and rigorous review standards. Fewer than 20 qualified global compliant suppliers are available in the market.

- **Leading quality standards**:

  Leading enterprises participate in the formulation of national, industrial and international standards. Their products reach world-class levels in stability, solubility, heavy metal content (Pb ≤1mg/kg) and microbial indicators (total bacterial count ≤100CFU/g), forming unbreakable quality barriers for competitors.

- **Stable supply chain compliance**:

  Pharmaceutical clients such as mRNA vaccine and oligonucleotide drug manufacturers impose extremely strict requirements on supply chain stability, requiring 100% stable product supply and consistent batch quality. Only a handful of leading enterprises are capable of continuous stable production for 36 consecutive months and global cold chain distribution, further lifting compliance thresholds.

5. Scale & Cost Barriers: Full Industrial Chain Collaboration to Consolidate Sustained Advantages

Large-scale production and full industrial chain collaboration serve as core supports for nucleotide enterprises to build cost advantages and seize market shares. Leading enterprises have established unreachable cost barriers for small and medium-sized manufacturers through capacity expansion and industrial chain integration.

- **Remarkable scale effect**:

  A single production plant needs an annual output of 500-1000 tons to achieve economic benefits. Equipped with hundred-ton-grade fermentation tanks and fully automatic production lines, leading enterprises realize large-scale and continuous production, cutting unit costs by 20%-30% compared with small and medium-sized

manufacturers.

- **Full industrial chain coordination**:

  Leading enterprises have built an integrated industrial chain covering yeast/RNA raw material self-supply, fermentation, enzymatic hydrolysis, separation, refining and compounding, effectively reducing costs in raw material procurement and production links. Comprehensive utilization of by-products including bacterial protein and amino acids further lowers overall production costs.

- **Raw material cost advantages**:

  Chinese enterprises benefit from local resource advantages in corn deep processing, molasses and yeast, achieving 15%-25% lower raw material costs than overseas peers. Along with global industrial chain transfer, Chinese enterprises are gradually gaining pricing discourse power in the global nucleotide market with continuously expanding cost advantages.

II. Analysis on Current Situation of Global Nucleotide Market (2024–2025)

Currently, the global nucleotide market is characterized by steady scale expansion, highly concentrated competition pattern, obvious regional differentiation and clear product structure. As the world's major production and consumption country, China acts as the core driving force for market growth. Detailed analysis is conducted from four dimensions: market scale, competition pattern, product structure and regional distribution.

1. Market Scale: Steady Global Growth with China Leading Growth Rate

Driven by multiple factors including global food consumption upgrading, policy-driven development of infant formula powder, booming nucleic acid drugs, full implementation of feed antibiotic bans and escalating health consumption demands, the global nucleotide market maintains steady growth, and the growth rate of China's market is significantly higher than the global average level.

- **Global market**:

  The global nucleotide market size reached approximately 680-720 million US dollars in 2024, and grew steadily to 715-860 million US dollars in 2025 with a year-on-year growth rate of 5%-20%. The compound annual growth rate (CAGR) will remain at 6.1%-7.49% from 2025 to 2031 with sustained growth momentum.

- **Chinese market**:

  As the world's largest production and consumption hub, China's market accounted for over 55% of the global total in 2025, rising by more than 30% compared with 2023. The domestic consumption volume of food-grade nucleotides hit 12,000 tons in 2023 and exceeded 15,000 tons in 2025 with a CAGR of 12.5%, far exceeding the global average growth rate and becoming the core engine driving global market expansion.

- **Segmented market**:

  Pharmaceutical-grade and modified nucleotides register a higher growth rate than the industrial average. The market share of pharmaceutical-grade products is expected to rise to 25% and that of modified nucleotides to 15% in 2025, emerging as the core growth drivers in the future.

2. Competition Pattern: Global Oligopoly with Rising Chinese Leading Enterprises

The global nucleotide market presents a pattern of concentrated leading players and scattered small and medium-sized manufacturers. The CR3 (market share of the top 3 enterprises in the industry) reaches as high as 73%, indicating an extremely high industrial concentration ratio. Chinese leading enterprises are accelerating development and gradually breaking the monopoly of global giants.

- **Global pattern**:

  The global CR3 stands at approximately 73.0%, consisting of top enterprises from Japan, South Korea and China, forming an oligopolistic market structure. Japanese leading enterprises occupy 35% of market shares and dominate the high-end food-grade and pharmaceutical-grade markets; South Korean leading enterprises hold 22% market shares with advanced fermentation technologies; Chinese leading enterprises account for 16% market shares and take charge of the global food-grade nucleotide market.

- **Chinese market pattern**:

  The domestic CR5 is about 60% with accelerating industrial integration. The development gap between leading enterprises and small and medium-sized manufacturers keeps widening. Leading domestic enterprises dominate the food-grade market, while professional segmented manufacturers are making steady breakthroughs in the pharmaceutical-grade field. More than 20 domestic small and medium-sized producers jointly occupy less than 10% of the total production capacity, most of which focus on low-value-added products and face elimination risks.

- **Competitive characteristics**:

  Global giants focus on high-end pharmaceutical-grade and modified products and control core markets in Europe and America. Relying on cost and capacity advantages, Chinese leading enterprises mainly lay out the food-grade segment, while speeding up R&D of pharmaceutical-grade products and international certification to expand global market presence.

3. Product Structure: Clear Hierarchy in Grade, Category and Application

The global nucleotide product market shows distinct hierarchical division in terms of grade, category and application. Food-grade nucleotides, I+G compound products and food additive applications constitute core segmented markets with an obvious high-end upgrading trend.

- **Classification by grade**:

  Food-grade (70%) > Pharmaceutical-grade (25%) > Feed-grade (5%). Food-grade products form the largest segmented market mainly applied in food additives and nutritional fortification; pharmaceutical-grade products feature high technical thresholds, high added value and the fastest growth rate; the feed-grade market is in a rapid penetration stage with huge development potential.

- **Classification by category**:

  Compound products (I+G, 45%) > Single nucleotides (35%, including GMP, IMP, CMP, UMP) > Modified nucleotides (15%) > Others (5%). I+G serves as the core product in the food industry, while modified nucleotides are pivotal raw materials in the pharmaceutical field with prominent growth potential.

- **Classification by application**:

  Food additives (50%, core field including compound seasonings, instant noodles, meat products and snack foods) > Infant formula powder (18%) > Pharmaceutical industry (17%, including mRNA vaccines, oligonucleotide drugs and antiviral drugs) > Feed additives (10%) > Others (5%, including health care products, sports nutrition and scientific research). Application scenarios keep expanding, and emerging fields such as pet food and special medical formula food are developing rapidly.

4. Regional Distribution: Asia-Pacific Dominates Production while Europe and America Lead High-end Consumption

The regional distribution of the global nucleotide market is closely linked with economic development level, maturity of food and pharmaceutical industries and policy orientation, forming a layout where the Asia-Pacific region leads production, Europe and North America dominate high-end consumption and emerging markets achieve rapid

growth.

- **Asia-Pacific region**: The world's largest production and consumption region, accounting for 55% of the global market share. China, India and Southeast Asian countries act as major growth drivers. China's production capacity takes up over 60% of the global total, and domestic consumption demands are mainly concentrated in food additives and infant formula powder fields with an annual growth rate of 8%-10%.
- **European region**: The second largest consumption market occupying 22% of the global total, mainly covering Germany, France and the United Kingdom. Strict food and pharmaceutical standards in the EU drive strong demand for high-end nucleotides, with a higher proportion of pharmaceutical-grade and high-purity products than the global average and a stable annual growth rate of 5%-7%.
- **North American region**: The third largest consumption market accounting for 15% of the global total, dominated by the United States and Canada. Market demands are mainly concentrated in pharmaceutical and scientific research fields. Local consumers have strong health awareness and high acceptance of high-end pharmaceutical-grade nucleotides, with an annual growth rate of 6%-8%.
- **Other regions**: Occupying 8% of the global market share, including South America, the Middle East and Africa. Benefiting from the rapid development of food and pharmaceutical industries and the implementation of feed antibiotic ban policies, Southeast Asia and South America have become potential emerging growth markets with an expected annual growth rate of 10%-15%.

III. Core Driving Factors of Global Nucleotide Market (2026–2035)

From 2026 to 2035, the global nucleotide market will maintain sustained steady and rapid growth, driven by five core factors: food industry transformation, rigid medical demand growth, policy support, upgraded health consumption demands and optimized technology & cost. The joint effect of these five factors will continuously expand market scale and promote high-quality industrial development.

1. Food Industry Transformation: Health-oriented and Functional Development Become Mainstream

The global food industry is transforming towards healthiness, functionality and high quality. As efficient and safe flavor-enhancing and nutritional raw materials, nucleotides are highly consistent with industrial development trends, driving continuous growth in market demands.

- **Popularized food nutritional fortification**:

Widely applied in infant formula powder, health care products and special medical formula food as nutritional fortifiers, nucleotides see steadily rising demands driven by the global trend of food nutritional enhancement.

- **Booming functional food market**:

  The rapid expansion of compound seasonings, sports nutrition food and meal replacement products fuels strong market demands for flavor enhancement and nutritional supplementation, pushing the demand growth rate of nucleotides to 8%-10%.

- **Clean label development trend**:

  Consumers raise higher requirements for the naturalness and safety of food raw materials. As bio-fermented raw materials free from artificial additives and capable of natural metabolism, nucleotides fully meet clean label requirements and are increasingly adopted by food enterprises worldwide.

2. Rigid Medical Demand: Booming Nucleic Acid Drugs Stimulate Surge in High-end Demands

Nucleotides enjoy rigid market demands in the pharmaceutical field. In particular, the rapid development of mRNA vaccines and oligonucleotide drugs triggers explosive growth in demands for pharmaceutical-grade and modified nucleotides, which has become the core driving force for market expansion.

- **Booming nucleic acid drug industry**:

  The application scope of mRNA vaccines and oligonucleotide drugs keeps expanding in antiviral therapy, anti-tumor treatment and rare disease treatment. The global nucleic acid drug market achieves an annual growth rate of 25%-30%, directly driving the demand for modified nucleotides to rise at an annual rate of 25%-35%.

- **Expanded clinical application scenarios**:

  As core raw materials for antiviral and anti-tumor drugs, nucleotides maintain stable market demands in the clinical treatment of hepatitis B, AIDS, lung cancer and other diseases. Continuous improvement of medical standards further expands their clinical application scope.

- **Upgrading global pharmaceutical industry**:

  The global pharmaceutical industry is moving towards high-end and refined development, putting forward higher requirements on the purity and stability of pharmaceutical-grade nucleotides, which in turn boosts market demands for high-end pharmaceutical-grade products and raises product added value.

3. Policy Orientation: Global Antibiotic Ban and Industrial Support Stimulate Demand Release

Industrial support policies and regulatory measures issued by countries around the world provide solid support for the development of the nucleotide industry and promote continuous release of market demands.

- **Full implementation of feed antibiotic bans**:

  Comprehensive antibiotic ban policies have been carried out in China, the EU, South America and other regions. As important substitutes for antibiotics, nucleotides are rapidly popularized in the feed industry with an annual demand growth rate of 15%-20%.

- **Favorable industrial support policies**:

  The Chinese government offers strong policy support for bio-manufacturing, synthetic biology and specialized, sophisticated, unique and innovative enterprises, encouraging enterprises to carry out technological innovation and high-end product R&D and providing solid policy guarantees for the upgrading of domestic nucleotide enterprises.

- **Improved food and pharmaceutical standards**:

  Continuous improvement of global standards and certification systems for food-grade and pharmaceutical-grade nucleotides standardizes industrial development, guides the industry to achieve high-quality and standardized development, raises industrial entry thresholds and brings benefits to leading enterprises.

4. Upgraded Health Demands: Rise of Precision Nutrition Expands Application Scenarios

Growing global residents' health awareness makes precision nutrition and health preservation mainstream consumption concepts, promoting the expanded application of nucleotides in the field of nutritional supplementation.

- **Precision nutrition development trend**:

  Consumers' demands for nutritional supplements are shifting from single nutrient supplementation to precise and efficient supplementation. As targeted nutritional supplementary raw materials, nucleotides can meet the diversified nutritional needs of infants, the elderly and sports enthusiasts, achieving sustained demand growth.

- **Growing prevalence of sub-health and aging problems**:

  The increasingly severe global sub-health crisis and aging society draw wide public attention to the functions of nucleotides in immunity enhancement, intestinal health improvement and anti-aging effects, boosting their application in health care products and special medical formula food.

- **Strengthened scientific research support**:

  In-depth global research on the physiological functions of nucleotides further verifies their nutritional and medical values, continuously expanding their applicable scenarios.

5. Technology & Cost Optimization: Increased Production Capacity Promotes Product Popularization

Continuous innovation in production technologies and cost optimization have lowered production thresholds and product prices of nucleotides, accelerating their popularization in various fields and improving the overall competitiveness of the industry.

- **Upgraded production technologies**:

  Emerging technologies such as synthetic biology, enzymatic catalysis and continuous-flow microreaction are gradually replacing traditional production processes. Bio-fermentation technology accounted for more than 80% of total production capacity in 2025, featuring high product purity, low pollution and low production costs and effectively boosting overall industrial production capacity.

- **Breakthroughs in core technologies**:

  The application of AI-assisted strain breeding, membrane separation and crystallization refining technologies further improves nucleotide purity and production efficiency while cutting production costs.

- **Expanded domestic production capacity**:

  As the world's largest nucleotide producer, China keeps expanding production capacity accounting for over 60% of the global total. The scale effect drives down product prices, making it possible for nucleotides to gain popularity in mid-to-low-end markets and further expand overall market demands.

IV. Future Development Trends of Global Nucleotide Market (2026–2035)

Based on current market conditions and core driving factors, the global nucleotide market will present five major development trends from 2026 to 2035: steady market scale expansion, high-end product upgrading, green and intelligent technological innovation, further concentrated competition pattern and continuous expansion of application scenarios, pushing the industry into a high-quality development era.

1. Market Scale: Rapid Global Growth with China Dominating the Industrial Pattern

- **Global market**: The global nucleotide market size is expected to reach 1.3-1.5 billion US dollars in 2030 with a CAGR of 6.5%-7.5% from 2026 to 2030, and hit 2.0-2.3 billion US dollars in 2035 with a stable CAGR of 6%-7% from 2031 to 2035. Among all products, pharmaceutical-grade and modified nucleotides will achieve a growth rate of 15%-20%, exceeding the industrial average level.
- **Chinese market**: China's market size is projected to exceed 1 billion US dollars in 2030 with a CAGR of 8%-10% during 2026-2030. Its global market share will rise to 65%-70% by 2035, establishing China as the absolute core of the global nucleotide industry and dominating the global supply chain and pricing power.
- **Regional growth**: Emerging markets including Southeast Asia, South America and the Middle East will achieve accelerated growth with an expected CAGR of 10%-15%, becoming new growth engines of the global market.

2. Product Upgrading: High-end, Diversified and Customized Development Become Core Trends

- **High-end upgrading trend**:

  Pharmaceutical-grade products complying with USP/EP/BP standards, high-purity products (purity ≥99.5%) and modified nucleotides will become mainstream market products with continuously rising added value. Leading enterprises will focus on R&D of high-end products to seize high-value market shares.
- **Diversified product innovation**:

  Product categories will be further enriched. Apart from traditional I+G compound products and single nucleotides, innovative modified nucleotides and functional compound products such as nucleotide-probiotic blends (for intestinal health care) and nucleotide-vitamin blends (for nutritional fortification) as well as customized pharmaceutical-grade nucleotides will gain growing popularity.
- **Diversified dosage forms**:

  Various new dosage forms including powder, granule, liquid and microcapsule are emerging rapidly to meet the demands of different consumer groups and application scenarios. In particular, dosage forms suitable for infants and the elderly have become the core direction for enterprises to build differentiated competitive advantages.
- **Clean label upgrading**:

  Non-GMO certification, organic certification, zero-additive formula and low-carbon production will become core selling points of products, catering to global consumers' demands for natural, healthy and eco-friendly raw materials.

3. Technological Innovation: Greenization, Intellectualization and High-precision Development Become Main Directions

- **Popularization of green production processes**:

  Green manufacturing technologies such as bio-fermentation, enzymatic synthesis, zero-discharge wastewater treatment and low-carbon production will become industrial mainstream. Enterprises will gradually realize energy conservation, consumption reduction and eco-friendly production in line with global dual-carbon development strategies.

- **Upgraded intelligent manufacturing**:

  The application of AI intelligent control, fully automatic fermentation, online quality control and digital twin technologies will improve production efficiency and product quality stability, cut production costs and promote large-scale and standardized industrial development.

- **Breakthroughs in high-end technologies**:

  Continuous progress in synthetic biology, novel chelating technologies and high-purity separation technologies will accelerate the domestic substitution process of modified nucleotides and expand high-end application scenarios covering high-end pharmaceutical industry and biological scientific research.

4. Competition Pattern: Further Industrial Concentration with Chinese Enterprises Leading the Global Market

- **Further improved industrial concentration**:

  The global CR3 is expected to rise from the current 73.0% to over 80% by 2035. Leading enterprises will further expand market shares through merger & acquisition integration and patent layout, accelerating the phase-out of backward small and medium-sized production capacities.

- **Accelerated development of Chinese enterprises**:

  Domestic leading nucleotide enterprises will speed up international layout, seize high-end markets in Europe, America and Southeast Asia via technology export, capacity expansion and international certification, gradually break the monopoly of international giants and take charge of the global nucleotide supply chain.

- **Shift of competition focus**:

  Market competition will shift from simple price competition to technological competition, product competition and compliance competition. Enterprises will focus on core technology R&D and product innovation to build differentiated competitive strengths and enhance brand influence.

5. Expanded Application Scenarios: Continuous Boom in Emerging Fields

- **Pet food industry**:

  Rising public awareness of pet health drives the application of nucleotides as pet nutritional fortifiers to improve pets' immunity and growth performance. This field achieves a demand growth rate of over 12% and becomes a new industrial growth highlight.

- **Sports nutrition industry**:

  The expanding sports population boosts market attention to the effects of nucleotides in post-exercise physical recovery and immunity enhancement. Nucleotides have become core raw materials for sports drinks, energy gels and recovery powder with a demand growth rate exceeding 10%.

- **Special medical formula field**:

  Growing market demands for formula food targeting special groups such as nephropathy patients, liver disease patients, the elderly and postoperative rehabilitation patients drive sustained growth in nucleotide consumption with high product added value.

- **Biological scientific research field**:

  With the development of gene editing, nucleic acid detection and other technologies, nucleotides see rising demands as scientific research reagents and become core basic raw materials in the high-end scientific research sector.

Report Conclusion

Against the backdrop of global food industry transformation, booming rigid medical demands, escalating health consumption needs and favorable policy support, nucleotides have been upgraded from traditional food additives to multi-functional, high-value-added and full-scenario core bio-based materials with broad industrial development prospects. The global market will maintain sustained steady and rapid growth from 2026 to 2035. Supported by superior production capacity, advanced technologies, cost advantages and complete industrial chains, Chinese enterprises are expected to achieve leapfrog development from dominating the food-grade market to making breakthroughs in high-end pharmaceutical-grade products and gradually take the leading position in the global industrial pattern.

For industrial enterprises, only by grasping the development trends of high-end orientation, greenization, intellectualization and diversification, focusing on core technology R&D and product innovation, improving compliance systems and global market layout, and strengthening industrial chain coordination can they stand out in fierce industrial competition, achieve high-quality enterprise development and seize the commanding height of the global nucleotide industry development.