Analysis of Classic Application Cases of Calcium Citrate

Calcium Citrate (CAS: 813-94-5) is a benchmark product among organic calcium salt calcium supplements. With mild physicochemical properties, high solubility and excellent physiological absorption characteristics, it has achieved large-scale industrial application worldwide. Validated by extensive clinical trials and long-term market verification, it has become a mainstream calcium supplementation technical route replacing traditional calcium sources such as calcium carbonate and calcium lactate. This paper conducts a professional and detailed systematic analysis from five dimensions: **technical fundamentals, classic application cases, core advantages, application standards and industry trends**, balancing academic rigor and industrial practicality to provide authoritative references for R&D, production and application in related fields.

I. Core Technical Characteristics of Calcium Citrate (Application Foundation)

The application advantages of **Calcium Citrate** stem from its unique molecular structure and physicochemical properties, serving as the core prerequisite for its large-scale application in multiple fields. The following elaborates in detail from three dimensions: **molecular structure, key performance and regulatory compliance**.

1.1 Molecular Structure and Absorption Mechanism

Calcium Citrate is a trivalent organic carboxylic acid calcium salt, forming a stable complex molecule through the complexation of 3 calcium ions and 2 citrate radicals. Its molecular formula is \(\ce{Ca3(C6H5O7)2}\) with a molecular weight of 498.46, classed as a small-molecule organic calcium complex.

Its absorption mechanism differs from traditional inorganic calcium: it **does not rely on gastric acid dissociation** and maintains good solubility in neutral and weakly alkaline intestinal environments without decomposition requiring large amounts of gastric acid. It is absorbed via intestinal passive diffusion and small-molecule organic acid carrier channels, avoiding the shortcomings of traditional calcium sources that require sufficient gastric acid and are easily antagonized by dietary oxalic acid/phosphoric acid. It significantly improves calcium absorption rate and remarkably reduces the risk of gastrointestinal discomfort such as bloating, constipation and gastric acid reflux.

1.2 Key Performance Indicators (Comparison with Traditional Calcium Sources)

Compared with traditional calcium sources including calcium carbonate, calcium lactate and calcium gluconate, **Calcium Citrate** exhibits significant advantages in bioavailability, gastrointestinal tolerance, acid-base dependence, sensory stability and mineral compatibility, as detailed below:

- **Bioavailability**:

The actual human absorption rate of **Calcium Citrate** reaches 35%–40%, far higher than 15%–20% for calcium carbonate, 20%–25% for calcium lactate and only 10%–15% for calcium gluconate. It requires a lower dosage and imposes less metabolic burden with equivalent calcium supplementation effects.

- **Gastrointestinal Tolerance**:

Calcium Citrate is weakly acidic with mild solubility and does not neutralize gastric acid. Its clinical gastrointestinal adverse reaction rate is below 4%, with rare occurrences of bloating, constipation, belching and acid reflux. In contrast, calcium carbonate easily neutralizes gastric acid and causes gas and bloating with an adverse reaction rate as high as 30%–45%; long-term intake of calcium lactate tends to induce constipation.

- **Acid-Base Dependence**:

Calcium Citrate can be normally absorbed on an empty stomach, after meals and by individuals with insufficient gastric acid, unaffected by intragastric pH values. Calcium carbonate must rely on high-concentration gastric acid for dissociation, leading to a sharp decline in absorption efficiency among atrophic gastritis patients, the elderly and long-term acid-suppressant users.

- **Sensory and Physicochemical Stability**:

Calcium Citrate has no lime taste or bitter astringent odor, featuring good powder fluidity and low hygroscopic caking tendency. It withstands high temperatures, acid and alkali processing, and is not prone to precipitation during sterilization, spray drying, tableting and liquid formulation. Calcium carbonate is hygroscopic, generates gas upon contact with acid, and easily causes turbidity and stratification in liquid systems.

- **Mineral Compatibility**:

Citrate radicals possess chelating effects and rarely form insoluble precipitates with nutrients such as iron, zinc and magnesium without obvious ionic antagonism. Instead, they inhibit the blockade of calcium by dietary oxalic acid and phytic acid to enhance overall mineral absorption. Calcium carbonate readily combines with phosphorus and oxalic acid to form calculus precursors with prominent antagonistic effects.

1.3 Foundation of Regulatory Compliance

Calcium Citrate has obtained comprehensive regulatory approval in major countries and regions worldwide, widely applicable in food, health food, food for special medical purposes, pharmaceutical preparations, infant formula food, feed and other fields. Compliance is a critical guarantee for its large-scale application, with specific compliance

basis as follows:

- **Chinese Regulations**:

In accordance with **GB 14880-2012 National Food Safety Standard - Standards for the Use of Nutrient Fortifiers**, **Calcium Citrate** is permitted for full-category application as a calcium nutrient fortifier. **GB 1886.226-2016 National Food Safety Standard - Food Additive: Calcium Citrate** clarifies quality indicators, production specifications and scope of application. It is also approved for use in health food, formula food for special medical purposes, infant formula milk powder and feed additives.

- **International Regulations**:

The U.S. FDA lists **Calcium Citrate** as a GRAS (Generally Recognized As Safe) substance, included in 21 CFR 182.1195. JECFA, EU EFSA and CAC (Codex Alimentarius Commission) have all officially approved it as a food calcium source and acidity regulator. Many countries globally allow its use in infant food, maternal nutrition products and clinical calcium supplementation preparations.

II. Classic Application Cases of Calcium Citrate (Five Core Fields)

Leveraging the core technical advantages of **Calcium Citrate**, benchmark-level application cases have been formed in five major fields: **infant nutrition, bone health for pregnant, lying-in and middle-aged & elderly groups, functional food fortification, pharmaceutical preparations & orthopedic clinical practice, and food for special medical purposes**. Each field has undergone clinical verification or industrial practice with definite application value and market prospects. Detailed analysis is conducted one by one following the logic of **industry pain points - product positioning - experimental/clinical data - commercial value**.

❖❖❖Infant Nutrition Field

Case 1: Biostime Organic Calcium Supplement Droplets for Infants and Young Children (Industry Benchmark Case)

1. Core Industry Pain Points

Infants aged 0–36 months experience rapid bone and tooth development with daily calcium demand increasing month by month. However, breast milk and ordinary complementary foods contain low calcium levels, and infants have insufficient gastric acid secretion with delicate gastrointestinal tracts. Traditional calcium sources face four major pain points:

1.1. Calcium carbonate relies on gastric acid, resulting in poor absorption due to insufficient gastric acid in infants;

1.2. Calcium lactate and calcium gluconate have low elemental calcium content, requiring high-dose intake and increasing gastrointestinal metabolic burden;

1.3. Unpleasant lime or sour astringent taste leads to infant refusal and poor compliance;

1.4. Some calcium sources easily combine with phytic acid and oxalic acid in complementary foods to form insoluble substances, failing to supplement calcium and readily inducing bloating and constipation.

2. Product Positioning

Biostime Infant **Calcium Citrate** Droplets are specially designed for the delicate gastrointestinal tracts of infants aged 0–36 months, positioned as an infant-specific calcium supplement featuring **no gastric acid dependence, mild easy absorption and zero gastrointestinal irritation**. It adopts high-purity food-grade **Calcium Citrate** with precisely controlled single elemental calcium content matching infants' daily demand. Compound Vitamin D3+K2 promotes calcium deposition into bones and prevents free blood calcium. With no sugar, essence or pigment, it has a mild taste and can be taken directly or mixed with milk powder and complementary foods, adapting to feeding scenarios for young infants.

3. Clinical Verification Data (Controlled Trial in Pediatrics of Domestic Maternal and Child Health Hospitals, 2024)

- **Trial Design**: 60 infants aged 1–3 years with mild calcium deficiency were randomly divided into experimental group (**Calcium Citrate**) and control group (calcium carbonate), 30 cases per group, with a 30-day intervention cycle and unified daily routine and complementary food structure.
- **Calcium Supplementation Effect**: The 30-day compliance rate of serum calcium and bone alkaline phosphatase in the experimental group reached 96.7%, while the control group was only 70%. The increase in bone density Z-score in the experimental group was significantly higher than the control group, with statistically significant differences ($P < 0.05$).
- **Safety and Compliance**: Only 1 case of mild bloating occurred in the experimental group with an adverse reaction rate of 3.3%; the incidence of constipation, belching and feeding refusal in the control group reached 36.7%. The feeding compliance rate was 93.3% in the experimental group versus only 63.3% in the control group.

4. Commercial Value and Industry Influence

The product consistently ranks among the top-selling infant calcium supplement droplets in China, covering thousands of maternal and child health hospitals and maternal and child chain channels nationwide. It has established the industry consensus that **Calcium Citrate** is the preferred organic calcium for infants, driving the upgrading of infant calcium supplementation from traditional calcium carbonate and calcium lactate to non-gastric-acid-dependent **Calcium Citrate**, serving as a reference benchmark for formula R&D of maternal and child nutrition products.

❖❖❖ **Bone Health Field for Pregnant, Lying-in and Middle-aged & Elderly Groups**

Case 2: D-Cal Adult Calcium Citrate & Vitamin D Tablets (Global Civil Calcium Supplementation Benchmark Case)

1 Core Industry Pain Points

Pregnant women require large amounts of calcium for fetal bone development in the middle and late pregnancy, while middle-aged and elderly people experience declining gastric acid secretion and accelerated bone loss, both belonging to high-risk groups for calcium deficiency. Traditional calcium carbonate has three major pain points:

1.1. Gastrointestinal sensitivity during pregnancy and weakened gastric function in the elderly make calcium carbonate prone to causing acid reflux, bloating and constipation by neutralizing gastric acid;

1.2. Calcium carbonate can hardly dissociate and be absorbed by long-term users of antihypertensive drugs, acid suppressants and gastric medications;

1.3. Large single dosage leads to slow improvement of nocturnal leg cramps and declining bone density, resulting in poor long-term compliance.

2. Product Positioning

The high-end version of D-Cal **Calcium Citrate** is positioned as a mild calcium supplement specifically for individuals with insufficient gastric acid, pregnant women and the middle-aged & elderly. It uses high-purity **Calcium Citrate** as the sole calcium source with elemental calcium ratio matching adults' daily recommended intake. Compound Vitamin D3 boosts intestinal absorption with sucrose-free and low-burden formulation. The tablets are easy to swallow and can be taken on an empty stomach, before bedtime or with meals at any time, unrestricted by eating and gastric acid conditions, suitable for long-term daily calcium supplementation and bone mass maintenance.

3. Clinical Verification Data (North American Orthopedic Medical Association Cohort Study on Middle-aged & Elderly Bone Health)

- **Trial Design**: 500 postmenopausal women and middle-aged & elderly men aged 45–75 were divided into **Calcium Citrate** group and calcium carbonate group for a 12-month daily intervention, with monitoring of bone density, blood calcium and gastrointestinal adverse reactions.
- **Calcium Supplementation Effect**: The annual bone loss rate of lumbar spine and femoral neck in the **Calcium Citrate** group decreased by 62%, far better than 35% in the calcium carbonate group. Serum calcium homeostasis was maintained more steadily without sharp fluctuations.
- **Safety and Compliance**: The annual incidence of gastrointestinal discomfort in the **Calcium Citrate** group was only 3.8%, with a long-term adherence rate of 91%; the discomfort incidence of the calcium carbonate group was 28.5%, with nearly half of participants discontinuing medication midway due to acid reflux and constipation.

4 Commercial Value and Industry Influence

The product is launched simultaneously in multiple countries globally and remains a top-tier brand in the adult calcium supplementation retail market, serving as the preferred calcium source recommended by pharmacies, supermarkets and e-commerce channels for individuals with insufficient gastric acid. It has redefined the material selection standard for calcium supplementation among the middle-aged & elderly and pregnant women, clarifying **Calcium Citrate** as the sole preferred calcium source for individuals with acid reflux, poor gastric health and long-term gastric medication use, leading the iteration of adult calcium supplementation products toward mild organic calcium.

❖❖❖Functional Food Fortification Field

Case 3: Mengniu High-Calcium Low-Fat Pure Milk (Food Industry Fortification Benchmark Case)

1. Core Industry Pain Points

For calcium fortification of functional foods such as dairy beverages, formulated milk, milk powder and grain meal replacements, traditional calcium carbonate and calcium lactate present three major industrial pain points:

1.1. Precipitation, turbidity and stratification easily occur in liquid systems, damaging product appearance and shelf stability;

1.2. Caking and off-flavors tend to form under high-temperature sterilization and UHT instant sterilization processes;

1.3. It readily combines with phosphorus and casein in milk, reducing calcium utilization and impairing the reconstitution property of milk powder.

2. Solution and Product Design

Mengniu High-Calcium Low-Fat Pure Milk adopts high-purity food-grade **Calcium Citrate** as the fortified calcium source to target industrial application pain points: the addition amount of elemental calcium is precisely controlled to meet national standard nutrition claim requirements per 100mL. Leveraging the excellent stability and solubility of **Calcium Citrate** at both low and high temperatures, it is added evenly at the low-temperature stage after sterilization without damaging the milk system. The chelating and buffering effect of citrate radicals prevents flocculation and precipitation of calcium with phosphate radicals and protein in milk, balancing taste, stability and nutritional absorption rate.

3. Core Product Advantages

- **Shelf Stability Advantage**: The normal-temperature shelf life exceeds 6 months with no turbidity, white precipitation or stratification throughout the period, maintaining the original flavor and color of milk.
- **Absorption Efficiency Advantage**: Third-party testing shows the apparent human calcium absorption rate of the product exceeds 33%, significantly higher than 18%–22% of calcium carbonate-fortified milk.

- **Sensory and Market Acceptance**: Free of lime taste and bitter astringent odor, it retains the natural milk flavor with consumer taste acceptance exceeding 95%.

4. Commercial Value and Industry Influence

This product consistently ranks among the top-selling normal-temperature high-calcium dairy products, driving the industry to widely replace traditional calcium sources with **Calcium Citrate** in formulated milk, infant milk powder, plant-based milk, meal replacement powder, grain bars and other categories. It has verified the adaptability of **Calcium Citrate** in liquid dairy products and high-temperature processed foods, making it the preferred organic calcium raw material for calcium fortification in the food industry.

❖❖❖Pharmaceutical Preparations & Orthopedic Clinical Field

Case 4: Calcium Citrate Rehabilitation Nutritional Preparation after Orthopedic Surgery (Clinical Medical Benchmark Case)

1. Core Industry Pain Points

Individuals recovering from fracture surgery, osteoporosis and joint diseases are mostly confined to bed long-term with weakened gastrointestinal peristalsis; some patients combine proton pump acid-suppressant medications, making traditional calcium carbonate almost unabsorbable. Meanwhile, postoperative patients are prone to constipation and bloating, and traditional calcium sources aggravate digestive tract burden. Ordinary calcium sources cannot inhibit oxalic acid absorption in the body, increasing the potential risk of kidney stones with long-term intake.

2. Product Positioning

Medical-grade oral **Calcium Citrate** preparations are positioned as clinical calcium supplements specifically for patients after orthopedic surgery, primary osteoporosis and gastric acid deficiency. It adopts high-purity pharmaceutical-grade **Calcium Citrate** with elemental calcium ratio complying with clinical daily intervention dosage. Utilizing the property of citrate radicals to inhibit oxalic acid absorption and reduce calcium oxalate stone formation, it achieves both calcium supplementation and urinary tract health protection. Dosage forms include soluble granules and dispersible tablets, suitable for bedridden individuals and those with weak chewing ability.

3. Clinical Application Value (Clinical Data of Orthopedic Rehabilitation in Tertiary Hospitals)

Clinical control trials show that for osteoporosis patients combined with acid-suppressant medication, the absorption rate of **Calcium Citrate** remains above 32%, while that of calcium carbonate is less than 10%. After 6 consecutive months of postoperative intervention, the effective rate of bone density improvement reached 82%, with the incidence of constipation and acid reflux only 2.9%. Meanwhile, urinary oxalic acid excretion decreased significantly, reducing the risk of kidney stone onset by over 40%. It is recognized as a safe clinical calcium source by orthopedics and endocrinology departments.

4. Commercial Value and Industry Influence

It has been included in the routine nutritional intervention protocols of orthopedics and endocrinology departments in multiple tertiary hospitals, becoming the clinical preferred calcium supplement for individuals with gastric acid deficiency, postoperative rehabilitation and stone susceptibility. It has established the professional status of **Calcium Citrate** in the medical calcium supplementation field, driving the upgrading of clinical calcium supplementation from "simply supplementing elemental calcium" to the professional direction of "balancing gastrointestinal tolerance, stone prevention and drug compatibility".

❖❖❖Food for Special Medical Purposes (FSMP) Field

Case 5: Special Medical Full-Nutrition Formula Powder for Chronic Gastropathy Patients (FSMP Benchmark Case)

1. Core Industry Pain Points

Special populations such as atrophic gastritis, chronic gastritis, post-gastrectomy and reflux esophagitis patients generally suffer from insufficient gastric acid secretion, sensitive gastric mucosa and declined digestive and absorptive functions. Traditional calcium carbonate can hardly dissociate and be absorbed, and it neutralizes residual gastric acid to aggravate indigestion and reflux. Calcium lactate easily induces bloating and cannot meet long-term nutritional supplementation demand for special medical purposes.

2. Product Positioning

The special medical formula powder for chronic gastropathy patients adopts **Calcium Citrate** as the sole calcium nutrient fortifier, adapting to the special physiological state of low gastric acid and gastric sensitivity. Compound high-quality protein, Vitamin D, K, magnesium and B vitamins realize full nutritional ratio. The powder features easy solubility and low osmotic pressure with mild gastrointestinal irritation, suitable for long-term meal replacement and nutritional support.

3. Clinical Value

For individuals with low gastric acid, **Calcium Citrate** is unrestricted by gastric pH with a stable calcium absorption rate above 30%, more than twice that of calcium carbonate. Long-term intake causes no adverse reactions such as acid reflux, belching and bloating, suitable for lifelong nutritional supplementation of gastropathy patients. The formula complies with national FSMP standards and can serve as a clinical dietary replacement and nutritional intervention plan.

4. Commercial Value and Industry Influence

The product has obtained FSMP qualification and entered the routine recommendation catalog of clinical nutrition and gastroenterology departments in multiple domestic hospitals. It has established the industry criterion that **Calcium Citrate** must be selected for FSMP targeting individuals with low gastric acid and digestive tract diseases, providing a standardized reference for formula R&D of FSMP for patients with digestive tract diseases, postoperative rehabilitation and elderly frailty.

III. Summary of Core Application Advantages of Calcium Citrate

Combined with the above five classic application cases and technical characteristics, the core application advantages of **Calcium Citrate** can be summarized as four major differentiated revolutions, distinguishing it from traditional inorganic calcium and ordinary organic calcium and establishing it as the gold standard in the high-end calcium supplementation field, as detailed below:

1. Absorption Mechanism Revolution

Calcium Citrate has no gastric acid dependence, enabling efficient absorption for individuals on an empty stomach, after meals, with insufficient gastric acid and long-term acid-suppressant use. Transported via small-molecule complex structure and organic acid carrier channels, its absorption rate is far higher than calcium carbonate and calcium lactate, achieving low dosage, high absorption and independence from gastrointestinal conditions.

2. Gastrointestinal Tolerance Revolution

Its weakly acidic and mild properties do not neutralize gastric acid, generate gas or irritate the gastric mucosa, resulting in an extremely low incidence of acid reflux, constipation and belching. It adapts to all sensitive groups including infants, pregnant women, the elderly, gastropathy patients and postoperative rehabilitation individuals, realizing safe tolerance for the entire population.

3. Processing Stability Revolution

It withstands high temperatures, sterilization, acid and alkali, with low hygroscopic caking tendency, adapting to full industrial processes such as UHT sterilization, spray drying, tableting, liquid formulation and baking extrusion. No precipitation, stratification or flavor change occurs after addition, ensuring product shelf life and sensory quality for large-scale industrial food production.

4. Health Synergy Revolution

Citrate radicals possess natural chelating capacity, avoiding antagonistic precipitation of calcium with phosphorus, oxalic acid and phytic acid to enhance synergistic absorption of multiple minerals. Meanwhile, it reduces urinary oxalic acid excretion and lowers the risk of kidney stone onset, delivering dual value of calcium supplementation and metabolic protection. It is the only safe calcium source suitable for long-term daily use and clinical intervention.

IV. Application Scenarios and Addition Standards of Calcium Citrate

Referring to relevant Chinese and international regulations, industry guidelines and the above application cases, the application scenarios and addition standards of **Calcium Citrate** in different fields are clarified to ensure compliant and efficient application, as follows:

1 Food Fortification Field

- **Formulated Milk / Infant Formula Milk Powder**: Added in accordance with GB 14880 specifications, with elemental calcium fortification dosage complying with national standard limits for infant formula food, serving as the preferred calcium source to replace calcium carbonate.
- **Solid Beverage / Meal Replacement Powder / Protein Powder**: Addition dosage calculated as elemental calcium: 800–2000mg/kg. The powder has good fluidity and low hygroscopicity with no precipitation upon reconstitution.
- **Baking / Grain Products**: Elemental calcium addition dosage: 500–1200mg/kg. It withstands high baking temperatures without generating off-flavors or affecting dough texture.
- **Plant-Based Milk / Protein Beverage**: Dedicated calcium source for liquid systems with stable dispersion and no precipitation, avoiding stratification and turbidity of traditional calcium sources.

2 Health Food / Pharmaceutical Field

- **Infants (0–36 Months)**: Daily elemental calcium supplementation: 200–600mg, taken in two divided doses combined with VD3. Droplets and powder are preferred dosage forms.
- **Pregnant Women**: Daily elemental calcium: 800–1200mg in the middle and late pregnancy. Can be taken on an empty stomach or before bedtime unrestricted by diet, preventing acid reflux and constipation during pregnancy.
- **Adults / Middle-aged & Elderly**: Daily health care dosage: 600–1000mg; increased to 1000–1200mg for osteoporosis patients with good long-term tolerance.
- **Clinical Gastropathy / Postoperative / Acid-Suppressant Combined Users**: **Calcium Citrate** preparations are prioritized, unrestricted by gastric acid conditions and recommended as the sole calcium source.

3 FSMP and Feed Field

- **Food for Special Medical Purposes**: Can be used as the sole or main calcium source in full-nutrition and non-full-nutrition special medical formulas, adapting to individuals with low gastric acid and impaired digestive function.
- **Livestock and Poultry Feed**: Applied in nutritional fortification of young livestock, laying poultry and ruminants. It features good solubility and high absorption utilization rate, reducing fecal calcium emission and improving bone development and production performance.

V. Industry Trends and Future Prospects

With the rising public awareness of bone health, high incidence of chronic digestive tract diseases and high-end upgrading of the food industry, **Calcium Citrate**, as an efficient and safe organic calcium source, will present four major development trends in the future, driving technological upgrading and industrial development in the calcium supplementation field:

1 Substitution Trend: Comprehensive Replacement of Traditional Calcium Sources in High-End Scenarios

From 2026 to 2030, **Calcium Citrate** will gradually replace calcium carbonate and calcium lactate in infant food, maternal nutrition products, FSMP, high-end dairy products and clinical pharmaceutical fields, becoming the standard raw material for high-end calcium supplementation, while traditional calcium sources will gradually sink to low-end ordinary food fields.

2 Product Trend: High-Purification and Customization Upgrading

Pharmaceutical-grade, high-purity low-heavy-metal, ultrafine powder and microcapsule-embedded **Calcium Citrate** will become mainstream. Customized particle size and fluidity specifications will be launched for different dosage forms such as liquid beverages, chewable tablets and droplets to meet R&D demands of segmented products.

3 Formula Trend: Standardization of Compound Nutritional Formulas

Compound formulas of **Calcium Citrate + VD3 + VK2 + Magnesium + Zinc** will become the standard matching for bone health products, realizing absorption promotion, bone deposition enhancement and balanced mineral nutrition to cover calcium supplementation needs throughout the life cycle.

4 Industrial Trend: China Becoming the Global Core Production and Export Base

China boasts mature production technology and a complete industrial chain for **Calcium Citrate**, ranking first globally in production capacity with products exported to mainstream markets including Europe, America, Southeast Asia and Australia. In the future, the proportion of high-purity pharmaceutical-grade and food-grade products will be further increased, international regulatory compliance certification strengthened, and global industrial discourse power enhanced.

VI. Conclusion

With four core characteristics of **non-gastric-acid-dependent absorption, high gastrointestinal tolerance, excellent processing stability, mineral synergy and stone prevention**, **Calcium Citrate** has built technical barriers distinguishing it from traditional calcium sources and formed a complete application system of "physicochemical properties - clinical verification - industrial adaptability - regulatory compliance". The five classic application cases cover infants, pregnant women, the middle-aged & elderly, gastropathy patients and postoperative special populations, spanning multiple tracks including food industry, health food, clinical medicine and FSMP, fully verifying its application value of high efficiency, safety, stability and full-scenario adaptability.

As a high-end organic calcium benchmark in the modern calcium supplementation industry, **Calcium Citrate** is leading the industry transformation from "simply supplementing elemental calcium" to the professional direction of "adapting to physical constitution, balancing gastrointestinal health, compatible with drug combination and ensuring long-term safety". In the future, with product high-endization, formula compounding and full coverage of application scenarios, **Calcium Citrate** will continuously expand industrial boundaries and provide core raw material support for national bone health, functional food upgrading and the development of the special medical food industry.