MagneINNO™ Technical Bulletin

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Document ID: MI-TB-2026-01
Effective Date: November 24, 2026
Web Reference: www.magneinno.com/science

Unbuffered Chelation Verification & Orthogonal Analytical Framework for Bulk Magnesium Bisglycinate

Executive Summary: MagneINNO™ supplies fully reacted, unbuffered magnesium bisglycinate (CAS 14783-68-7, C4H8MgN2O4, MW 172.42 g/mol) built on proprietary MagniLift™ technology. Pure anhydrous 1:2 magnesium bisglycinate carries a stoichiometric ceiling of approximately 14.10% elemental magnesium; commercial figures in the 18% to 22% range indicate blending with inorganic magnesium oxide rather than an unbuffered chelate. Because no single test establishes true chelation, MagneINNO supports qualification using orthogonal methods: ICP-OES, FTIR, XRD, HPLC, complexometric titration for free magnesium (<= 0.02% w/w), and Karl Fischer moisture analysis.

1. Molecular Stoichiometry vs. Buffered Commercial Claims

For procurement and quality assurance teams qualifying dietary supplement and functional beverage raw materials under 21 CFR 111.320, evaluating an elemental magnesium assay starts from chemical mass balance:

Stoichiometric Anhydrous Ceiling (14.10% Mg)

Atomic weight of magnesium (24.305 g/mol) divided by anhydrous bisglycinate molecular mass C4H8MgN2O4 (172.423 g/mol) equals **14.10% elemental magnesium**. Hydrated or taste-engineered commercial chelates sit in the nominal 8% to 12% range due to coordinated water and sensory tuning.

Identifying Buffered Oxide Blends (18% to 22%+ Mg)

Magnesium oxide carries approximately 60% elemental magnesium. Any commercial powder claiming 18% to 22% elemental magnesium on an as-received basis exceeds the stoichiometric limit of a 1:2 bisglycinate complex and contains unreacted or blended inorganic magnesium salts unless explicitly declared.

2. Orthogonal Analytical Verification Matrix

Total elemental magnesium alone cannot separate a genuine chelate from a dry physical blend of magnesium oxide and glycine. Confirm lot integrity using complementary analytical checkpoints:

Quality Question	Analytical Method	Observed Target / Spec Boundary	Interpretation & Boundary Note
Total Elemental Magnesium	ICP-OES	Nominal 12% (typical 12.01% on Grade 1), 10%, or 8% per grade	Quantifies total Mg atomic mass after digestion; does not preserve or establish coordination structure on its own.
Chelate Coordination Fingerprint	FTIR Spectroscopy	Conforms to qualified true-chelate reference spectrum	Evaluates carboxylate-to-magnesium coordination shifts vs. physical mixtures of MgO and free glycine.
Inorganic Phase Screen	XRD (X-ray Diffraction)	No unaccounted crystalline inorganic Mg phase within detection limits	Screens crystalline phase identity alongside FTIR and free-magnesium titration against qualified reference patterns.
Amino Acid Ligand Profile	HPLC	Conforms for glycine ligand identity and free-glycine control	Assesses selectivity against dissociated glycine under defined extraction and preparation conditions.
Unbound / Free Magnesium	Complexometric Titration	**<= 0.02% w/w**	Measures operational unchelated magnesium fraction under defined pH and endpoint procedure; distinguishes bound chelate from loose salts.
Water vs. Drying Volatile Basis	Karl Fischer / Loss on Drying	Grade-specific specification (24-month stability basis)	Karl Fischer measures true water; gravimetric Loss on Drying captures total volatiles. Confirm as-is vs. dry reporting basis before dosing calculations.

3. Commercial Grade Architecture, COA Limits & Compliance Files

Grade Name	Nominal Mg	Recommended Formulation Fit	Release Specification Benchmarks
Taste Optimized (Grade 1)	12% (typical 12.01% ICP-OES)	Capsules, tablets, compact multi-active stacks	Free Mg: <= 0.02% w/w | Purity: 99.8% | Lot pass rate: 99.8% (distinct metrics) Heavy Metals (ICP-MS/ICP-OES): Pb <= 0.5 ppm, As <= 1.0 ppm, Cd <= 0.5 ppm, Hg <= 0.1 ppm Microbiology: TPC <= 1,000 CFU/g, Y&M <= 100 CFU/g, E. coli negative/10 g, Salmonella negative/25 g
Taste Free (Grade 2)	10% target	Pectin and gelatin gummies; dual beverage screening	
Ultra Taste Free (Grade 3)	8% target	Electrolyte mixes, stick packs, sparkling & RTD beverages	

Quality Systems & Regulatory Path Support

MagneINNO™ is **produced at an NSF GMP for Sport registered facility** (covering facility operations and banned-substance sourcing controls; finished-brand sport seals are separate finished-product programs). Material holds **self-affirmed GRAS** status and **Non-GMO Project Verified** alignment, with ISO 9001, FSSC 22000, FDA facility registration records, Halal, Kosher, SDS, allergen declarations, traceability packs, and process flow charts available on request.

California Commercial Inventory & Sample Policy

Stocked at our 50,000 sq ft Ontario, California warehouse (3,000+ tons/year annual production capacity). Standard packing: 25 kg fiber drums, 24-month shelf life. In-stock California orders typically ship in ~3 days; made-to-order runs take 1 to 2 weeks. Free 50 g samples and lot-matched COAs ship for bench qualification.

References & Verification Links: 1. 21 CFR 111.320 (ecfr.gov) | 2. PubChem / ChemSpider C4H8MgN2O4 (CAS 14783-68-7) | 3. CIAAW Mg Atomic Weight (24.304-24.307) | 4. MagneINNO Analytical Science: https://www.magneinno.com/science | 5. Quality Documentation: https://www.magneinno.com/quality | 6. Verify Full Chelation Guide: https://www.magneinno.com/knowledge/verify-magnesium-glycinate-chelation | 7. Company & Product Facts: https://www.magneinno.com/company-product-facts
Disclaimer: Technical reference for B2B R&D, procurement, and QA qualification teams. Not regulatory or medical advice; confirm release criteria on the current grade specification and lot COA.