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Cartalax

Formula: C12H19N3O8

Document ID: ed050622
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Section 1 — Product and Company Identification

Product Name	Cartalax
Synonyms	alanyl-glutamyl-aspartic acid; H-Asp-Glu-Asp-OH; RefChem:915345
CAS Number	*Not determined*
Molecular Formula	C12H19N3O8
IUPAC Name	(2S)-2-[[(2S)-2-[[(2S)-2-aminopropanoyl]amino]-4-carboxybutanoyl]amino]butanedioic acid
Identified Uses	Research laboratory chemical for in vitro scientific research and development use only.
Restriction on Use	Not for human or veterinary use. Not for food, drug, cosmetic, household, agricultural, clinical, therapeutic, or diagnostic applications.

Manufacturer / Supplier

Company	Ruo.bio
Address	30 N Gould St, Sheridan, WY 82801, US
Phone	+1-804-636-6879
Website	https://ruo.bio/
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Section 2 — Hazard Identification

Classification of the substance

Not classified based on currently available data; however, data is limited and hazards cannot be fully characterized. The absence of classification should not be interpreted as a determination of the absence of hazard.

Classification has been conducted in accordance with 29 CFR 1910.1200 (OSHA HazCom 2012) and GHS Rev.8 using all available data and scientifically valid weight-of-evidence approaches (GHS Rev.8 Chapter 1.3.2.4), including read-across from chemical class and structural considerations where substance-specific study data is not available.

Signal Word: **None**

GHS Pictograms:
None required based on classification.

Hazard Statements
None. This substance is not classified for any GHS hazard class based on available data.

Precautionary Statements

- P261: Avoid breathing dust, fume, gas, mist, vapors, or spray.
- P264: Wash hands and exposed skin thoroughly after handling.
- P280: Wear protective gloves, protective clothing, and eye/face protection.
- P501: Dispose of contents and container in accordance with local, regional, national, and international regulations.

Precautionary statements are provided as best practice for handling substances with limited toxicological data, and are not a declaration of GHS classification.

Hazards Not Otherwise Classified (HNOC)
None known based on available data and weight-of-evidence assessment. The toxicological properties of this substance have not been fully characterized; handle as a potentially bioactive substance of unknown toxicity.

Section 3 — Composition / Information on Ingredients

Single-substance product. Chemical identity:

Ingredient	CAS Number	Mol. Formula	Mol. Weight	Concentration
Cartalax	Not determined	C12H19N3O8	333.29 g/mol	>98% (research grade)

Impurities
No hazardous impurities known to be present above the GHS classification thresholds specified in 29 CFR 1910.1200 Appendix A. Residual synthesis reagents, solvents, and counter-ions may be present at levels consistent with research-grade (>98% purity) material. Balance: non-hazardous impurities. Refer to the accompanying Certificate of Analysis (CoA) for the lot-specific impurity profile.

Section 4 — First Aid Measures

Eye Contact
Rinse cautiously with water for several minutes. If irritation persists, seek medical advice.

Skin Contact
Wash with soap and water. Remove contaminated clothing and wash before reuse. If irritation persists, seek medical advice.

Inhalation
Move affected person to fresh air. If symptoms develop, seek medical advice.

Ingestion
Rinse mouth thoroughly with water. If large amounts are swallowed or if symptoms develop, seek medical advice. Do not induce vomiting unless directed by medical personnel.

Note to Physician
Treat symptomatically. No specific antidote known.

Section 5 — Fire Fighting Measures

Flash Point: *Not determined*

Suitable Extinguishing Media
Use extinguishing media appropriate to the surrounding fire conditions. Carbon dioxide (CO2), dry chemical powder, foam, or water spray.

Special Hazards
May produce toxic gases upon combustion. Carbon monoxide and other combustion products may be generated.

Protective Equipment for Firefighters
Wear self-contained breathing apparatus (SCBA) and full protective gear. Do not enter fire area without proper protective equipment.

Section 6 — Accidental Release Measures

Personal Precautions
Avoid dust formation. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Use personal protective equipment as described in Section 8.

Environmental Precautions
Prevent further leakage or spillage if safe to do so. Do not allow the product to enter drains, sewers, or waterways.

Containment and Cleanup
Sweep up and shovel. Keep in suitable, closed containers for disposal. Avoid raising dust. Clean contaminated surface thoroughly. Dispose of waste in accordance with local regulations (see Section 13).

Section 7 — Handling and Storage

Handling Precautions
Handle in accordance with good laboratory practice (GLP) and the OSHA Laboratory Standard (29 CFR 1910.1450). Because authoritative toxicological data for alanyl-glutamyl-aspartic acid (Ala-Glu-Asp; C12H19N3O8, MW 333.29) are not available in major regulatory databases (OSHA, NIOSH, NTP, IARC, ECHA, PubChem CID 87815447), treat the substance as a material of unknown toxicity, per OSHA 1910.1450 Appendix A, which advises that all substances of unknown toxicity should be assumed to be toxic. Use only in a well-ventilated area or under local exhaust ventilation (e.g., a certified chemical fume hood or weighing enclosure) sufficient to keep airborne dust below nuisance-dust levels. Wear appropriate personal protective equipment as specified in Section 8, including chemical-resistant gloves, safety eyewear meeting ANSI Z87.1, and a laboratory coat; use respiratory protection (e.g., an N95 or higher per NIOSH 42 CFR Part 84) when weighing, transferring, or otherwise generating dust or aerosols. Avoid contact with skin, eyes, and clothing, and avoid breathing dust, mist, or vapor. Do not eat, drink, smoke, or apply cosmetics in work areas. Wash hands and exposed skin thoroughly after handling and before breaks and at the end of the workday. Ground and bond containers when transferring to minimize static accumulation associated with fine powders. Use the smallest practical quantity, keep containers tightly closed when not in use, and reseal under an inert atmosphere (e.g., dry nitrogen or argon) when feasible to limit exposure to moisture and atmospheric oxygen. Clean up spills promptly using HEPA vacuuming or damp wiping to minimize dust generation, and avoid dry sweeping. Provide eyewash and safety shower facilities in the immediate work area in accordance with ANSI Z358.1.

Storage Conditions

Store in tightly closed, clearly labeled, chemically compatible containers (e.g., amber glass vials or appropriate polypropylene containers) protected from light, moisture, and air. The lyophilized peptide solid is best preserved when kept desiccated; recommended long-term storage of lyophilized peptides is at -20 degC or colder, with short-term (working) storage permitted at 2-8 degC for limited periods, consistent with general guidance for lyophilized peptide stability (peptide carries free alpha-amino, carboxylic acid, and amide bonds susceptible to hydrolysis, oxidation, and moisture uptake). Allow containers to equilibrate to room temperature in a desiccator before opening to prevent condensation of atmospheric moisture onto the solid. After reconstitution, aliquot solutions to minimize freeze-thaw cycles and store frozen (<= -20 degC); discard any solution showing precipitation, discoloration, or microbial contamination. Store away from direct sunlight, heat sources, ignition sources, and incompatible materials (see below). Storage area should be cool, dry, well-ventilated, and accessible only to trained personnel; secondary containment is recommended. No specific manufacturer-supplied expiration data have been adopted by an authoritative regulatory body; assign shelf life based on in-house stability testing or established peer-reviewed lyophilized-peptide stability data. The substance is not listed as a DOT/IATA/IMDG dangerous good and has no published NIOSH REL, OSHA PEL, or ACGIH TLV; standard chemical-storage controls apply.

Incompatibilities

Keep away from strong oxidizing agents (e.g., peroxides, perchlorates, nitrates, chlorates, hypochlorites), which can react with the peptide's amine, amide, and carboxylic acid functionalities. Avoid contact with strong acids and strong bases, which can catalyze hydrolysis of the amide (peptide) bonds and degrade the molecule. Avoid strong reducing agents and electrophilic reagents (e.g., aldehydes, acyl halides, isocyanates) that may react with the free alpha-amino group of the N-terminal alanine residue or the free carboxylates of the glutamate/aspartate side chains. Protect from moisture and humid air, which promote hydrolysis and can cause caking of the lyophilized solid, and from prolonged exposure to atmospheric oxygen and light, which can promote oxidative degradation. Avoid elevated temperatures and incompatible metal ions (e.g., free transition-metal catalysts such as Cu(II) or Fe(III)) that can catalyze oxidation or hydrolysis of peptides. Hazardous decomposition products on heating or combustion may include carbon monoxide, carbon dioxide, and oxides of nitrogen (NOx), as is typical for organic compounds containing C, H, N, and O (see Section 10).

Section 8 — Exposure Controls / Personal Protection

Exposure Limits

No regulatory occupational exposure limits (OEL) have been established by OSHA, ACGIH, NIOSH, or equivalent bodies for alanyl-glutamyl-aspartic acid (Ala-Glu-Asp). No biological exposure indices (BEIs) have been established. Control exposure to the lowest level reasonably achievable (ALARA) using the engineering controls and PPE specified below. Handle as a potentially bioactive substance of unknown toxicity.

Engineering Controls

Use in a well-ventilated area. Weighing, transfer, and reconstitution of the dry powder should be performed inside a ventilated enclosure such as a laboratory fume hood, ducted balance enclosure, or Class I/II biological safety cabinet to prevent generation of airborne dust. Where dust generation cannot be eliminated, supplemental local exhaust ventilation (LEV) is recommended in accordance with ANSI/AIHA Z9.5 and ACGIH Industrial Ventilation: A Manual of Recommended Practice. Provide accessible emergency eyewash and safety shower stations meeting ANSI Z358.1 in the immediate work area. Implement good occupational hygiene practices consistent with OSHA 29 CFR 1910.1450 (Occupational Exposure to Hazardous Chemicals in Laboratories): no eating, drinking, smoking, or cosmetic application in work areas; wash hands and exposed skin thoroughly after handling and before breaks.

Personal Protective Equipment

Respiratory Protection: No regulatory OEL exists, so airborne exposures cannot be quantitatively benchmarked. Where engineering controls (fume hood, balance enclosure, BSC) adequately contain the material, routine respiratory

protection is not required. If dust, mist, or aerosol may be generated outside of a containment device, wear a NIOSH-approved (42 CFR Part 84) air-purifying particulate respirator equipped with N95 (or higher, e.g., N100/P100) filters. For larger-scale handling or unknown airborne concentrations, use a powered air-purifying respirator (PAPR) with HEPA filters. All respirator use in the workplace must comply with the OSHA Respiratory Protection Standard (29 CFR 1910.134), including medical clearance, fit testing, and a written respiratory protection program.

Hand Protection: Wear chemically resistant gloves conforming to EN ISO 374 / ANSI-ISEA 105. Disposable nitrile gloves (minimum thickness >=0.11 mm / 4 mil) are generally suitable for handling small quantities of this solid peptide and its aqueous solutions. For prolonged contact, with organic reconstitution solvents (e.g., DMSO, DMF), or for bulk handling, use heavier-gauge nitrile or butyl rubber gloves selected per the glove manufacturer's permeation data for the specific solvent in use. Inspect gloves before use, change immediately if contaminated, torn, or punctured, and dispose of as contaminated laboratory waste. Wash hands thoroughly with soap and water after removing gloves, as required by 29 CFR 1910.1450.

Eye / Face Protection: Wear tight-fitting protective safety glasses with side shields meeting ANSI/ISEA Z87.1 as a minimum. Where splashing, spraying, or generation of dust is possible (e.g., weighing dry powder outside an enclosure, reconstitution, vortexing), wear indirectly vented chemical splash goggles meeting ANSI/ISEA Z87.1 (Z87+ D3 rating). A full-face shield worn over goggles is recommended for operations involving significant splash or pressurized transfer. Emergency eyewash meeting ANSI Z358.1 must be available within 10 seconds of travel from the work area, per OSHA 29 CFR 1910.151(c).

Skin Protection: Wear a long-sleeved laboratory coat or chemically resistant lab coat, fully buttoned, over long pants. Closed-toe, non-absorbent chemical-resistant footwear is required; sandals, open-toe shoes, and absorbent cloth shoes are prohibited in the work area. For operations with potential for splash or visible dust deposition, wear an impervious chemical-resistant apron or disposable protective sleeves over the lab coat. Remove and segregate contaminated clothing promptly; do not wear contaminated PPE outside the work area or take it home for laundering. Manage contaminated garments in accordance with OSHA 29 CFR 1910.132 and 1910.1450. Wash exposed skin thoroughly with soap and water after handling.

Section 9 — Physical and Chemical Properties

Physical State	Solid (research-grade lyophilised powder or crystalline solid)
Appearance	White to off-white lyophilized powder
Odor	Odorless
Odor Threshold	Not available.
Boiling Point	*Not determined*
Melting Point	*Not determined*
Flash Point	*Not determined*
Auto-ignition Temperature	No data available.
Decomposition Temperature	No experimental data available.
Vapor Pressure	*Not determined*
Vapor Density	*Not determined*
Specific Gravity	*Not determined*
Partition Coefficient (log Kow)	No experimental data available.
Solubility	Soluble in water; very slightly soluble in ethanol

Stability in Solution	Subject to hydrolytic and oxidative degradation typical of the chemical class; store reconstituted solutions refrigerated or frozen, protect from light, and use within the stability window indicated on the Certificate of Analysis.
pH	*Not determined*
Molecular Weight	333.29 g/mol
Molecular Formula	C12H19N3O8

Section 10 — Stability and Reactivity

Chemical Stability: Stable under normal conditions of use, storage, and transport.

Conditions to Avoid: Excessive heat, open flames, sparks, incompatible materials.

Incompatible Materials: Keep away from strong oxidizing agents (e.g., peroxides, perchlorates, nitrates, chlorates, hypochlorites), which can react with the peptide's amine, amide, and carboxylic acid functionalities. Avoid contact with strong acids and strong bases, which can catalyze hydrolysis of the amide (peptide) bonds and degrade the molecule. Avoid strong reducing agents and electrophilic reagents (e.g., aldehydes, acyl halides, isocyanates) that may react with the free alpha-amino group of the N-terminal alanine residue or the free carboxylates of the glutamate/aspartate side chains. Protect from moisture and humid air, which promote hydrolysis and can cause caking of the lyophilized solid, and from prolonged exposure to atmospheric oxygen and light, which can promote oxidative degradation. Avoid elevated temperatures and incompatible metal ions (e.g., free transition-metal catalysts such as Cu(II) or Fe(III)) that can catalyze oxidation or hydrolysis of peptides. Hazardous decomposition products on heating or combustion may include carbon monoxide, carbon dioxide, and oxides of nitrogen (NOx), as is typical for organic compounds containing C, H, N, and O (see Section 10).

Hazardous Decomposition Products: Upon combustion or decomposition may produce: carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxides (NOx).

Hazardous Polymerization: Will not occur.

Section 11 — Toxicological Information

The toxicological properties of this substance have not been fully characterized. Where no authoritative study data was identified, endpoint classifications are based on a weight-of-evidence approach using read-across from the compound's chemical class and structural features, per GHS Rev.8 Chapter 1.3.2.4. “Not classified” entries below mean “not classified based on currently available data” — hazards cannot be excluded.

Acute Toxicity: Acute toxicity data specific to alanyl-glutamyl-aspartic acid (Ala-Glu-Asp; C12H19N3O8, MW 333.29) have not been fully characterized in the publicly available literature. No oral, dermal, or inhalation LD50/LC50 values for this substance are reported in PubChem (CID 87815447), ECHA, NIOSH RTECS, or the peer-reviewed toxicology literature. Not classified for acute toxicity (oral, dermal, or inhalation) based on currently available data; however, hazards cannot be excluded in the absence of substance-specific studies (per GHS Rev.8, Chapter 1.3.2.4, weight-of-evidence). Handle as a substance of unknown acute toxicity and minimize all routes of exposure.

Skin Corrosion / Irritation: No substance-specific in vivo or validated in vitro (OECD TG 431/439) skin irritation or corrosion data have been located for alanyl-glutamyl-aspartic acid in PubChem, ECHA, or peer-reviewed sources. The molecule contains free carboxylic acid groups (two -COOH from Glu and Asp side chains plus a C-terminal carboxyl) and a free primary amine, so dust or concentrated solutions may produce mechanical or mild chemical irritation on contact. Not classified for skin corrosion/irritation based on currently available data; hazards cannot be excluded. Avoid skin contact and use impervious gloves as a precaution.

Serious Eye Damage / Irritation: No substance-specific eye irritation or serious eye damage data (e.g., OECD TG 405, 437, 438, 492) are available for alanyl-glutamyl-aspartic acid in PubChem (CID 87815447), ECHA, or the open toxicological literature. Particulates of any solid and solutions containing free carboxylic acid functionalities can be

mechanically and chemically irritating to ocular tissue. Not classified for serious eye damage/eye irritation based on currently available data; hazards cannot be excluded. Use appropriate eye protection.

Skin / Respiratory Sensitization: No skin or respiratory sensitization data (e.g., OECD TG 406, 429, 442A-E; human repeat insult patch testing) have been identified for alanyl-glutamyl-aspartic acid in PubChem, ECHA, NIOSH, or peer-reviewed literature. Not classified for skin or respiratory sensitization based on currently available data; sensitization potential cannot be excluded for a synthetic tripeptide that has not undergone formal sensitization testing. Persons with known peptide or protein hypersensitivities should avoid exposure.

Germ Cell Mutagenicity / Genotoxicity: Not classified based on currently available data; hazards cannot be excluded. Weight-of-evidence assessment applied using read-across from chemical class and structural considerations (GHS Rev.8 Chapter 1.3.2.4); no authoritative substance-specific study data identified.

Carcinogenicity: Alanyl-glutamyl-aspartic acid is not listed as a carcinogen by IARC, the U.S. National Toxicology Program (NTP 15th Report on Carcinogens), OSHA (29 CFR 1910.1003 / Subpart Z), the U.S. EPA IRIS, or ACGIH. No long-term carcinogenicity bioassays specific to this substance have been published. Not classified for carcinogenicity based on currently available data; hazards cannot be excluded due to the absence of chronic studies (GHS Rev.8 weight-of-evidence).

Reproductive Toxicity: No reproductive toxicity, developmental toxicity, or fertility studies (e.g., OECD TG 414, 416, 421, 422, 443) specific to alanyl-glutamyl-aspartic acid have been located in PubChem, ECHA, or the peer-reviewed literature. The substance is not listed on the California Proposition 65 list of chemicals known to cause reproductive toxicity. Not classified for reproductive toxicity or effects on or via lactation based on currently available data; hazards cannot be excluded in the absence of substance-specific reproductive/developmental studies.

Specific Target Organ Toxicity (STOT): Specific Target Organ Toxicity - Single Exposure (STOT-SE) and Repeated Exposure (STOT-RE): No substance-specific single-dose or repeated-dose systemic toxicity studies (e.g., OECD TG 407, 408, 410, 411, 412, 413) have been identified for alanyl-glutamyl-aspartic acid in PubChem (CID 87815447), ECHA, NIOSH, or the open peer-reviewed toxicology literature; no target organs have been established. Not classified for STOT-SE or STOT-RE based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). The toxicological properties of this substance are not fully characterized - minimize occupational exposure as a precautionary measure.

Aspiration Hazard: Not classified based on currently available data; hazards cannot be excluded. Weight-of-evidence assessment applied using read-across from chemical class and structural considerations (GHS Rev.8 Chapter 1.3.2.4); no authoritative substance-specific study data identified.

Derived No-Effect Level (DNEL): No data available — no substance-specific DNEL has been derived.

Predicted No-Effect Concentration (PNEC): No data available — no substance-specific PNEC has been derived.

Section 12 — Ecological Information

No authoritative substance-specific ecotoxicity study data was identified. In the absence of experimental data, adverse environmental effects cannot be fully excluded.

Ecotoxicity: No substance-specific experimental aquatic toxicity data (e.g., fish LC50, Daphnia EC50, algae ErC50) have been identified in authoritative sources (ECHA, EPA ECOTOX, PubChem CID 87815447) for alanyl-glutamyl--aspartic acid (Ala-Glu-Asp). Not classified as hazardous to the aquatic environment (acute or chronic) under GHS/CLP based on a weight-of-evidence assessment in the absence of authoritative experimental data. The substance is a tripeptide composed exclusively of the proteinogenic L-amino acid residues alanine, glutamic acid, and aspartic acid (C12H19N3O8), with no halogen, sulfur, phosphorus, or metal substituents that would indicate ecotoxicological concern. Avoid release to the environment as a general precautionary measure.

Persistence and Degradability: No substance-specific ready biodegradability test data (e.g., OECD 301 series) have been identified in authoritative sources for this tripeptide. The molecule consists of three alpha-amino acid residues linked by peptide bonds and is expected to be susceptible to enzymatic and microbial hydrolysis to the constituent

natural amino acids (L-alanine, L-glutamic acid, L-aspartic acid), which are themselves endogenous metabolites; however, no measured half-lives in water, soil, or sediment from authoritative sources have been located to confirm this expectation.

Bioaccumulative Potential: No experimentally determined bioconcentration factor (BCF) has been identified in authoritative sources. Given the highly polar, zwitterionic nature of the molecule (three free carboxylic acid groups and a free primary amine, multiple amide bonds, molecular weight 333.29 g/mol) and an expected low log Kow typical of small oligopeptides composed of natural amino acids, significant bioaccumulation in aquatic organisms is not anticipated. No authoritative experimental log Kow or BCF value is available to confirm this assessment.

Mobility in Soil: No substance-specific experimental data identified.

Other Adverse Effects: No other adverse environmental effects identified. The substance is not included on the Montreal Protocol list of ozone-depleting substances.

Section 13 — Disposal Considerations

Dispose of contents and container in accordance with all local, state, and federal regulations. Do not dispose of this material into sewers or waterways. Contact a licensed waste disposal company for disposal guidance.

US: Dispose in accordance with 40 CFR Parts 261-270 (RCRA). **EU:** Dispose according to Directive 2008/98/EC (Waste Framework Directive).

Section 14 — Transport Information

DOT (US)	Not regulated as dangerous goods under DOT (49 CFR) based on current classification.
IATA	Not regulated as dangerous goods under IATA Dangerous Goods Regulations based on current classification.
IMDG	Not regulated as dangerous goods or as a marine pollutant under the IMDG Code based on current classification.
UN Number	Not applicable.

Transport classifications above are based on the substance's intrinsic hazard classification; the shipper must independently verify the classification, packaging, labelling, and documentation requirements for their specific shipment configuration, quantity, and carrier (including airline policies) prior to dispatch.

Section 15 — Regulatory Information

United States

TSCA (Toxic Substances Control Act): May be eligible for exemption from TSCA inventory listing requirements under the R&D provisions of 40 CFR 720.36, depending on actual conditions of use. This substance is supplied solely for use in scientific research and development in small quantities; it is not intended for, and shall not be used for, any commercial manufacturing, processing, or distribution in commerce. The importer/end user is responsible for confirming that the R&D exemption criteria are met for their specific use. **OSHA HazCom 2012:** This SDS was prepared in accordance with 29 CFR 1910.1200 (HazCom 2012), aligned with the Globally Harmonized System (GHS) Rev. 8. **CERCLA / SARA Title III:** Not listed as a CERCLA Hazardous Substance (40 CFR 302.4); not subject to SARA 313 reporting based on available classification data. Users must independently verify applicability for their facility.

European Union

REACH (EC 1907/2006): Supplied solely for Scientific Research and Development (SR&D) use in quantities below 1 tonne per year per legal entity. Where applicable, this use may be exempt from REACH registration obligations under the scientific research and development provisions of REACH Article 3(23) and the conditions of Article 26(3); importers/users should independently verify the applicable exemption pathway for their specific use. If the substance is used as part of a formally notified Product and Process Oriented Research and Development (PPORD) programme, the separate notification procedure under REACH Article 9 (with a 5-year exemption renewable once) may apply instead. **CLP (EC 1272/2008):** Not classified under CLP based on available data; no harmonized classification entry identified in Annex VI of CLP or the ECHA Classification and Labelling (C&L) Inventory.

Canada

WHMIS 2015 / HPR: Not classified as a hazardous product under the Hazardous Products Act and Hazardous Products Regulations (SOR/2015-17) based on available data and weight-of-evidence assessment. Supplied for laboratory research use only. **DSL/NDSL:** Research-use exemption applies; substance is not intended for commercial import or manufacture in Canada.

Note: The regulatory statements above reflect the intended use of this substance for scientific research and development only and do not constitute a legal determination of regulatory status. If the substance is used outside the R&D exemption scope, users are solely responsible for independently verifying applicable regulatory obligations (TSCA, REACH, WHMIS, state, and local) for their specific use and jurisdiction prior to any such use.

Section 16 — Other Information

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Prepared By	Prepared in accordance with GHS Rev.8 and OSHA HazCom 2012 (29 CFR 1910.1200). Independent review by a qualified chemical safety professional is recommended prior to use.

Revision History

Revision date: 2026-08-07
Version: 1.0
Change description: Initial issue. Document prepared in 16-section GHS Rev.8 / OSHA HazCom 2012 format.

Sources Used

- PubChem (U.S. National Library of Medicine / NCBI) — https://pubchem.ncbi.nlm.nih.gov
- Peer-reviewed chemistry and toxicology literature (class-based read-across and weight-of-evidence assessment per GHS Rev.8 Chapter 1.3.2.4)
- OSHA HazCom 2012 / 29 CFR 1910.1200 Appendix A–C; GHS Rev.8; OECD Test Guidelines

Key to Abbreviations

CAS = Chemical Abstracts Service; GHS = Globally Harmonized System of Classification and Labelling of Chemicals; OSHA = U.S. Occupational Safety and Health Administration; HazCom = Hazard Communication Standard; REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals; CLP = Classification, Labelling and Packaging Regulation; TSCA = Toxic Substances Control Act; WHMIS = Workplace Hazardous Materials Information System; OEL = Occupational Exposure Limit; PEL = Permissible Exposure Limit; TLV = Threshold Limit Value; REL = Recommended Exposure Limit; STOT = Specific Target Organ Toxicity; LD50 =

Median Lethal Dose; LC50 = Median Lethal Concentration; PPE = Personal Protective Equipment; SCBA = Self-Contained Breathing Apparatus; R&D = Research and Development.

Disclaimer

DISCLAIMER: The information in this Safety Data Sheet is compiled from the authoritative sources cited above, supplemented by weight-of-evidence assessment based on the compound's chemical class and published literature. It is believed to be accurate as of the revision date but is provided "as is" without warranty of any kind, express or implied, including fitness for a particular purpose. The preparer of this document has not independently tested the substance described herein. Users bear sole responsibility for verifying all information, ensuring safe handling, and compliance with all applicable federal, state, provincial, and local regulations. This SDS is not a substitute for independent chemical safety assessment by a qualified professional. This product is intended for scientific research and development use only and is not for human consumption, drug, food, cosmetic, agricultural, or household use.

This SDS complies with GHS Revision 8 / UN GHS Rev.8 and OSHA HazCom 2012 (29 CFR 1910.1200).

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