HCG

CAS: 26988-45-0
Formula: C11H19N3O6S

Document ID: 79d28a90
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Version: 1.0

Section 1 — Product and Company Identification

Product Name	HCG
Synonyms	9002-61-3; DELTA-(L-ALPHA-AMINOADIPOYL)-L-CYSTEINYL-GLYCINE; HCG
CAS Number	26988-45-0
Molecular Formula	C11H19N3O6S
IUPAC Name	(2S)-2-amino-6-[[(2R)-1-(carboxymethylamino)-1-oxo-3-sulfanylpropan-2-yl]amino]-6-oxohexanoic 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/
Emergency Phone	+1(804)636-6879 - Monday-Friday: 9:00 AM - 5:00 PM Pacific

Section 2 — Hazard Identification

Classification of the substance

Classified under GHS Rev.8 / OSHA HazCom 2012 — see hazard statements below.

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: **DANGER**

GHS Pictograms:

GHS07 GHS08

Hazard Statements

- H317: May cause an allergic skin reaction [Warning Sensitization, Skin]
- H332: Harmful if inhaled [Warning Acute toxicity, inhalation]
- H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled [Danger Sensitization, respiratory]
- H360: May damage fertility or the unborn child [Danger Reproductive toxicity]
- H361: Suspected of damaging fertility or the unborn child [Warning Reproductive toxicity]
- H372: Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]

Precautionary Statements

- P203
- P233
- P260
- P261
- P264
- P270
- P271
- P272
- P280
- P284
- P302+P352
- P304+P340
- P317
- P318
- P319
- P321
- P333+P317
- P342+P316
- P362+P364
- P403
- P405
- P501

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

HCG	26988-45-0	C11H19N3O6S	321.35 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
Remove contaminated clothing immediately. Wash affected area with soap and water for at least 15 minutes. Seek medical attention if irritation or symptoms develop.

Inhalation
Move affected person to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, administer oxygen. Seek immediate medical attention.

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 industrial hygiene and safety practices and the general laboratory handling principles set out in OSHA's Laboratory Standard (29 CFR 1910.1450) and the National Research Council's 'Prudent Practices in the Laboratory' (NCBI Bookshelf NBK55872). Because comprehensive toxicological data for delta-(L-alpha--aminoadipoyl)-L-cysteinyl-glycine (CAS 26988-45-0) are not established, treat the material as a substance of unknown toxicity and minimize all routes of exposure (inhalation, skin/eye contact, ingestion). Weigh and manipulate the solid in a chemical fume hood, ventilated balance enclosure, or glove box to control airborne particulates; avoid generating dust or aerosols. Wear chemically resistant gloves, a buttoned laboratory coat, and ANSI Z87.1-compliant safety eyewear; select respiratory protection in accordance with 29 CFR 1910.134 if engineering controls do not adequately limit airborne exposure. Do not eat, drink, smoke, or apply cosmetics in areas where the substance is handled, and wash hands and exposed skin thoroughly after handling. The molecule contains a free cysteinyl thiol (-SH), which according to published peptide-handling guidance for Cys-, Met-, and Trp-containing peptides is prone to air oxidation and disulfide formation; minimize exposure to air, moisture, and oxidizing conditions during weighing and dissolution, and where possible work under an inert atmosphere (nitrogen or argon) and prepare solutions in degassed, oxygen-free water or buffer, optionally containing a reducing agent (e.g., DTT or TCEP) as is standard practice for thiol-bearing peptides. Avoid contact with strong oxidizers. Collect waste in clearly labeled, closed, compatible containers and dispose of in accordance with federal, state, and local regulations (40 CFR 262 et seq.).

Storage Conditions

Store the substance tightly closed in its original, clearly labeled container under a dry, inert atmosphere (e.g., nitrogen or argon headspace) to limit oxidation of the cysteinyl thiol group, in accordance with general handling guidance published for Cys-containing peptides. Keep protected from light, moisture, heat, ignition sources, and incompatible materials (see below), in a cool, dry, well-ventilated area dedicated to laboratory chemicals as recommended by OSHA 29 CFR 1910.1450 App. A and NRC 'Prudent Practices in the Laboratory.' No authoritative regulatory storage temperature or shelf-life is established for CAS 26988-45-0; in the absence of such data, low-temperature storage of the solid (refrigerated or frozen, desiccated) is consistent with general practice for hygroscopic, oxidation-sensitive peptides. Reconstituted aqueous solutions of cysteine-containing peptides are typically less stable than the solid and should be prepared fresh in oxygen-free solvent, aliquoted, and stored frozen to limit repeated freeze-thaw cycles. Segregate from food, feed, and incompatible chemicals; store within secondary containment where practical. Restrict access to trained personnel only.

Incompatibilities

Avoid contact with strong oxidizing agents (e.g., peroxides, hypochlorites, permanganates, nitric acid, chromates), which can oxidize the free cysteinyl thiol (-SH) and may generate disulfides, sulfenic/sulfonic acid derivatives, or other decomposition products. Avoid strong acids and strong bases, which can hydrolyze the peptide (amide) bonds. Avoid heavy-metal ions (e.g., Hg(II), Ag(I), Cu(II), Pb(II), As(III)), which readily coordinate to and irreversibly modify thiol groups. Avoid alkylating agents (e.g., iodoacetamide, N-ethylmaleimide, haloalkanes) and aldehydes, which react with thiol and primary amine functionalities. Protect from prolonged exposure to atmospheric oxygen and humidity, which promote air oxidation of the thiol. Keep away from open flames, sparks, and other ignition sources, and from incompatible reactive materials as specified in NFPA and OSHA chemical-storage guidance.

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 delta-(L-alpha-aminoadipoyl)-L-cysteinyl-glycine (CAS 26988-45-0). 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; this compound is a non-ribosomal peptide intermediate in beta-lactam (penicillin/cephalosporin) biosynthesis and a structural analogue of the ACV tripeptide, so workers with known beta-lactam (penicillin) hypersensitivity should avoid handling.

Engineering Controls

Use in accordance with the hierarchy of controls described in OSHA 29 CFR 1910.1450 and the NIOSH 'Current Intelligence Bulletin 68' / NIOSH guidance for handling hazardous drugs and bioactive research compounds. Handle weighing, dissolution, and other dust- or aerosol-generating operations inside a ventilated enclosure such as a certified Class I or Class II Type A2/B2 biosafety cabinet, a ducted chemical fume hood, or a containment/powder-handling glove box. Maintain laboratory ventilation that provides directional airflow away from the worker's breathing zone (typical research-laboratory design per ANSI/AIHA Z9.5). Provide accessible emergency eyewash and safety shower meeting ANSI Z358.1 within 10 seconds of the work area. Decontaminate work surfaces after use; prohibit eating, drinking, smoking, and food storage in the work area (29 CFR 1910.141 and 1910.1450).

Personal Protective Equipment

Respiratory Protection: No regulatory OEL has been assigned, so airborne exposure must be controlled by engineering means. When operations are fully enclosed in a fume hood or biosafety cabinet, routine respiratory protection is not required. If material must be handled as a dry powder outside such containment, or if aerosols/dusts may be generated, wear a NIOSH-approved air-purifying respirator equipped with N95 (or higher, e.g., N100/P100) filters as specified in 29 CFR 1910.134. Respirator selection, fit-testing, medical clearance, and training must comply with a written respiratory protection program under 29 CFR 1910.134.

Hand Protection: Wear chemically resistant, powder-free disposable nitrile gloves meeting EN ISO 374-5 / ASTM D6319. Inspect gloves before use; replace immediately if torn, punctured, or contaminated, and at minimum at the end of each task or per the manufacturer's permeation/breakthrough data. Double-gloving is recommended when weighing dry powder or handling concentrated solutions, consistent with NIOSH recommendations for handling bioactive research compounds. Wash hands thoroughly with soap and water after glove removal and before leaving the work area.

Eye / Face Protection: Wear tightly fitting safety glasses with side shields meeting ANSI/ISEA Z87.1. Use indirectly vented chemical splash goggles meeting ANSI/ISEA Z87.1 when handling solutions, performing transfers that may splash, or working outside a sash-protected fume hood. A face shield (worn over goggles, not as a substitute) is recommended for operations with a credible splash or implosion risk. Eye-protection requirements follow OSHA 29 CFR 1910.133.

Skin Protection: Wear a laboratory coat or chemical-resistant lab gown with long sleeves and knit cuffs, closed-toe chemically resistant footwear, and full-length trousers. For weighing operations, handling of bulk powder, or potential for splash, wear a fluid-resistant disposable gown or sleeve covers over the lab coat. Remove and launder/dispose of contaminated clothing before leaving the laboratory; do not take potentially contaminated PPE home. Skin contact controls are consistent with OSHA 29 CFR 1910.132 and 1910.1450 (Laboratory Standard). Workers with documented penicillin/beta-lactam allergy should consult occupational health before handling, given the compound's role as a beta-lactam biosynthetic intermediate.

Section 9 — Physical and Chemical Properties

Physical State	Solid (research-grade lyophilised powder or crystalline solid)
Appearance	White to off-white powder

Odor	Not available.
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
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	321.35 g/mol
Molecular Formula	C11H19N3O6S

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: Avoid contact with strong oxidizing agents (e.g., peroxides, hypochlorites, permanganates, nitric acid, chromates), which can oxidize the free cysteinyl thiol (-SH) and may generate disulfides, sulfenic/sulfonic acid derivatives, or other decomposition products. Avoid strong acids and strong bases, which can hydrolyze the peptide (amide) bonds. Avoid heavy-metal ions (e.g., Hg(II), Ag(I), Cu(II), Pb(II), As(III)), which readily coordinate to and irreversibly modify thiol groups. Avoid alkylating agents (e.g., iodoacetamide, N-ethylmaleimide, haloalkanes) and aldehydes, which react with thiol and primary amine functionalities. Protect from prolonged exposure to atmospheric oxygen and humidity, which promote air oxidation of the thiol. Keep away from open flames, sparks, and other ignition sources, and from incompatible reactive materials as specified in NFPA and OSHA chemical-storage guidance.
Hazardous Decomposition Products: Upon combustion or decomposition may produce: carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxides (NOx), sulfur oxides (SOx).

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: No authoritative acute toxicity data (oral, dermal, or inhalation LD50/LC50) for delta-(L-alpha--aminoadipoyl)-L-cysteinyl-glycine (CAS 26988-45-0) have been located in PubChem (CID 4369448), ECHA, NIOSH, NTP, or peer-reviewed literature. The toxicological properties of this substance are not fully characterized. Not classified

for acute toxicity based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). Handle as a substance of unknown acute toxicity and minimize all routes of exposure (inhalation of dust/aerosols, skin contact, ingestion).

Skin Corrosion / Irritation: No experimental skin corrosion/irritation study (OECD TG 404, 431, or 439) has been identified for CAS 26988-45-0 in PubChem, ECHA, or peer-reviewed sources. The molecule contains a free sulfhydryl (-SH) group and carboxylic acid functionalities, which may be reactive toward skin proteins; however, no validated data are available to support a category assignment. Not classified for skin corrosion/irritation based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). Treat as a potential irritant pending further data.

Serious Eye Damage / Irritation: No experimental serious eye damage/eye irritation study (OECD TG 405, 437, 438, 460, 491, or 492) has been identified for CAS 26988-45-0 in PubChem, ECHA, or peer-reviewed sources. Not classified for serious eye damage/eye irritation based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). The substance may cause mechanical irritation on direct ocular contact; eye protection is recommended.

Skin / Respiratory Sensitization: No data from authoritative sources (OECD TG 442A, 442B, 442C, 442D, 442E, or guinea pig maximization test) are available for respiratory or skin sensitization of CAS 26988-45-0. The molecule possesses a free thiol group; thiol-reactive electrophilicity is a recognized molecular initiating event in the skin sensitization adverse outcome pathway (OECD AOP 40), but no in chemico, in vitro, or in vivo study has been located that characterizes this substance's sensitization potential. Not classified for skin or respiratory sensitization based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4).

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: CAS 26988-45-0 is not listed by IARC, the U.S. National Toxicology Program (NTP) Report on Carcinogens, OSHA (29 CFR 1910 Subpart Z), the U.S. EPA IRIS, or ACGIH as a known, probable, or suspected human carcinogen. No long-term carcinogenicity bioassay has been identified in the peer-reviewed literature or PubChem (CID 4369448). Not classified for carcinogenicity based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4).

Reproductive Toxicity: No reproductive or developmental toxicity studies (OECD TG 414, 415, 416, 421, 422, or 443) have been identified for CAS 26988-45-0 in ECHA, NTP, EPA IRIS, PubChem, or 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, including effects on or via lactation, based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4).

Specific Target Organ Toxicity (STOT): No specific target organ toxicity data following single exposure (STOT-SE) or repeated exposure (STOT-RE) have been identified for CAS 26988-45-0 in ECHA, NTP, EPA IRIS, PubChem (CID 4369448), or peer-reviewed literature, and no subacute (OECD TG 407), subchronic (OECD TG 408/413), or chronic (OECD TG 452) toxicity studies are available. No occupational exposure limits have been established by OSHA (PEL), NIOSH (REL), or ACGIH (TLV). 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 repeated and prolonged exposure as a precaution.

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, algal ErC50) were identified for delta-(L-alpha-aminoadipoyl)-L-cysteinyl-glycine (CAS 26988-45-0) in authoritative sources reviewed, including the US EPA ECOTOX Knowledgebase, ECHA registration dossiers, and PubChem (CID 4369448). The compound is not listed on the EPA Toxic Substances Control Act (TSCA) inventory ecotoxicity datasets or the EU CLP harmonised classification list. Not classified as hazardous to the aquatic environment (acute or chronic) under GHS/CLP based on a weight-of-evidence assessment, given the absence of authoritative experimental data. Release to surface waters, drains, or the environment should nonetheless be avoided as a matter of good laboratory practice.
Persistence and Degradability: No substance-specific experimental data on ready biodegradability (e.g., OECD 301 series), inherent biodegradability (OECD 302), or abiotic hydrolysis (OECD 111) were identified in authoritative sources reviewed. A definitive determination of environmental persistence cannot be made from publicly available regulatory data. The molecule contains a free thiol (cysteinyl side chain) that is expected to be susceptible to oxidation (e.g., to the corresponding disulfide) under aerobic aqueous conditions, but this has not been quantified in standardized environmental fate studies.
Bioaccumulative Potential: No measured bioconcentration factor (BCF) or experimental log Kow (octanol-water partition coefficient) from an authoritative source (ECHA dossier, EPA, peer-reviewed primary literature) was identified for this substance. Given the highly polar, zwitterionic, multi-ionizable structure (two carboxylic acid groups, a primary amine, an amide backbone, and a free thiol) and high water solubility expected for an amino-acid-derived compound, significant bioaccumulation in aquatic organisms is not anticipated; however, this conclusion is based on structural considerations only and not on substance-specific experimental data.
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)	May be classified as a hazardous material for transport. Consult applicable transport regulations (49 CFR, IATA DGR, IMDG Code) before shipping.
IATA	May be restricted - consult current IATA Dangerous Goods Regulations.
IMDG	May be classified under IMDG Code - consult regulations before sea shipment.
UN Number	Consult applicable SDS and transport regulations.

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

Document ID	79d28a90-de34-4af6-b987-82ddae4d86a4
Revision Date	2026-08-13
Version	1.0
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: 2026-08-13
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).