Tesamorelin

CAS: 218949-48-5
Formula: C221H366N72O67S

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Section 1 — Product and Company Identification

Product Name	Tesamorelin
Synonyms	Tesamorelin; TH9507; MQG94M5EEO
CAS Number	218949-48-5
Molecular Formula	C221H366N72O67S
IUPAC Name	(4S)-4-[[2-[[(2S)-5-amino-2-[[(2S)-5-amino-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2S,3S)-2-[[(2S)-2-[[(2S)-5-amino-2-[[(2S)-2-[[(2S)-2-[[(2S)-6-amino-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2S)-5-amino-2-[[2-[[(2S)-2-[[(2S)-2-[[(2S)-6-amino-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2S)-4-amino-2-[[(2S,3R)-2-[[(2S)-2-[[(2S,3S)-2-[[(2S)-2-[[(2S)-3-carboxy-2-[[(2S)-2-[[(2S)-2-[[(E)-hex-3-enoyl]amino]-3-(4-hydroxyphenyl)propanoyl]amino]propanoyl]amino]propanoyl]amino]propanoyl]amino]-3-methylpentanoyl]amino]-3-phenylpropanoyl]amino]-3-hydroxybutanoyl]amino]-4-oxobutanoyl]amino]-3-hydroxypropanoyl]amino]-3-(4-hydroxyphenyl)propanoyl]amino]-5-carbamimidamidopentanoyl]amino]hexanoyl]amino]-3-methylbutanoyl]amino]-4-methylpentanoyl]amino]acetyl]amino]-5-oxopentanoyl]amino]-4-methylpentanoyl]amino]-3-hydroxypropanoyl]amino]propanoyl]amino]-5-carbamimidamidopentanoyl]amino]hexanoyl]amino]-4-methylpentanoyl]amino]-4-methylpentanoyl]amino]-5-oxopentanoyl]amino]-3-carboxypropanoyl]amino]-3-methylpentanoyl]amino]-4-methylsulfanylbutanoyl]amino]-3-hydroxypropanoyl]amino]-5-carbamimidamidopentanoyl]amino]-5-oxopentanoyl]amino]-5-oxopentanoyl]amino]acetyl]amino]-5-[[(2S)-1-[[(2S)-4-amino-1-[[(2S)-5-amino-1-[[(2S)-… [truncated — full value in PDF metadata]
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

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
Tesamorelin	218949-48-5	C221H366N72O67S	5136 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 industrial hygiene and safety practice and the principles of OSHA's Laboratory Safety Guidance (OSHA 3404-11R) and 29 CFR 1910.1450 (Occupational Exposure to Hazardous Chemicals in Laboratories). Because no occupational exposure limits (OSHA PEL, NIOSH REL, or ACGIH TLV) have been established for this peptide, treat it as a potentially bioactive substance of unknown toxicity and minimize all routes of exposure. Weigh and manipulate the lyophilized powder inside a certified ventilated enclosure (e.g., chemical fume hood, ventilated balance enclosure, or Class II biological safety cabinet) to control airborne particulates, consistent with NIOSH guidance for handling powders of unknown toxicity (NIOSH Current Intelligence Bulletins on control of hazardous drugs and APIs). Wear appropriate personal protective equipment as specified in Section 8: chemical-resistant nitrile gloves, lab coat, and ANSI Z87.1-compliant safety eyewear; use a NIOSH-approved particulate respirator (e.g., N95 or P100) when engineering controls cannot prevent aerosol or dust generation. Avoid generating dust, aerosols, or mists; do not breathe dust and avoid contact with skin, eyes, and clothing. Do not eat, drink, smoke, or apply cosmetics in work areas (29 CFR 1910.141 and 1910.1450). Use closed transfer techniques where possible and decontaminate work surfaces and equipment after use. Wash hands thoroughly after handling and before breaks. Ground containers when transferring to control static. Keep containers tightly closed when not in use to prevent moisture uptake and contamination.

Storage Conditions

Store in the tightly closed original container, protected from light, moisture, and incompatible materials, in a cool, dry, well-ventilated area in accordance with 29 CFR 1910.1450 and OSHA 3404-11R. As a lyophilized peptide, the dry powder should be kept desiccated; recommended long-term storage for lyophilized peptides of this class is at or below -20 degC in a frost-free freezer, protected from light, while short-term storage of the unopened, sealed vial at 2-8 degC is acceptable consistent with general FDA/USP guidance for peptide active pharmaceutical ingredients (USP <1079> Good Storage and Distribution Practices). Reconstituted solutions should be stored refrigerated at 2-8 degC and used promptly; avoid repeated freeze-thaw cycles, which can degrade peptide integrity. Keep away from heat, direct sunlight, ignition sources, and high-humidity environments. Store separately from oxidizers, strong acids, and strong bases. Restrict access to trained personnel and label the storage location clearly. Refer to the certificate of analysis for any compound-specific re-test or expiry date, as no authoritative shelf-life value is established by OSHA, NIOSH, EPA, or PubChem for this substance.

Incompatibilities

No specific incompatibilities for this peptide are listed by OSHA, NIOSH, EPA, ECHA, or PubChem. Based on the general chemistry of peptides containing primary amines, amide bonds, a methionine-type sulfur (formula C221H366N72O67S), and multiple ionizable side chains, avoid contact with: strong oxidizing agents (which can oxidize methionine and other residues); strong acids and strong bases (which can catalyze hydrolysis of peptide bonds and deamidation); strong reducing agents; aldehydes and other electrophilic reagents (which can react with free amines and form adducts); heavy metal ions (which can catalyze oxidation); and proteolytic enzymes or microbial contamination. Avoid prolonged exposure to elevated temperature, humidity, and direct light/UV, which can accelerate hydrolysis, oxidation, deamidation, and aggregation. No hazardous polymerization is expected under normal storage conditions. Hazardous decomposition products on thermal degradation may include carbon oxides (CO, CO2), nitrogen oxides (NO), and sulfur oxides (SO), consistent with combustion of organic sulfur-containing peptides.

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 tesamorelin (CAS 218949-48-5). 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; as a synthetic 44-amino-acid GHRH analog active pharmaceutical ingredient, occupational hygienists may apply a precautionary control banding approach typical for pharmaceutical peptides until a substance-specific OEL is derived.

Engineering Controls

Use in a designated area with controls appropriate to a bioactive pharmaceutical compound. Weigh, transfer, and reconstitute the solid in a ventilated containment device such as a ducted laboratory fume hood, a Class II Type A2/B2 biological safety cabinet, a ventilated balance enclosure, or a glove box / isolator that prevents release of airborne dust. Operations capable of generating aerosols (e.g., dry powder dispensing, lyophilization, sonication, pipetting of concentrated solutions) should be performed inside primary containment. Provide local exhaust ventilation directed away from the breathing zone, HEPA-filtered exhaust where powders are handled, and a general room ventilation rate consistent with ANSI/AIHA Z9.5 and ASHRAE laboratory guidance. Restrict access to trained personnel. Provide readily accessible emergency eyewash and safety shower meeting ANSI Z358.1 within the work area. Prohibit eating, drinking, smoking, and cosmetic application in handling areas (29 CFR 1910.141 and 1910.1450). Use closed systems, sealed centrifuge rotors, and HEPA-filtered transfer devices where feasible. Decontaminate surfaces and equipment after use; manage waste in accordance with 40 CFR 261/262 and institutional procedures for pharmaceutical waste.

Personal Protective Equipment

Respiratory Protection: Where engineering controls maintain airborne concentrations below an internally derived control limit or where handling is conducted within a closed containment device, routine respiratory protection is not required. If powder is handled outside primary containment, if visible dust or aerosols may be generated, or if airborne exposure cannot be characterized, use a NIOSH-approved (42 CFR Part 84) air-purifying respirator with N100/P100 filters or a powered air-purifying respirator (PAPR) with HEPA cartridges. For emergency response or unknown high-exposure situations, use a NIOSH-approved supplied-air or self-contained breathing apparatus operated in pressure-demand mode. Respirator selection, fit-testing, medical clearance, and program administration shall comply with the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Hand Protection: Wear chemically resistant, powder-free disposable gloves selected in accordance with EN ISO 374-1/-5 (chemical/biological protection) and 29 CFR 1910.138. Double-gloving with nitrile (minimum 0.11 mm / 4-8 mil) is recommended when weighing or transferring the neat solid, consistent with USP <800> practice for handling hazardous pharmaceutical compounds. Inspect gloves before use; change immediately if torn, punctured, or contaminated, and at minimum every 30 minutes of continuous use or per the manufacturer's permeation/breakthrough data. Wash hands thoroughly with soap and water after removing gloves and before leaving the work area. Breakthrough times specific to tesamorelin have not been published; glove selection should be verified with the glove manufacturer.

Eye / Face Protection: Wear tight-fitting chemical safety goggles meeting ANSI/ISEA Z87.1 (or EN 166) when handling the solid or solutions. A full-face shield worn over goggles is recommended when there is a risk of splash, spray, or aerosol generation (e.g., reconstitution, sonication, pressurized transfers). Contact lenses are not a substitute for eye protection. Provide an ANSI Z358.1-compliant emergency eyewash station within 10 seconds of travel from handling locations, as required by 29 CFR 1910.151(c).

Skin Protection: Wear a long-sleeved, closed-front chemical-resistant laboratory coat or disposable coverall (e.g., polyethylene-coated or equivalent) over street clothing, in accordance with 29 CFR 1910.132 and 1910.1450. Use disposable sleeve covers when handling open containers of the powder. Wear closed-toe, chemical-resistant footwear; add disposable shoe covers when working with the neat solid. Remove contaminated PPE before leaving the work area and dispose of it as pharmaceutical/chemical waste; do not launder contaminated garments with general laundry. Avoid skin contact at all times and wash exposed skin promptly with soap and water if contact occurs. Practices consistent with USP <800> and NIOSH guidance for handling hazardous drugs in healthcare and research settings are appropriate.

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; soluble in dilute acetic acid; 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	5136 g/mol
Molecular Formula	C221H366N72O67S

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: No specific incompatibilities for this peptide are listed by OSHA, NIOSH, EPA, ECHA, or PubChem. Based on the general chemistry of peptides containing primary amines, amide bonds, a methionine-type sulfur (formula C221H366N72O67S), and multiple ionizable side chains, avoid contact with: strong oxidizing agents (which can oxidize methionine and other residues); strong acids and strong bases (which can catalyze hydrolysis of peptide bonds and deamidation); strong reducing agents; aldehydes and other electrophilic reagents (which can react with free amines and form adducts); heavy metal ions (which can catalyze oxidation); and proteolytic enzymes or microbial contamination. Avoid prolonged exposure to elevated temperature, humidity, and direct light/UV, which can accelerate hydrolysis, oxidation, deamidation, and aggregation. No hazardous polymerization is expected under normal storage conditions. Hazardous decomposition products on thermal degradation may include carbon oxides (CO, CO2), nitrogen oxides (NO), and sulfur oxides (SO), consistent with combustion of organic sulfur-containing peptides.

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 acute toxicity values (LD50/LC50) for Tesamorelin (CAS 218949-48-5) by oral, dermal, or inhalation routes have been located in authoritative sources (NIOSH RTECS, ECHA, 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. Handle as a substance of unknown acute toxicity and minimize all routes of exposure.

Skin Corrosion / Irritation: No validated skin corrosion/irritation studies (e.g., OECD TG 404, 431, 439) for Tesamorelin have been identified in authoritative sources. Injection-site reactions including erythema, pruritus, pain, and urticaria have been reported clinically (FDA EGRIFTA prescribing information, NDA 022505), but these reflect parenteral administration and are not a substitute for a dermal irritation study. Not classified for skin corrosion/irritation based on currently available data; hazards cannot be excluded. Avoid skin contact.

Serious Eye Damage / Irritation: No validated serious eye damage/eye irritation studies (e.g., OECD TG 405, 437, 492) for Tesamorelin have been identified in authoritative sources. The toxicological properties for this endpoint are not fully characterized. Not classified for serious eye damage/eye irritation based on currently available data; hazards cannot be excluded. Avoid eye contact.

Skin / Respiratory Sensitization: No validated skin sensitization studies (e.g., OECD TG 429, 442A-C) or respiratory sensitization data for Tesamorelin have been identified in authoritative sources. Anti-tesamorelin antibody formation has been observed in clinical use (FDA EGRIFTA prescribing information, NDA 022505), and hypersensitivity reactions including rash and urticaria have been reported; these clinical observations do not constitute a GHS classification. Not classified for skin or respiratory sensitization based on currently available data; hazards cannot be excluded. As with other proteinaceous active pharmaceutical ingredients, treat as a potential sensitizer and avoid inhalation of dust/aerosols and skin contact.

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: Tesamorelin is not listed by IARC, NTP (Report on Carcinogens), OSHA (29 CFR 1910.1003), or ACGIH as a carcinogen. According to the FDA pharmacology review and EGRIFTA prescribing information (NDA 022505), life-time carcinogenicity studies in rodents have not been conducted with tesamorelin acetate; therefore a definitive carcinogenicity conclusion cannot be drawn. Not classified for carcinogenicity based on currently available data; hazards cannot be excluded.

Reproductive Toxicity: According to the FDA EGRIFTA prescribing information (NDA 022505), administration of tesamorelin acetate to rats during organogenesis resulted in findings warranting caution in pregnancy; no effect on fertility was observed in male or female rats at doses up to 0.6 mg/kg (approximately equal to clinical exposure) administered for 28 days (males) or 14 days (females). Findings in a 26-week rat toxicity study were reported in females at approximately 16 and 25 times the clinical dose. Germ cell mutagenicity testing reported in the FDA pharmacology review was negative in the bacterial reverse mutation (Ames) assay, in vitro mammalian cell gene mutation assay (CHO-K1 cells), and the in vivo mouse bone marrow micronucleus/chromosomal damage assay. Not classified for reproductive toxicity or germ cell mutagenicity based on currently available data; hazards cannot be excluded.

Specific Target Organ Toxicity (STOT): STOT - Single Exposure (STOT-SE): No data from validated single-exposure target-organ toxicity studies for Tesamorelin have been located in authoritative sources. Not classified for STOT-SE based on currently available data; hazards cannot be excluded. STOT - Repeated Exposure (STOT-RE): Repeat-dose toxicity studies summarized in the FDA pharmacology review for tesamorelin acetate (NDA 022505), including a 26-week rat study, identified treatment-related findings at multiples of the clinical exposure; these were considered consistent with exaggerated pharmacology rather than discrete target-organ toxicity meeting GHS STOT-RE criteria. Not classified for STOT-RE based on currently available data; hazards cannot be excluded. The toxicological profile of this substance is not fully characterized; minimize repeated occupational exposure.

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) have been identified in authoritative sources (ECHA, EPA, PubChem, peer-reviewed literature) for tesamorelin (CAS 218949-48-5). Not classified as hazardous to the aquatic environment under GHS based on a weight-of-evidence assessment in the absence of authoritative experimental data. Tesamorelin is a synthetic 44-amino-acid polypeptide analog of human growth hormone-releasing hormone (GHRH); large, hydrophilic polypeptides of this type are generally expected to have low acute aquatic toxicity, but this has not been experimentally verified for this substance. Prevent release to the environment, surface waters, and sewers where reasonably practicable.

Persistence and Degradability: No substance-specific ready biodegradability (OECD 301 series) or simulation test data have been identified in authoritative regulatory databases for tesamorelin. As a 44-residue polypeptide composed of natural and modified L-amino acids linked by peptide bonds, the substance is expected to undergo enzymatic and hydrolytic degradation (proteolysis) in biological and environmental matrices, but no authoritative experimental half-life values in water, soil, or sediment have been identified.

Bioaccumulative Potential: No experimental bioconcentration factor (BCF) or measured log Kow has been identified in authoritative sources for tesamorelin. Given the very high molecular weight (5136 g/mol), large polar surface area, multiple ionizable groups, and high hydrophilicity characteristic of a 44-amino-acid polypeptide, significant bioaccumulation in aquatic organisms is not anticipated; however, this has not been confirmed by substance-specific experimental study.

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

Document ID	baa2e317-663a-4e1b-b7d6-654f45a19273
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).