CAS: 2381089-83-2

Formula: C221H342N46O68

Document ID: f4237b87
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Version: 1.0

Section 1 — Product and Company Identification

Product Name	CAS: 2381089-83-2
Synonyms	Triple G; orb1981169; EX-A7826E
CAS Number	*Not determined*
Molecular Formula	C221H342N46O68
IUPAC Name	20-[[(1S)-4-[2-[2-[2-[[(5S)-5-[[(2S)-6-amino-2-[[(2S)-2-[[(2S)-2-[[(2R)-2-[[(3S)-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2S,3R)-2-[[(2S)-2-[[(2S,3R)-2-[[2-[[(2S)-5-amino-2-[[2-[[(2S)-2-amino-3-(4-hydroxyphenyl)propanoyl]amino]-2-methylpropanoyl]amino]-5-oxopentanoyl]amino]acetyl]amino]-3-hydroxybutanoyl]amino]-3-phenylpropanoyl]amino]-3-hydroxybutanoyl]amino]-3-hydroxypropanoyl]amino]-3-carboxypropanoyl]amino]-3-(4-hydroxyphenyl)propanoyl]amino]-3-hydroxypropanoyl]amino]-3-methylpentanoyl]amino]-2,4-dimethylpentanoyl]amino]-4-methylpentanoyl]amino]-3-carboxypropanoyl]amino]hexanoyl]amino]-6-[[(2S)-1-[[(2S)-5-amino-1-[[1-[[(2S)-1-[[(2S)-1-[[(3S)-1-[[(2S)-1-[[(2S)-1-[[(2S)-1-[[(2S)-1-[[2-[[2-[[(2S)-2-[[(2S)-1-[[(2S)-1-[[2-[[(2S)-1-[(2S)-2-[(2S)-2-[(2S)-2-[[(2S)-1-amino-3-hydroxy-1-oxopropan-2-yl]carbamoyl]pyrrolidine-1-carbonyl]pyrrolidine-1-carbonyl]pyrrolidin-1-yl]-1-oxopropan-2-yl]amino]-2-oxoethyl]amino]-3-hydroxy-1-oxopropan-2-yl]amino]-3-hydroxy-1-oxopropan-2-yl]carbamoyl]pyrrolidin-1-yl]-2-oxoethyl]amino]-2-oxoethyl]amino]-4-carboxy-1-oxobutan-2-yl]amino]-4-methyl-1-oxopentan-2-yl]amino]-4-methyl-1-oxopentan-2-yl]amino]-3-(4-hydroxyphenyl)-1-oxopropan-2-yl]amino]-4-ca… [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
CAS: 2381089-83-2	Not determined	C221H342N46O68	4731 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 Triple G (PubChem CID 171390338; C221H342N46O68; MW 4731) only in a properly ventilated laboratory under the protective work practices required by 29 CFR 1910.1450 (Occupational Exposure to Hazardous Chemicals in Laboratories) and the general duties of 29 CFR 1910.1200 (Hazard Communication). Because this is a high--molecular-weight peptide of unknown toxicity, treat it as a potentially bioactive substance and apply prudent practices for substances of unknown hazard as described in the NRC publication 'Prudent Practices in the Laboratory' (NIH/CDC reference). Use engineering controls (chemical fume hood, ventilated balance enclosure, or HEPA-filtered glove box) when weighing or otherwise manipulating the dry solid to avoid generating airborne dust, in accordance with the NIOSH hierarchy of controls. Wear appropriate personal protective equipment as specified in Section 8: chemical-resistant nitrile gloves, ANSI Z87.1-compliant safety eyewear, and a buttoned lab coat; if dust or aerosols cannot be controlled by ventilation, use a NIOSH-approved particulate respirator (e.g., N95 or higher) selected under a written respiratory protection program (29 CFR 1910.134). Peptides of this class are typically hygroscopic (Bachem peptide handling guidance); allow sealed containers to warm to ambient temperature inside a desiccator before opening to minimize moisture uptake, and reseal promptly under dry inert atmosphere where practical. Avoid generating dust, mist, or aerosols. Do not eat, drink, smoke, or apply cosmetics in areas where the substance is handled, and wash hands and exposed skin thoroughly with soap and water after handling, before breaks, and before leaving the work area (29 CFR 1910.141). Avoid contact with eyes, skin, and clothing, and avoid inhalation and ingestion. Use clean, dedicated labware to prevent cross-contamination. Promptly clean up any spills using HEPA vacuuming or damp wiping (do not dry-sweep) and decontaminate work surfaces after use.

Storage Conditions

Store the lyophilized solid in its original tightly closed container, protected from light, moisture, and air. Recommended storage for lyophilized peptides of this type is at or below -20 degC in a sealed, desiccated container, with -80 degC suitable for long-term archival storage; these conditions are consistent with general peptide handling guidance published by Bachem and applied across the research-peptide community. Keep the container in a dry, well-ventilated location away from direct sunlight, heat sources, and ignition sources. Do not store with food, beverages, or animal feed. Aliquot before freezing where feasible and minimize freeze-thaw cycles; reconstituted solutions should be stored separately according to the solvent system used and should not generally be re-frozen (per published peptide stability guidance). Use secondary containment and store in a manner consistent with 29 CFR 1910.1450 chemical hygiene plan requirements. No specific shelf-life value has been established by an authoritative regulatory source for this compound; assign a documented expiration based on internal stability data or supplier certificate of analysis.

Incompatibilities

No incompatibility data for Triple G have been reported by an authoritative source (OSHA, NIOSH, EPA, ECHA, PubChem CID 171390338). On the basis of its peptide structure (numerous amide bonds, hydroxyl, amine, carboxyl, and phenolic functional groups), avoid contact with strong oxidizing agents, strong acids and strong bases (which can cause hydrolysis of peptide bonds and side-chain modification), strong reducing agents (which may reduce disulfide bonds if present), reactive electrophiles and alkylating agents, and heavy-metal ions that can catalyze oxidation. Protect from prolonged exposure to moisture, atmospheric oxygen, elevated temperatures, and ultraviolet light, all of which can promote hydrolytic and oxidative degradation of peptides. Keep away from incompatible materials, open flames, and ignition sources. Refer to Section 10 for additional stability and reactivity information.

Section 8 — Exposure Controls / Personal Protection

Exposure Limits

No regulatory occupational exposure limits (OEL) have been established by OSHA, ACGIH, NIOSH, or equivalent bodies. 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. Triple G (PubChem CID 171390338; molecular formula C221H342N46O68; MW ~ 4731 Da) is a high-molecular-weight synthetic peptide; handle as a potentially bioactive substance of unknown toxicity.

Engineering Controls

Use in accordance with OSHA 29 CFR 1910.1450 (laboratory standard) and the principles of prudent practice described by the NIOSH/CDC and the U.S. National Research Council's 'Prudent Practices in the Laboratory.' Weighing, dissolution, and other dust- or aerosol-generating operations should be performed inside a certified ventilated enclosure (chemical fume hood operated at face velocities specified by ANSI/AIHA Z9.5, ventilated balance enclosure, glove box, or Class II biological safety cabinet) so that airborne concentrations are kept as low as reasonably achievable. Provide local exhaust ventilation at points of potential release. An emergency eyewash and safety shower meeting ANSI/ISEA Z358.1 must be accessible within 10 seconds of the work area. Prohibit eating, drinking, smoking, and food storage in areas where the substance is handled. Decontaminate work surfaces and equipment after use; collect and dispose of all waste in accordance with applicable EPA and local regulations.

Personal Protective Equipment

Respiratory Protection: Where engineering controls (fume hood, ventilated enclosure, glove box) maintain airborne exposure at negligible levels, routine respiratory protection is not required. For operations outside containment that may generate dusts, aerosols, or mists (e.g., weighing of dry powder, lyophilization, sonication of solutions), use a NIOSH-approved (42 CFR Part 84) air-purifying respirator equipped with N95 or P100 particulate filters. For larger-scale handling, undefined airborne concentrations, or emergency response, use a NIOSH-approved powered air-purifying respirator (PAPR) or supplied-air respirator. Respirator selection, fit-testing, medical clearance, and use must comply with the OSHA Respiratory Protection Standard (29 CFR 1910.134).

Hand Protection: Wear chemically resistant, disposable nitrile gloves meeting EN 374 / ASTM F739 conforming to OSHA 29 CFR 1910.138. Because specific permeation/breakthrough data for Triple G are not available, use a double-glove technique for handling the dry powder or concentrated solutions and replace gloves immediately if contamination, tearing, or degradation is suspected. Wash hands thoroughly with soap and water after removing gloves. Dispose of used gloves as contaminated waste.

Eye / Face Protection: Wear ANSI/ISEA Z87.1-compliant chemical splash goggles when handling solutions, as required by OSHA 29 CFR 1910.133. A face shield worn over goggles is recommended when there is a risk of splashing, spraying, or release outside a fume hood. Contact lenses should not be relied upon as eye protection.

Skin Protection: Wear a long-sleeved laboratory coat or chemical-resistant gown that fully covers the arms and torso, full-length pants, and closed-toe chemical-resistant footwear, in accordance with OSHA 29 CFR 1910.132. For operations with a higher potential for skin contact (e.g., handling of bulk powder, spill response), wear a chemical-resistant apron or disposable coverall (e.g., Tyvek or equivalent). Remove and launder or dispose of contaminated clothing before reuse; do not take contaminated clothing home. Wash exposed skin thoroughly with soap and water after handling and before breaks.

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 and DMSO
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	4731 g/mol
Molecular Formula	C221H342N46O68

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 incompatibility data for Triple G have been reported by an authoritative source (OSHA, NIOSH, EPA, ECHA, PubChem CID 171390338). On the basis of its peptide structure (numerous amide bonds, hydroxyl, amine, carboxyl, and phenolic functional groups), avoid contact with strong oxidizing agents, strong acids and strong bases (which can cause hydrolysis of peptide bonds and side-chain modification), strong reducing agents (which may reduce disulfide bonds if present), reactive electrophiles and alkylating agents, and heavy-metal ions that can catalyze oxidation. Protect from prolonged exposure to moisture, atmospheric oxygen, elevated temperatures, and ultraviolet light, all of which can promote hydrolytic and oxidative degradation of peptides. Keep away from incompatible materials, open flames, and ignition sources. Refer to Section 10 for additional stability and reactivity information.
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 for Triple G (CID 171390338; C221H342N46O68; MW 4731) have not been fully characterized in authoritative regulatory databases (PubChem, ECHA, NIOSH, NTP). No species-specific LD50 or LC50 values from peer-reviewed primary literature or recognized regulatory bodies (OSHA, NIOSH, ECHA, EPA) have been identified for the oral, dermal, or inhalation routes. Based on currently available data, the substance is not classified for acute toxicity; however, hazards cannot be excluded (per GHS Rev.8 S1.3.2.4 weight-of-evidence). The material is a high-molecular-weight synthetic polypeptide supplied typically as a lyophilized solid; generation of inhalable dust or aerosols during weighing or reconstitution should be assumed to pose an inhalation hazard until characterized.

Skin Corrosion / Irritation: No experimental skin irritation or corrosion data for Triple G have been located in authoritative sources (ECHA dossier, PubChem, peer-reviewed literature). The substance is not classified for skin corrosion/irritation based on currently available data; hazards cannot be excluded (GHS Rev.8 S1.3.2.4). Direct skin contact with the solid or solutions should be avoided as a precaution.

Serious Eye Damage / Irritation: No experimental eye irritation or serious eye damage data for Triple G have been identified in authoritative sources (ECHA, PubChem, peer-reviewed literature). The substance is not classified for serious eye damage/eye irritation based on currently available data; hazards cannot be excluded (GHS Rev.8 S1.3.2.4). Particulate contact with the eye may cause mechanical irritation.

Skin / Respiratory Sensitization: No respiratory or skin sensitization studies (e.g., LLNA, guinea pig maximization, human repeat insult patch test) for Triple G have been identified in authoritative regulatory sources or the peer-reviewed literature. The substance is not classified for sensitization based on currently available data; hazards cannot be excluded (GHS Rev.8 S1.3.2.4). High-molecular-weight polypeptides administered or inhaled as protein aerosols are recognized in the occupational hygiene literature (NIOSH) as a class with potential to elicit respiratory sensitization; therefore inhalation of dust should be prevented as a precautionary measure.

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: Triple G is not listed as a carcinogen by IARC, the U.S. National Toxicology Program (NTP) Report on Carcinogens, OSHA (29 CFR 1910 Subpart Z), ACGIH, or the EU CLP harmonized classification list (Annex VI to Regulation (EC) 1272/2008). No long-term carcinogenicity bioassays have been identified in the peer-reviewed literature. The substance is not classified for carcinogenicity based on currently available data; carcinogenic hazard cannot be excluded in the absence of chronic studies (GHS Rev.8 S1.3.2.4).

Reproductive Toxicity: No reproductive toxicity, developmental toxicity, or fertility studies (OECD 414, 416, 421, 422) for Triple G have been identified in authoritative sources (ECHA, EPA, NTP) or the peer-reviewed literature. The substance is not listed on the EU CLP Annex VI harmonized list or on California Proposition 65 for reproductive toxicants. The substance is not classified for reproductive toxicity based on currently available data; hazards cannot be excluded (GHS Rev.8 S1.3.2.4).

Specific Target Organ Toxicity (STOT): No data from repeated-dose toxicity studies (OECD 407, 408, 411) or single-exposure target-organ studies meeting GHS criteria for STOT-SE or STOT-RE classification have been identified for Triple G in authoritative sources (ECHA, NTP, EPA) or the peer-reviewed literature. The substance is not classified for specific target organ toxicity (single or repeated exposure) based on currently available data; target-organ hazards cannot be excluded (GHS Rev.8 S1.3.2.4). The toxicological properties of this substance are not fully characterized.

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 for this compound in authoritative sources (ECHA, EPA ECOTOX, PubChem). Not classified as hazardous to the aquatic environment based on weight-of-evidence assessment in the absence of authoritative experimental data. The substance is a high-molecular-weight (~4731 g/mol) lipidated polypeptide; its large size and

polar/ionizable character suggest limited bioavailability to aquatic organisms, but this has not been experimentally confirmed. Avoid release to surface waters, drains, and the environment.

Persistence and Degradability: No substance-specific biodegradation studies (e.g., OECD 301 series) have been identified in authoritative sources. As a polypeptide composed exclusively of amide-linked amino acid residues with a fatty diacid substituent (molecular formula C221H342N46O68; C, H, N, O only), the substance is expected to undergo hydrolytic and enzymatic (proteolytic) degradation in environmental and biological compartments, although the presence of non-natural residues (e.g., alpha-aminoisobutyric acid) and the lipid moiety may slow proteolysis relative to native peptides. No definitive regulatory determination of environmental persistence has been identified.

Bioaccumulative Potential: No experimentally determined bioconcentration factor (BCF) or log Kow has been identified for this substance in authoritative databases (ECHA, PubChem, EPA). Given the very high molecular weight (~4731 g/mol), large molecular size, multiple ionizable groups, and high polarity characteristic of a 39-residue lipidated peptide, significant uptake across biological membranes and bioaccumulation in aquatic organisms is not expected (consistent with ECHA guidance that substances of this size are generally not bioavailable). No PBT or vPvB assessment from an authoritative source has been identified.

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	f4237b87-27da-43a2-9570-47a4851d8936
Revision Date	2026-08-07
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: 2026-08-07
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).