Minuteman Peptides, LLC

Tirzepatide

CAS: 2023788-19-2
Formula: C225H348N48O68

Document ID: 10c7a25a
Revision Date: 2026-07-18
Version: 1.0

Section 1 — Product and Company Identification

Product Name	Tirzepatide
Synonyms	Tirzepatide; AT40456; 2023788-19-2
CAS Number	2023788-19-2
Molecular Formula	C225H348N48O68
IUPAC Name	20-[[(1S)-4-[2-[2-[2-[2-[2-[2-[[(5S)-5-[[(2S)-5-amino-2-[[(2S)-2-[[(2S,3S)-2-[[(2S)-6-amino-2-[[(2S)-2-[[(2S)-2-[[2-[[(2S,3R)-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-[[(2R)-2-[[(2S,3R)-2-[[(2S)-2-[[(2S,3R)-2-[[2-[[(2S)-2-[[2-[[(2S)-2-amino-3-(4-hydroxyphenyl)propanoyl]amino]-2-methylpropanoyl]amino]-4-carboxybutanoyl]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-methylpropanoyl]amino]-4-methylpentanoyl]amino]-3-carboxypropanoyl]amino]hexanoyl]amino]-3-methylpentanoyl]amino]propanoyl]amino]-5-oxopentanoyl]amino]-6-[[(2S)-1-[[(2S)-1-[[(2S)-1-[[(2S)-5-amino-1-[[(2S)-1-[[(2S)-1-[[(2S,3S)-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]-1-oxopropan-2-yl]amino]-3-methyl-1-oxopentan-2-yl]amino]-4-methyl-1… [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	Minuteman Peptides, LLC
Address	53 Knox Trail, Suite 200, Acton, MA 01720, US
Phone	978-596-1533
Website	https://minutemanpeptides.com/
Emergency Contact	CHEMTREC
Emergency Phone	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/ week

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

Tirzepatide	2023788-19-2	C225H348N48O68	4813 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 as a potentially bioactive substance of unknown toxicity in accordance with OSHA HazCom 2012 (29 CFR 1910.1200) and general laboratory chemical hygiene principles (29 CFR 1910.1450). Use only in a well-ventilated area, preferably within a certified chemical fume hood, laminar-flow enclosure, or containment device (e.g., glove box or ventilated weighing balance) to minimize generation of airborne dust when weighing or transferring the lyophilized peptide powder. Employ engineering controls consistent with NIOSH guidance for handling powders of unknown toxicity and follow the ACGIH "hierarchy of controls." Wear appropriate personal protective equipment: chemical-resistant nitrile gloves, safety goggles or splash-proof glasses, and a lab coat; where dust exposure is possible, use an appropriate NIOSH-approved particulate respirator (e.g., N95 or P100) per 29 CFR 1910.134. Avoid inhalation, ingestion, and contact with skin, eyes, and clothing. Do not eat, drink, smoke, or apply cosmetics in work areas. Wash hands and exposed skin thoroughly after handling and before leaving the work area. Because the lyophilized peptide is hygroscopic, minimize exposure to atmospheric moisture by allowing sealed vials to equilibrate to room temperature before opening and by working quickly under a dry inert atmosphere (e.g., nitrogen or argon) when practical. Avoid generation of aerosols and static discharge. Decontaminate work surfaces and equipment after use; collect waste in labeled, closed containers for disposal in accordance with applicable federal, state, and local regulations.

Storage Conditions

Store the lyophilized solid tightly sealed in its original container under an inert atmosphere (nitrogen or argon recommended) in a cool, dry location protected from light, moisture, heat, and oxidizing conditions. Long-term storage of the neat powder is typically at -20 degC (or colder, e.g., -80 degC) in a non-frost-free freezer to avoid temperature cycling; refer to the certificate of analysis or manufacturer technical data sheet for lot-specific recommended storage temperature and retest date. Once reconstituted in aqueous or organic solvent, store at -80 degC or -20 degC in single-use aliquots to minimize repeated freeze-thaw cycles, which can accelerate peptide degradation. Allow containers to warm to room temperature before opening to prevent condensation of atmospheric moisture onto the hygroscopic solid. Keep containers clearly labeled per OSHA HazCom 2012 (29 CFR 1910.1200(f)) and segregated from incompatible materials and foodstuffs. Restrict access to trained personnel.

Incompatibilities

As a complex amide-bond-containing synthetic lipidated peptide, incompatibilities include strong oxidizing agents (which can oxidize methionine, tryptophan, and tyrosine residues), strong acids and strong bases (which can catalyze amide-bond hydrolysis and racemization), and strong electrophiles or alkylating agents. Avoid contact with moisture, elevated temperatures, direct sunlight/UV light, and proteolytic contamination, all of which can promote hydrolytic or oxidative degradation. Hazardous decomposition products upon thermal breakdown or combustion may include carbon monoxide, carbon dioxide, and nitrogen oxides (NOx). No specific incompatibility data for this substance are established in authoritative regulatory sources (OSHA, NIOSH, EPA, ECHA, PubChem); handle using conservative practices for peptide active pharmaceutical ingredients.

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. Handle as a potentially

bioactive substance of unknown toxicity; tirzepatide (CAS 2023788-19-2) is a high-molecular-weight synthetic peptide (C225H348N48O68, MW ~4813) for which no public regulatory airborne limit has been promulgated.

Engineering Controls

Use in a controlled laboratory or containment environment. Handle within a ventilated enclosure such as a certified Class II biological safety cabinet, ventilated balance enclosure, powder-weighing hood, or chemical fume hood capable of maintaining containment during weighing, transfer, and reconstitution. Where dust or aerosols may be generated (e.g., handling of dry lyophilized powder, sonication, or lyophilization), use local exhaust ventilation with HEPA filtration and, where feasible, closed-system transfer devices. General dilution ventilation is not a substitute for local exhaust. Provide accessible eyewash stations and emergency deluge showers in the work area per ANSI Z358.1. Prohibit eating, drinking, smoking, and cosmetic application in areas where the substance is handled. Decontaminate work surfaces after use and manage waste as pharmaceutically active material.

Personal Protective Equipment

Respiratory Protection: Under normal handling of solutions in a properly functioning containment enclosure, additional respiratory protection is generally not required. When engineering controls are inadequate, when handling open dry powder outside of containment, or when airborne exposure cannot otherwise be characterized, use a NIOSH-approved respirator selected in accordance with 29 CFR 1910.134 and OSHA's respiratory protection standard. A NIOSH-approved half-face or full-face air-purifying respirator with N100/P100 (HEPA) particulate filters is appropriate for particulate/aerosol exposure; for higher-risk operations with dry powder, a powered air-purifying respirator (PAPR) with HEPA filters or a supplied-air respirator may be warranted. Respirator use must be part of a written respiratory protection program including medical clearance, fit testing, and training.

Hand Protection: Wear chemically resistant, disposable gloves compliant with EN 374 / ASTM D6978. Nitrile gloves of at least 0.11 mm (4-5 mil) thickness are recommended; double-gloving is advised when handling dry powder or concentrated stocks. Inspect gloves before use, change immediately if punctured, torn, or contaminated, and dispose as contaminated pharmaceutical waste. Wash hands thoroughly with soap and water after removing gloves and before leaving the work area. Consult the glove manufacturer for permeation/breakthrough data appropriate to the actual solvent system in use.

Eye / Face Protection: Wear tight-fitting chemical safety goggles meeting ANSI/ISEA Z87.1 (or EN 166 equivalent) when handling powders, solutions, or when there is any potential for splash, aerosol, or eye contact. A full-face shield worn over goggles is recommended for operations with higher splash or aerosol potential (e.g., pouring, sonication, lyophilization opening, reconstitution of dry powder). Contact lenses should not be relied upon as eye protection.

Skin Protection: Wear a fully buttoned, chemically resistant laboratory coat or disposable impervious gown with long sleeves and knit cuffs, closed-toe chemical-resistant footwear, and full-length trousers. Sleeve covers should be used for operations with higher exposure potential. Remove and replace protective clothing immediately if contaminated; do not launder contaminated clothing with general laundry, and dispose of single-use garments as contaminated pharmaceutical waste. Bare skin, shorts, and open footwear are not permitted in areas where this substance is handled.

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 aqueous buffers; slightly soluble in 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	4813 g/mol
Molecular Formula	C225H348N48O68

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: As a complex amide-bond-containing synthetic lipidated peptide, incompatibilities include strong oxidizing agents (which can oxidize methionine, tryptophan, and tyrosine residues), strong acids and strong bases (which can catalyze amide-bond hydrolysis and racemization), and strong electrophiles or alkylating agents. Avoid contact with moisture, elevated temperatures, direct sunlight/UV light, and proteolytic contamination, all of which can promote hydrolytic or oxidative degradation. Hazardous decomposition products upon thermal breakdown or combustion may include carbon monoxide, carbon dioxide, and nitrogen oxides (NOx). No specific incompatibility data for this substance are established in authoritative regulatory sources (OSHA, NIOSH, EPA, ECHA, PubChem); handle using conservative practices for peptide active pharmaceutical ingredients.

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: No authoritative acute toxicity values (LD50/LC50) for tirzepatide (CAS 2023788-19-2) have been located in NIOSH, ECHA, or peer-reviewed literature; the acute toxicological profile is not fully characterized. Not classified based on currently available data; hazards cannot be excluded. In accordance with GHS Rev.8 Chapter 1.3.2.4, handle as a substance of unknown acute toxicity and minimize exposure by all routes (inhalation of dusts/-aerosols, dermal contact, ingestion). The FDA-approved prescribing information (MOUNJARO, accessdata.fda.gov, 2025) notes gastrointestinal effects (nausea, vomiting, diarrhea) as the most common systemic effects observed with parenteral clinical administration, and postmarketing reports of acute pancreatitis and acute kidney injury (some requiring hemodialysis, often secondary to volume depletion).

Skin Corrosion / Irritation: Specific skin irritation/corrosion data for tirzepatide are not available from ECHA, NIOSH, or peer-reviewed sources; this endpoint is not fully characterized. Not classified based on currently available data; hazards cannot be excluded. Injection-site reactions (erythema, pruritus) have been reported in clinical use per the FDA-approved label (MOUNJARO, accessdata.fda.gov). Avoid skin contact and use impervious gloves as a precaution.

Serious Eye Damage / Irritation: No authoritative eye irritation or serious eye damage data have been identified for tirzepatide in ECHA, NIOSH, or peer-reviewed literature; this endpoint is not fully characterized. Not classified based on currently available data; hazards cannot be excluded. Use eye protection to prevent mechanical or particulate contact.

Skin / Respiratory Sensitization: No standardized guideline studies (e.g., LLNA, GPMT) for skin or respiratory sensitization of tirzepatide have been identified in ECHA or peer-reviewed literature. However, the FDA-approved prescribing information (MOUNJARO, accessdata.fda.gov, 2025) documents postmarketing reports of serious hypersensitivity reactions, including anaphylaxis and angioedema, in patients receiving tirzepatide. Sensitization potential in an occupational setting is not fully characterized; hazards cannot be excluded. Handle to minimize inhalation and dermal exposure, particularly for individuals with a history of hypersensitivity to GLP-1 receptor agonists.

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: Tirzepatide is not listed by IARC, NTP (Report on Carcinogens), OSHA, or ACGIH as a carcinogen. However, the FDA-approved prescribing information (MOUNJARO, accessdata.fda.gov, 2025; DailyMed) carries a Boxed Warning stating that in a 2-year carcinogenicity study in rats, tirzepatide caused a dose-dependent and treatment-duration-dependent increase in the incidence of thyroid C-cell tumors (adenomas and carcinomas) in both sexes at clinically relevant exposures. Human relevance of these rodent findings could not be determined by clinical or nonclinical studies. Tirzepatide is contraindicated in patients with a personal or family history of medullary thyroid carcinoma (MTC) or Multiple Endocrine Neoplasia syndrome type 2 (MEN 2). Not classified under GHS based on currently available data; however, occupational carcinogenic hazard cannot be excluded and exposure should be minimized.

Reproductive Toxicity: The FDA-approved prescribing information for tirzepatide (MOUNJARO, accessdata.fda.gov, 2025) reports that in pregnant rats administered tirzepatide during organogenesis, fetal growth reductions and fetal abnormalities occurred at clinical exposures based on AUC in maternal animals; in pregnant rabbits, fetal abnormalities and increased postimplantation loss were observed at exposures below clinical exposure. The label notes evidence of teratogenicity, embryofetal toxicity, and abortion in animal reproduction studies. Occupational reproductive/developmental hazard cannot be excluded on the basis of these findings; pregnant or nursing workers should avoid exposure. Not classified under GHS based on currently available data, but hazards to reproduction and the developing fetus cannot be excluded per GHS Rev.8 weight-of-evidence guidance.

Specific Target Organ Toxicity (STOT): STOT-Single Exposure (STOT-SE): No authoritative data establishing a single-exposure target organ classification for tirzepatide have been identified; this endpoint is not fully characterized. Not classified based on currently available data; hazards cannot be excluded. STOT-Repeated Exposure (STOT-RE): Repeat-dose findings from rodent studies described in the FDA-approved prescribing information (MOUNJARO, accessdata.fda.gov, 2025) include thyroid C-cell proliferative changes in rats (addressed under Carcinogenicity). Postmarketing clinical experience identifies the pancreas (acute pancreatitis), gallbladder/biliary tract (cholelithiasis, cholecystitis), and kidney (acute kidney injury, often secondary to dehydration) as organs of concern following repeated parenteral administration. A formal STOT-RE classification is not established by an authoritative body; hazards from repeated occupational exposure cannot be excluded, and exposure should be minimized.

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 or terrestrial toxicity data (e.g., fish LC50, Daphnia EC50, algal ErC50) have been identified for tirzepatide (CAS 2023788-19-2) in authoritative sources including PubChem, ECHA, EPA ECOTOX, or peer-reviewed literature. 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. Tirzepatide is a high-molecular-weight (~4813 g/mol) synthetic lipidated peptide of pharmaceutical origin; environmental release should nonetheless be minimized. Prevent entry into drains, surface water, groundwater, and soil.

Persistence and Degradability: No substance-specific ready-biodegradability (e.g., OECD 301 series) or simulation test (OECD 307/308/309) data have been identified in authoritative sources for tirzepatide. Because tirzepatide contains a non-proteinogenic lipidated side chain (C20 diacid-gammaGlu-2xOEG linker attached to a modified peptide backbone containing alpha-aminoisobutyric acid residues) that is not composed exclusively of natural L-alpha-amino acids, class read-across to native peptides as "readily biodegradable" is not appropriate. Environmental persistence has not been experimentally established.

Bioaccumulative Potential: No experimentally determined log Kow, BCF, or BAF values from authoritative sources (PubChem, ECHA, EPA) have been identified for tirzepatide. Given its very high molecular weight (~4813 g/mol), large polar surface area, and multiple ionizable groups characteristic of a lipidated peptide, significant uptake across biological membranes and bioaccumulation in aquatic organisms would not be expected on physicochemical grounds; however, no substance-specific experimental bioaccumulation data are available to confirm this.

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	10c7a25a-df13-432c-905a-ba88cb8f3931
Revision Date	2026-07-18
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: 2026-07-18
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).