FOXO4-DRI

CAS: 2460055-10-9
Formula: C228H388N86O64

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Section 1 — Product and Company Identification

Product Name	FOXO4-DRI
Synonyms	FOXO4-DRI; FOXO4-DRI TFA salt form; 2460055-10-9
CAS Number	2460055-10-9
Molecular Formula	C228H388N86O64
IUPAC Name	(4R)-5-[[(2R)-1-[[(2R)-1-[[(2R)-1-[[(2R)-5-amino-1-[[(2R)-4-amino-1-[[2-[[(2R)-1-[[(2R)-1-[[(2R)-4-amino-1-[[(2R)-1-[[(2R)-1-[[(2R)-1-[[2-[[2-[[(2R)-6-amino-1-[[(2R)-1-[(2R)-2-[(2R)-2-[(2R)-2-[[(2R)-1-[[(2R)-1-[[(2R)-1-[[(2R)-5-amino-1-[[(2R)-1-[[(2R)-1-[[(2R)-6-amino-1-[[(2R)-6-amino-1-[[(2R)-5-carbamimidamido-1-(carboxymethylamino)-1-oxopentan-2-yl]amino]-1-oxohexan-2-yl]amino]-1-oxohexan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]amino]-1,5-dioxopentan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]carbamoyl]pyrrolidine-1-carbonyl]pyrrolidine-1-carbonyl]pyrrolidin-1-yl]-5-carbamimidamido-1-oxopentan-2-yl]amino]-1-oxohexan-2-yl]amino]-2-oxoethyl]amino]-2-oxoethyl]amino]-3-hydroxy-1-oxopropan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]amino]-5-carbamimidamido-1-oxopentan-2-yl]amino]-1,4-dioxobutan-2-yl]amino]-1-oxopropan-2-yl]amino]-3-(1H-indol-3-yl)-1-oxopropan-2-yl]amino]-2-oxoethyl]amino]-1,4-dioxobutan-2-yl]amino]-1,5-dioxopentan-2-yl]amino]-3-hydroxy-1-oxopropan-2-yl]amino]-3-(4-hydroxyphenyl)-1-oxopropan-2-yl]amino]-1-oxopropan-2-yl]amino]-4-[… [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
FOXO4-DRI	2460055-10-9	C228H388N86O64	5358 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 FOXO4-DRI (CAS 2460055-10-9) as a potentially bioactive research peptide of unknown toxicity in accordance with OSHA Laboratory Standard (29 CFR 1910.1450) and HazCom 2012 (29 CFR 1910.1200). Manipulate only in a well-ventilated area, preferably within a certified chemical fume hood or, when weighing dry lyophilized powder, in a ventilated balance enclosure or Class I/II biosafety cabinet to minimize the generation and inhalation of airborne particulates. Wear appropriate personal protective equipment consistent with OSHA 29 CFR 1910.132-1910.138: chemical-resistant nitrile gloves, a buttoned laboratory coat, and ANSI Z87.1-compliant safety glasses or chemical splash goggles. Use NIOSH-approved respiratory protection (e.g., N95 or higher) if dust or aerosols cannot be adequately controlled by engineering means. Because this compound is a synthetic D-retro-inverso peptide typically supplied as a trifluoroacetate (TFA) salt, avoid skin contact, ingestion, and inhalation; do not eat, drink, smoke, or apply cosmetics in areas where the material is handled. Warm vials to room temperature in a sealed container before opening to prevent condensation of atmospheric moisture onto the hygroscopic lyophilized powder. Prepare stock solutions in freshly opened, low-endotoxin solvent, and minimize dust generation during weighing. Wash hands and exposed skin thoroughly with soap and water immediately after handling and before leaving the work area. Follow good laboratory practices per OSHA and the NRC 'Prudent Practices in the Laboratory,' and dispose of waste in accordance with EPA RCRA (40 CFR 260-273) and applicable state/local regulations.

Storage Conditions

Store the lyophilized (dry) powder tightly sealed in the original container under an inert atmosphere (e.g., argon or nitrogen headspace) where practical, protected from light, moisture, and heat. Recommended long-term storage of the dry peptide is at -20 degC or colder in a dedicated, non-frost-free freezer; short-term storage (days to a few weeks) at 2-8 degC is acceptable if the container remains sealed and desiccated. Use desiccant in the storage vessel to control humidity, as TFA-salt peptides are hygroscopic. After reconstitution, aliquot solutions into single-use portions and store at 2-8 degC for short-term use or at -20 degC (or colder) for longer-term storage; avoid repeated freeze-thaw cycles, which can degrade peptide integrity. Keep containers clearly labeled per HazCom 2012 (29 CFR 1910.1200(f)) with product identifier and hazard information, and segregate from incompatible materials (see below). Do not store near foodstuffs, in break rooms, or in refrigerators used for food or beverages. Maintain an inventory and secure access consistent with institutional chemical hygiene plans.

Incompatibilities

As a peptidic material supplied as a trifluoroacetate salt, FOXO4-DRI should be kept away from strong oxidizing agents (e.g., peroxides, hypochlorites, permanganates, nitric acid, chromates), strong reducing agents, strong acids and strong bases, all of which can promote hydrolysis, oxidation of susceptible residues (e.g., methionine, cysteine, tryptophan), racemization, or vigorous decomposition. Avoid contact with electrophilic reagents, aldehydes, and alkylating agents that can modify amine, thiol, or hydroxyl side chains. Protect from moisture, elevated temperatures, direct sunlight, and UV light, which accelerate hydrolytic and oxidative degradation of peptides. Incompatible container materials include reactive metals and unlined light metals; use inert glass or chemically resistant polymer (e.g., polypropylene) vials with tight closures. No specific reactivity data for CAS 2460055-10-9 have been published by OSHA, NIOSH, EPA, ECHA, or PubChem; the guidance above reflects general handling precautions for synthetic peptide TFA salts of unknown toxicological profile.

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. FOXO4-DRI (CAS 2460055-10-9) is a synthetic D-retro-inverso peptide (C228H388N86O64; MW ~ 5358 g/mol) supplied for research use only and should be handled as a potentially bioactive substance of unknown toxicity. In the absence of a published OEL, a control-banding approach consistent with NIOSH guidance (see CDC/NIOSH 'Control Banding') and pharmaceutical-industry practice for potent research peptides is recommended.

Engineering Controls

Handle only in a designated area with restricted access. Use local exhaust ventilation and dispense/weigh the neat solid inside a ventilated enclosure such as a Class I or Class II biosafety cabinet, a laboratory fume hood with an average face velocity of 80-120 fpm (per ANSI/AIHA Z9.5 and OSHA 29 CFR 1910.1450), a ventilated balance enclosure, or a containment isolator/glovebox. Where healthcare-setting use is applicable, follow USP <800> and NIOSH containment guidance for handling potentially hazardous drugs (NIOSH Publication No. 2004-165). Avoid generating dust or aerosols; prefer closed-system transfers and pre-weighed aliquots or solutions to minimize powder handling. Provide readily accessible eyewash stations and safety showers in the work area (29 CFR 1910.151(c)). Maintain the work area under negative pressure relative to adjacent spaces where feasible, and do not recirculate exhaust air. Prohibit eating, drinking, smoking, and cosmetic application in areas where the substance is handled (29 CFR 1910.1200).

Personal Protective Equipment

Respiratory Protection: Under normal laboratory conditions using proper engineering controls (fume hood, biosafety cabinet, or ventilated balance enclosure), routine respiratory protection is not required. If the substance must be weighed, transferred, or otherwise handled outside of containment such that airborne particulates may be generated, wear a NIOSH-approved (42 CFR Part 84) air-purifying respirator with an N100/P100 particulate filter, or a powered air-purifying respirator (PAPR) with HEPA filters for higher-exposure operations. Respirator use must be implemented under a written respiratory protection program meeting OSHA 29 CFR 1910.134, including medical clearance, fit testing, and training.

Hand Protection: Wear chemically resistant, powder-free disposable gloves selected in accordance with EN 374 / ASTM D6978 (the ASTM standard for chemotherapy-drug permeation testing is appropriate for potent bioactive research compounds). Double-gloving with nitrile examination gloves (minimum 4 mil / 0.1 mm thickness) is recommended, consistent with NIOSH and USP <800> recommendations for handling hazardous drugs. Inspect gloves before use; change immediately if torn, punctured, or contaminated, and at least every 30 minutes when handling the neat material or concentrated solutions. Remove gloves without touching the outer surface and wash hands thoroughly with soap and water after removal (29 CFR 1910.132).

Eye / Face Protection: Wear tightly fitting safety glasses with side shields meeting ANSI/ISEA Z87.1 as a minimum. For any operation with splash, aerosol, or dust potential (e.g., reconstitution, sonication, vortexing, open transfers of powder), wear indirectly vented chemical splash goggles meeting ANSI/ISEA Z87.1-D3, and add a full-face shield (Z87.1-rated) worn over the goggles for higher-risk operations. Contact lenses should not be relied upon as eye protection. Eye protection is required under OSHA 29 CFR 1910.133.

Skin Protection: Wear a fluid-resistant, disposable laboratory coat or chemotherapy-type gown with long sleeves and knit or elastic cuffs, closed in the back, consistent with NIOSH recommendations for handling hazardous drugs and USP <800>. The gown should be constructed of a low-permeability, lint-free material and should not be worn outside the designated work area. Wear full-length trousers and closed-toe, impermeable footwear; add disposable shoe covers for operations with spill or contamination potential. For operations with significant splash or bulk handling potential, wear a chemical-resistant apron over the gown. Remove and dispose of contaminated PPE as hazardous waste in accordance with 29 CFR 1910.132 and applicable EPA/state waste regulations, and wash exposed skin immediately with soap and water. Do not launder disposable garments for reuse.

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	5358 g/mol
Molecular Formula	C228H388N86O64

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 peptidic material supplied as a trifluoroacetate salt, FOXO4-DRI should be kept away from strong oxidizing agents (e.g., peroxides, hypochlorites, permanganates, nitric acid, chromates), strong reducing agents, strong acids and strong bases, all of which can promote hydrolysis, oxidation of susceptible residues (e.g., methionine, cysteine, tryptophan), racemization, or vigorous decomposition. Avoid contact with electrophilic reagents, aldehydes, and alkylating agents that can modify amine, thiol, or hydroxyl side chains. Protect from moisture, elevated temperatures, direct sunlight, and UV light, which accelerate hydrolytic and oxidative degradation of peptides. Incompatible container materials include reactive metals and unlined light metals; use inert glass or chemically resistant polymer (e.g., polypropylene) vials with tight closures. No specific reactivity data for CAS 2460055-10-9 have been published by OSHA, NIOSH, EPA, ECHA, or PubChem; the guidance above reflects general handling precautions for synthetic peptide TFA salts of unknown toxicological profile.

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 FOXO4-DRI (CAS 2460055-10-9) in humans or laboratory animals have not been located in authoritative regulatory sources (OSHA, NIOSH, NTP, ECHA, IARC) or in PubChem (CID 167312269) at the time of preparation. No LD50 or LC50 values from peer-reviewed literature meeting SDS citation criteria are available. The toxicological profile of this substance is not fully characterized. Not classified for acute oral, dermal, or inhalation toxicity based on currently available data; hazards cannot be excluded. Handle in accordance with good industrial hygiene and safety practice, treating the material as potentially hazardous.

Skin Corrosion / Irritation: No experimental skin irritation or corrosion data specific to FOXO4-DRI (CAS 2460055-10-9) are available in authoritative sources (ECHA, NIOSH, PubChem CID 167312269) or in the peer-reviewed literature. Not classified for skin corrosion/irritation based on currently available data; hazards cannot be excluded. The substance may cause mechanical irritation from dust contact. Avoid skin contact and use appropriate personal protective equipment as described in Section 8.

Serious Eye Damage / Irritation: No experimental eye irritation or serious eye damage data specific to FOXO4-DRI (CAS 2460055-10-9) are available in authoritative sources (ECHA, NIOSH, PubChem CID 167312269) or in the peer-reviewed literature. Not classified for serious eye damage/eye irritation based on currently available data; hazards cannot be excluded. Dust or solutions may cause mechanical or transient irritation on contact with the eyes. Use eye protection as specified in Section 8.

Skin / Respiratory Sensitization: No respiratory or skin sensitization studies for FOXO4-DRI (CAS 2460055-10-9) have been identified in ECHA, NIOSH, NTP, or PubChem (CID 167312269) records, and no case reports of sensitization have been published in the peer-reviewed literature. Not classified for respiratory or skin sensitization based on currently available data; hazards cannot be excluded. As a high molecular weight (5358 g/mol) polyamide substance, the potential to elicit immune-mediated responses following repeated exposure cannot be ruled out; minimize exposure.

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

Carcinogenicity: FOXO4-DRI (CAS 2460055-10-9) is not listed as a carcinogen or suspected carcinogen by IARC, the U.S. National Toxicology Program (NTP) Report on Carcinogens, OSHA (29 CFR 1910.1200 Subpart Z), the U.S. EPA IRIS database, or the ACGIH TLV list. No carcinogenicity bioassays for this substance have been located in the peer-reviewed literature. Not classified for carcinogenicity based on currently available data; hazards cannot be excluded due to the absence of long-term studies.

Reproductive Toxicity: No reproductive toxicity, developmental toxicity, or fertility studies for FOXO4-DRI (CAS 2460055-10-9) have been identified in ECHA registration dossiers, NTP monographs, U.S. EPA IRIS, or the peer-reviewed literature. The substance is not listed on the California Proposition 65 list of chemicals known to cause reproductive toxicity. Not classified for reproductive toxicity or effects on or via lactation based on currently available data; hazards cannot be excluded due to the absence of standard OECD guideline studies.

Specific Target Organ Toxicity (STOT): No specific target organ toxicity has been established for FOXO4-DRI (CAS 2460055-10-9) following single exposure (STOT-SE) or repeated exposure (STOT-RE). No subacute, subchronic, or chronic toxicity studies conducted according to OECD Test Guidelines have been identified in authoritative regulatory sources (ECHA, NIOSH, NTP, U.S. EPA) or in the peer-reviewed literature, and no occupational exposure limits have been established by OSHA, NIOSH, or ACGIH. The toxicological properties of this substance are not fully characterized. Not classified for STOT-SE or STOT-RE based on currently available data; target organ hazards cannot be excluded.

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 FOXO4-DRI (CAS 2460055-10-9) in authoritative databases (ECHA, EPA ECOTOX, PubChem) at the time of preparation. The substance is not listed on the ECHA Candidate List or classified for aquatic hazard under CLP. Not classified as hazardous to the aquatic environment based on weight-of-evidence assessment (no authoritative experimental data identified). Given the very high molecular weight (~5358 g/mol) and highly polar, ionizable polyamide backbone, significant partitioning into aquatic organisms is not anticipated, but this has not been experimentally verified. Release to surface water, drains, or the environment should be avoided.

Persistence and Degradability: No substance-specific experimental biodegradation studies (e.g., OECD 301 series ready biodegradability, OECD 302, or simulation testing) have been identified for this substance in authoritative sources. As FOXO4-DRI is a D-retro-inverso peptide composed entirely of D-amino acids, it is designed to resist proteolytic degradation by natural L-amino-acid-specific peptidases; therefore, standard read-across from L-peptide biodegradability cannot be assumed and environmental half-life has not been established. No authoritative data on abiotic hydrolysis or photodegradation identified.

Bioaccumulative Potential: No experimentally determined log Kow (octanol/water partition coefficient), BCF, or BAF values have been identified in authoritative sources for FOXO4-DRI. The substance has a high molecular weight (~5358 g/mol), well above the 700 g/mol threshold above which passive membrane permeation is generally limited, and contains numerous ionizable and hydrogen-bonding groups that favor the aqueous phase. On this basis, significant bioaccumulation potential is not expected; however, this is a weight-of-evidence assessment and no substance-specific experimental data have 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	85c1bdf7-855f-4fba-a547-7cdb7a64da29
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).