



GHS / OSHA HazCom 2012 Compliant

TB-4 (TB500)

CAS: 77591-33-4

Formula: C₂₁₂H₃₅₀N₅₆O₇₈S

Document ID: 72264e2a

Revision Date: 2026-08-02

Version: 1.0

Section 1 — Product and Company Identification

Truncated — full value in PDF metadata
Research laboratory chemical for in vitro

Restriction on Use	Not for human or veterinary use. Not for food, drug, cosmetic, household, agricultural, clinical, therapeutic, or diagnostic applications.
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Manufacturer / Supplier

Company	Lab Rats Collective
Address	5900 Balcones Dr, Ste 100, Austin, TX 78731, US
Phone	9728370284
Website	https://labratsco.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
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TB-4 (TB500)	77591-33-4	C212H350N56O78S	4963 g/mol	>98% (research grade)
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Impurities

No hazardous impurities known to be present above the GHS classification thresholds specified in 29 CFR 1910.1200 Appendix A. Residual synthesis reagents, solvents, and counter-ions may be present at levels consistent with research-grade (>98% purity) material. Balance: non-hazardous impurities. Refer to the accompanying Certificate of Analysis (CoA) for the lot-specific impurity profile.

Section 4 — First Aid Measures

Eye Contact

Rinse cautiously with water for several minutes. If irritation persists, seek medical advice.

Skin Contact

Wash with soap and water. Remove contaminated clothing and wash before reuse. If irritation persists, seek medical advice.

Inhalation

Move affected person to fresh air. If symptoms develop, seek medical advice.

Ingestion

Rinse mouth thoroughly with water. If large amounts are swallowed or if symptoms develop, seek medical advice. Do not induce vomiting unless directed by medical personnel.

Note to Physician

Treat symptomatically. No specific antidote known.

Section 5 — Fire Fighting Measures

Flash Point: *Not determined*

Suitable Extinguishing Media

Use extinguishing media appropriate to the surrounding fire conditions. Carbon dioxide (CO₂), dry chemical powder, foam, or water spray.

Special Hazards

May produce toxic gases upon combustion. Carbon monoxide and other combustion products may be generated.

Protective Equipment for Firefighters

Wear self-contained breathing apparatus (SCBA) and full protective gear. Do not enter fire area without proper protective equipment.

Section 6 — Accidental Release Measures

Personal Precautions

Avoid dust formation. Avoid breathing vapors, mist, or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. Use personal protective equipment as described in Section 8.

Environmental Precautions

Prevent further leakage or spillage if safe to do so. Do not allow the product to enter drains, sewers, or waterways.

Containment and Cleanup

Sweep up and shovel. Keep in suitable, closed containers for disposal. Avoid raising dust. Clean contaminated surface thoroughly. Dispose of waste in accordance with local regulations (see Section 13).

Section 7 — Handling and Storage

Handling Precautions

Handle in accordance with good industrial hygiene and laboratory safety practices as set out in the OSHA Laboratory Standard (29 CFR 1910.1450) and the OSHA Hazard Communication Standard (29 CFR 1910.1200). Because comprehensive toxicological data for this synthetic peptide are not available, treat it as a potentially bioactive substance of unknown toxicity and minimize all routes of exposure (inhalation, skin/eye contact, ingestion). Weigh, transfer, and reconstitute the lyophilized solid in a ventilated enclosure (chemical fume hood, ducted balance enclosure, or Class II biosafety cabinet) to control airborne particulates, in accordance with the NIOSH Current Intelligence Bulletin on the hierarchy of controls and NIOSH guidance for handling powders of unknown toxicity. Wear appropriate personal protective equipment: chemical-resistant nitrile gloves (selected per ASTM D6978 / 29 CFR 1910.138), a lab coat, and ANSI Z87.1-compliant safety eyewear; use a NIOSH-approved N95 or higher-rated particulate respirator (per 29 CFR 1910.134) if engineering controls do not adequately control airborne dust during weighing of the dry peptide. Avoid generation of dust and aerosols. Do not eat, drink, smoke, or apply cosmetics in areas where the substance is handled (29 CFR 1910.141 and 1910.1450). Wash hands and exposed skin thoroughly after handling and before breaks. Ground and bond containers when transferring to prevent electrostatic discharge with the dry solid. Keep containers tightly closed when not in use to protect the hygroscopic peptide from moisture, and allow sealed containers to warm to room temperature before opening to prevent condensation on the product.

Storage Conditions

Store the lyophilized solid tightly sealed in the original container, protected from light, moisture, and air, in a cool, dry, well-ventilated area consistent with 29 CFR 1910.1450 laboratory chemical storage requirements. For long-term storage of the dry peptide, keep desiccated at -20 degC or below; short-term storage at 2-8 degC is acceptable for working quantities. After reconstitution in aqueous solution, store refrigerated at 2-8 degC for short-term use and at ≤ -20 degC for longer-term storage; avoid repeated freeze/thaw cycles, which can promote peptide aggregation and degradation. Do not store above the manufacturer's stated stability temperature. Keep away from heat, direct sunlight, ignition sources, and incompatible materials (see below). Segregate from foodstuffs and from strong oxidizers. Storage areas should be equipped with secondary containment and access should be restricted to trained personnel. No specific OSHA PEL, NIOSH REL, or ACGIH TLV has been established for this substance.

Incompatibilities

Strong oxidizing agents (which can oxidize the methionine and other susceptible residues in the peptide backbone), strong acids and strong bases (which can hydrolyze peptide bonds), strong reducing agents, and proteolytic enzymes. Moisture and elevated temperatures will accelerate hydrolytic and oxidative degradation of the peptide. Prolonged exposure to light and air should also be avoided. No hazardous polymerization is expected. Hazardous decomposition products under fire conditions may include carbon oxides (CO, CO₂), nitrogen oxides (NO), and sulfur oxides (SO).

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.

Engineering Controls

Handle as a potentially bioactive substance of unknown toxicity. Use in a laboratory setting with adequate general and local exhaust ventilation. Weighing, transfer, and reconstitution of the dry peptide (which can generate fine, respirable dust) should be performed inside a certified chemical fume hood, ventilated balance enclosure, or Class I/II biosafety cabinet to prevent inhalation and dispersion of aerosols. Provide readily accessible emergency eyewash stations and safety showers in the work area, in accordance with ANSI/ISEA Z358.1. Maintain good industrial hygiene practices: no eating, drinking, smoking, or storage of food in areas where the substance is handled (29 CFR 1910.141). Wash hands and exposed skin thoroughly after handling. Contain and manage spills to prevent environmental release.

Personal Protective Equipment

Respiratory Protection: Under normal laboratory use within a properly functioning fume hood or biosafety cabinet, no respirator is required. If handling of dry powder occurs outside of containment, or if airborne dust, mist, or aerosols may be generated, wear a NIOSH-approved (42 CFR Part 84) air-purifying respirator equipped with N100 (or P100) particulate filters. Respirator selection, fit-testing, and use must comply with the OSHA Respiratory Protection Standard (29 CFR 1910.134). For higher-exposure operations or unknown airborne concentrations, use a powered air-purifying respirator (PAPR) with HEPA filters.

Hand Protection: Wear chemically resistant, disposable protective gloves conforming to EN ISO 374 / ANSI-ISEA 105. Nitrile rubber gloves (minimum thickness ≥ 0.11 mm) are generally suitable for handling aqueous solutions of peptides in a research laboratory. Double-gloving is recommended when handling the neat solid. No specific breakthrough data are available for this peptide; inspect gloves before use, replace immediately if contamination, degradation, or puncture is suspected, and follow the manufacturer's stated breakthrough time. Remove gloves without contaminating skin and wash hands thoroughly afterward.

Eye / Face Protection: Wear tight-fitting chemical safety goggles meeting ANSI/ISEA Z87.1 (or EN 166 in the EU) whenever there is potential for eye contact with powder, solutions, or splashes. A full-face shield worn over safety goggles is recommended for operations with a higher splash potential or when handling larger quantities.

Skin Protection: Wear a fastened, chemically resistant laboratory coat with long sleeves, full-length trousers, and closed-toe, non-absorbent footwear. Use disposable sleeve covers or a chemical-resistant apron when handling bulk quantities or during operations with a potential for splash. Remove and launder contaminated clothing before reuse; discard heavily contaminated disposable garments as chemical/biological waste in accordance with institutional and EPA/RCRA requirements. Do not wear contaminated clothing outside the work area.

Section 9 — Physical and Chemical Properties

Physical State	Solid (research-grade lyophilised powder or crystalline solid)
Appearance	White lyophilized powder
Odor	Odorless
Odor Threshold	Not available.
Boiling Point	<i>Not determined</i>
Melting Point	<i>Not determined</i>
Flash Point	<i>Not determined</i>
Auto-ignition Temperature	No data available.
Decomposition Temperature	No experimental data available.
Vapor Pressure	<i>Not determined</i>
Vapor Density	<i>Not determined</i>
Specific Gravity	<i>Not determined</i>

Partition Coefficient (log Kow)	No experimental data available.
Solubility	Soluble in water
Stability in Solution	Subject to hydrolytic and oxidative degradation typical of the chemical class; store reconstituted solutions refrigerated or frozen, protect from light, and use within the stability window indicated on the Certificate of Analysis.
pH	<i>Not determined</i>
Molecular Weight	4963 g/mol
Molecular Formula	C212H350N56O78S

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: Strong oxidizing agents (which can oxidize the methionine and other susceptible residues in the peptide backbone), strong acids and strong bases (which can hydrolyze peptide bonds), strong reducing agents, and proteolytic enzymes. Moisture and elevated temperatures will accelerate hydrolytic and oxidative degradation of the peptide. Prolonged exposure to light and air should also be avoided. No hazardous polymerization is expected. Hazardous decomposition products under fire conditions may include carbon oxides (CO, CO₂), nitrogen oxides (NO), and sulfur oxides (SO).

Hazardous Decomposition Products: Upon combustion or decomposition may produce: carbon monoxide (CO), carbon dioxide (CO₂), nitrogen oxides (NO_x), sulfur oxides (SO_x).

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 reliable acute toxicity data (oral, dermal, or inhalation LD₅₀/LC₅₀) for thymosin beta-4 (CAS 77591-33-4) have been located in authoritative sources such as ECHA, NIOSH, or peer-reviewed toxicology literature. The toxicological properties of this substance are not fully characterized. In the absence of experimental data, acute toxicity endpoints are not classified based on currently available data; however, hazards cannot be excluded (GHS Rev.8, S1.3.2.4). Handle as a substance of unknown acute toxicity and avoid ingestion, inhalation of dusts or aerosols, and skin/eye contact.

Skin Corrosion / Irritation: No experimental in vivo (OECD 404) or validated in vitro (OECD 431/439) skin corrosion or irritation study results have been identified for thymosin beta-4 in authoritative databases (ECHA, PubChem CID 45382195). Skin corrosion/irritation is not classified based on currently available data; hazards cannot be excluded. Mechanical or drying effects on skin from the solid substance are possible. Use impervious gloves and protective clothing as specified in Section 8.

Serious Eye Damage / Irritation: No experimental in vivo (OECD 405) or validated in vitro (OECD 437/438/491/492) serious eye damage/eye irritation study results have been identified for thymosin beta-4 in authoritative databases. Serious eye damage/eye irritation is not classified based on currently available data; hazards cannot be excluded. Particulate contact with the eye may cause transient mechanical irritation. Eye protection meeting the requirements of Section 8 should be worn.

Skin / Respiratory Sensitization: No respiratory or skin sensitization study data (e.g., OECD 429 LLNA, OECD 442A-E, or guinea pig maximization) for thymosin beta-4 have been identified in ECHA or peer-reviewed literature. Respiratory and skin sensitization are not classified based on currently available data; hazards cannot be excluded. As a high-molecular-weight biomolecule, the potential for immunogenicity or hypersensitivity following repeated exposure cannot be ruled out; individuals with known sensitivity to biological macromolecules should 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: Thymosin beta-4 is not listed as a carcinogen by IARC, the U.S. National Toxicology Program (NTP 15th Report on Carcinogens), OSHA (29 CFR 1910.1200 Subpart Z), or ACGIH. No standard rodent carcinogenicity bioassay meeting OECD TG 451 has been identified for this substance. Carcinogenicity is not classified based on currently available data; hazards cannot be excluded. Peer-reviewed literature (e.g., Ricci-Vitiani et al., and studies indexed in PubMed on pancreatic and non-small-cell lung cancer cell lines) has reported associations between elevated intracellular thymosin beta-4 expression and tumor progression endpoints in vitro; the occupational-exposure relevance of these findings is undetermined.

Reproductive Toxicity: No reproductive toxicity, developmental toxicity, or fertility studies conducted according to OECD TG 414, 416, 421, 422, or 443 have been identified for thymosin beta-4 in ECHA registration dossiers, NTP monographs, or authoritative peer-reviewed literature. Reproductive toxicity and effects on or via lactation are not classified based on currently available data; hazards cannot be excluded. Women who are pregnant, planning pregnancy, or breastfeeding should avoid exposure as a precaution.

Specific Target Organ Toxicity (STOT): Specific Target Organ Toxicity - Single Exposure (STOT-SE, GHS Category 1-3): No study data identified in authoritative sources; STOT-SE is not classified based on currently available data; hazards cannot be excluded. Specific Target Organ Toxicity - Repeated Exposure (STOT-RE, GHS Category 1-2): No sub-acute (OECD TG 407/412), sub-chronic (OECD TG 408/413), or chronic (OECD TG 452) repeated-dose toxicity studies via any relevant occupational route have been identified in ECHA or peer-reviewed literature for thymosin beta-4; STOT-RE is not classified based on currently available data; hazards cannot be excluded. The toxicological profile of this substance is not fully characterized; exposure should be minimized under the hierarchy of controls.

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

Derived No-Effect Level (DNEL): No data available — no substance-specific DNEL has been derived.

Predicted No-Effect Concentration (PNEC): No data available — no substance-specific PNEC has been derived.

Section 12 — Ecological Information

No authoritative substance-specific ecotoxicity study data was identified. In the absence of experimental data, adverse environmental effects cannot be fully excluded.

Ecotoxicity: No substance-specific experimental aquatic toxicity data (e.g., fish LC50, Daphnia EC50, algal ErC50) have been identified in authoritative sources (ECHA, EPA, PubChem, or peer-reviewed literature) for Thymosin beta-4 (CAS 77591-33-4). The substance is not listed on the ECHA Candidate List or classified under CLP for aquatic hazards. Not classified as hazardous to the aquatic environment based on weight-of-evidence assessment (no authoritative experimental data identified). As a 43-residue polypeptide of high molecular weight (~4963 g/mol) composed exclusively of proteinogenic L-amino acids, systemic uptake and toxicity in aquatic organisms are expected to be limited by low membrane permeability and susceptibility to extracellular proteolysis. Avoid release to the environment; do not discharge to surface waters, sewers, or drains without treatment.

Persistence and Degradability: No substance-specific ready-biodegradability studies (e.g., OECD 301 series) have been identified for Thymosin beta-4 in authoritative databases. The molecule is a linear polypeptide consisting solely of standard L-amino acid residues linked by peptide bonds; such structures are generally susceptible to hydrolytic

and enzymatic (proteolytic) degradation in environmental compartments and in biological wastewater treatment, yielding constituent amino acids that enter natural nitrogen and carbon cycles. In the absence of measured half-lives, environmental persistence cannot be definitively quantified.

Bioaccumulative Potential: No experimentally determined bioconcentration factor (BCF), bioaccumulation factor (BAF), or n-octanol/water partition coefficient (log Kow) has been identified in authoritative sources for Thymosin beta-4. Owing to its very high molecular weight (~4963 g/mol, exceeding the 700 Da threshold considered by ECHA REACH Annex XIII to limit membrane passage), its highly polar and ionizable character (numerous acidic and basic amino acid side chains), and its susceptibility to proteolytic breakdown, significant bioaccumulation in aquatic organisms is not expected. A definitive classification cannot be made in the absence of substance-specific experimental data.

Mobility in Soil: No substance-specific experimental data identified.

Other Adverse Effects: No other adverse environmental effects identified. The substance is not included on the Montreal Protocol list of ozone-depleting substances.

Section 13 — Disposal Considerations

Dispose of contents and container in accordance with all local, state, and federal regulations. Do not dispose of this material into sewers or waterways. Contact a licensed waste disposal company for disposal guidance.

US: Dispose in accordance with 40 CFR Parts 261-270 (RCRA). **EU:** Dispose according to Directive 2008/98/EC (Waste Framework Directive).

Section 14 — Transport Information

DOT (US)	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	72264e2a-21b5-4a46-be2a-94793accd629
Revision Date	2026-08-02
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: 2026-08-02

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).