HGH FRAG 176-191

CAS: 66004-57-7
Formula: C78H123N23O22S2

Document ID: c640d15a
Revision Date: 2026-08-13
Version: 1.0

Section 1 — Product and Company Identification

Product Name	HGH FRAG 176-191
Synonyms	Somatotropin (176-191); 66004-57-7; Hgh (176-191)
CAS Number	66004-57-7
Molecular Formula	C78H123N23O22S2
IUPAC Name	[(2S)-2-[[(2S,3S)-2-[[(2S)-2-[[(2S)-2-[[(2S)-2-amino-3-phenylpropanoyl]amino]-4-methylpentanoyl]amino]-5-carbamimidamidopentanoyl]amino]-3-methylpentanoyl]amino]-3-methylbutanoyl] (4S)-5-[[2-[(2S)-2-[[2-[[(2R)-2-[[(2S)-2-amino-3-hydroxypropanoyl]amino]-3-sulfanylpropanoyl]amino]acetyl]amino]-3-phenylpropanoyl]oxy-2-oxoethyl]amino]-4-[[(2S)-2-[[(2S)-2-[[(2S)-5-carbamimidamido-2-[[(2R)-2-[[(2S)-2,5-diamino-5-oxopentanoyl]amino]-3-sulfanylidenepropanoyl]amino]pentanoyl]amino]-3-hydroxypropanoyl]amino]-3-methylbutanoyl]amino]-5-oxopentanoate
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
HGH FRAG 176-191	66004-57-7	C78H123N23O22S2	1799.1 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 AOD-9604 only in a well-ventilated area or chemical fume hood by trained personnel familiar with safe handling of bioactive peptides of unknown toxicity. In accordance with OSHA HazCom 2012 (29 CFR 1910.1200) and OSHA Laboratory Standard (29 CFR 1910.1450), employ engineering controls (local exhaust ventilation or a ventilated weigh enclosure) to minimize generation of airborne dust during weighing and transfer of the lyophilized powder. Wear appropriate PPE: chemical splash goggles meeting ANSI Z87.1, a buttoned laboratory coat, and chemical-resistant nitrile gloves (double-glove for weighing operations); inspect gloves before each use and change immediately if contaminated. Where dust or aerosol generation 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). Avoid

breathing dust, mist, or vapor; avoid contact with skin, eyes, and clothing. 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). Keep containers tightly closed when not in use; minimize exposure of the solid to air and moisture, as the intramolecular disulfide bond is susceptible to oxidation and disulfide scrambling. When preparing solutions, use degassed, oxygen-free buffers to limit oxidative degradation of the disulfide-containing peptide (per published peptide handling guidance, e.g., Bachem Peptide Guide). Use ground-bonded equipment where applicable and avoid generation of static during powder transfer. Decontaminate work surfaces and reusable equipment after use; collect waste in clearly labeled, closed containers and dispose of in accordance with federal, state, and local regulations.

Storage Conditions

Store the lyophilized solid in tightly closed original containers, protected from light, moisture, and air, in a secure, cool, dry, well-ventilated area accessible only to authorized personnel. Long-term storage of synthetic peptides containing intramolecular disulfide bonds is generally recommended at <= -20 degC (preferably -80 degC) with desiccant in sealed, airtight containers to minimize hydrolysis, oxidation, and disulfide scrambling (general peptide handling guidance, Bachem Peptide Guide; LifeTein peptide storage recommendations). Allow sealed containers to equilibrate to room temperature before opening to prevent condensation of atmospheric moisture onto the hygroscopic solid. Reconstituted aqueous solutions should be stored refrigerated (2-8 degC) for short-term use or aliquoted and frozen at <= -20 degC to avoid repeated freeze-thaw cycles. Keep away from heat, direct sunlight, ignition sources, and incompatible materials (see below). Store separately from oxidizing agents, strong acids, and strong bases. No specific shelf-life is established by an authoritative regulatory body; users should refer to manufacturer certificate of analysis for retest/expiry information.

Incompatibilities

Treat as incompatible with strong oxidizing agents (e.g., peroxides, hypochlorites, permanganates, nitric acid), which can oxidize or scramble the intramolecular (Cys7-Cys14) disulfide bond. Avoid strong reducing agents (e.g., dithiothreitol, beta-mercaptoethanol, TCEP) outside of intended controlled use, as these will reduce the disulfide bridge and generate free thiols, altering the molecule. Incompatible with strong acids and strong bases, which can promote hydrolysis of peptide (amide) bonds, deamidation of glutamine/asparagine residues, and racemization. Avoid contact with electrophilic alkylating agents (e.g., iodoacetamide, N-ethylmaleimide, haloacetates) that react with thiol groups should the disulfide be reduced. Moisture, elevated temperatures, atmospheric oxygen, transition-metal ion contaminants (e.g., Cu2+, Fe3+), and prolonged exposure to light should be avoided as they accelerate oxidation and degradation of cysteine-containing peptides (Bachem Peptide Guide; Sigma-Aldrich Fmoc SPPS Cysteine Peptides technical document). No hazardous polymerization is expected under recommended storage conditions.

Section 8 — Exposure Controls / Personal Protection

Exposure Limits

No regulatory occupational exposure limits (OEL) have been established by OSHA, ACGIH, NIOSH, or equivalent bodies for AOD-9604 (CAS 66004-57-7). 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.

Engineering Controls

Use only in well-ventilated areas. Local exhaust ventilation is required when weighing, opening containers, reconstituting lyophilized material, or otherwise generating dusts, aerosols, or mists. Perform powder-handling operations inside a ventilated enclosure such as a certified laboratory fume hood, ventilated balance enclosure, glove box, or Class II biological safety cabinet with HEPA filtration appropriate for fine particulates and proteinaceous material. Engineering controls should be designed, tested, and maintained in accordance with ANSI/AIHA Z9.5 (Laboratory

Ventilation) and OSHA 29 CFR 1910.1450 where applicable. Provide eyewash stations and safety showers in the immediate work area per ANSI Z358.1. Prohibit eating, drinking, smoking, and the application of cosmetics in areas where this substance is handled.

Personal Protective Equipment

Respiratory Protection: Respiratory protection is not normally required when material is handled in a properly functioning fume hood or ventilated enclosure. Where engineering controls are not feasible or airborne exposure may occur (e.g., weighing dry powder outside a containment enclosure, response to a spill, or generation of aerosols), use a NIOSH-approved (42 CFR Part 84) air-purifying respirator equipped with N100, P100, or HEPA particulate filters. Respirator selection, fit testing, medical evaluation, and use must comply with OSHA 29 CFR 1910.134. For higher-exposure or emergency scenarios, use a powered air-purifying respirator (PAPR) with HEPA cartridges or supplied-air respirator.

Hand Protection: Wear chemically resistant, disposable protective gloves conforming to EN ISO 374 / ANSI/ISEA 105. Nitrile gloves of at least 0.11 mm thickness are generally suitable for handling solid peptide and aqueous solutions; double-gloving is recommended when handling bulk powder or concentrated stock solutions. Inspect gloves before use, change immediately if contaminated, torn, or punctured, and discard as contaminated waste. Wash hands thoroughly with soap and water after removing gloves and before leaving the work area, in accordance with OSHA 29 CFR 1910.138.

Eye / Face Protection: Wear tight-fitting safety glasses with side shields meeting ANSI/ISEA Z87.1 as a minimum. When handling powders, solutions under pressure, or when there is a potential for splash or aerosol generation, wear chemical splash goggles. A face shield (worn over goggles, not as a substitute) is recommended for operations with a significant splash risk. Eye protection must comply with OSHA 29 CFR 1910.133. Emergency eyewash stations meeting ANSI Z358.1 must be readily accessible.

Skin Protection: Wear a laboratory coat or chemical-resistant gown with long sleeves, closed-toe chemical-resistant footwear, and full-length trousers, in accordance with OSHA 29 CFR 1910.132. Use disposable sleeve covers or a chemical-resistant apron when handling bulk powder, performing reconstitution, or when splash potential exists. Remove and segregate contaminated clothing immediately; do not take potentially contaminated clothing home. Launder reusable garments separately from personal clothing. Contaminated disposable PPE must be discarded as chemical/biological waste in accordance with institutional and local regulations.

Section 9 — Physical and Chemical Properties

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

Partition Coefficient (log Kow)	No experimental data available.
Solubility	Soluble in water; soluble in aqueous buffers
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	1799.1 g/mol
Molecular Formula	C78H123N23O22S2

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: Treat as incompatible with strong oxidizing agents (e.g., peroxides, hypochlorites, permanganates, nitric acid), which can oxidize or scramble the intramolecular (Cys7-Cys14) disulfide bond. Avoid strong reducing agents (e.g., dithiothreitol, beta-mercaptoethanol, TCEP) outside of intended controlled use, as these will reduce the disulfide bridge and generate free thiols, altering the molecule. Incompatible with strong acids and strong bases, which can promote hydrolysis of peptide (amide) bonds, deamidation of glutamine/asparagine residues, and racemization. Avoid contact with electrophilic alkylating agents (e.g., iodoacetamide, N-ethylmaleimide, haloacetates) that react with thiol groups should the disulfide be reduced. Moisture, elevated temperatures, atmospheric oxygen, transition-metal ion contaminants (e.g., Cu2+, Fe3+), and prolonged exposure to light should be avoided as they accelerate oxidation and degradation of cysteine-containing peptides (Bachem Peptide Guide; Sigma-Aldrich Fmoc SPPS Cysteine Peptides technical document). No hazardous polymerization is expected under recommended storage conditions.

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

Hazardous Polymerization: Will not occur.

Section 11 — Toxicological Information

The toxicological properties of this substance have not been fully characterized. Where no authoritative study data was identified, endpoint classifications are based on a weight-of-evidence approach using read-across from the compound's chemical class and structural features, per GHS Rev.8 Chapter 1.3.2.4. “Not classified” entries below mean “not classified based on currently available data” — hazards cannot be excluded.

Acute Toxicity: No authoritative acute toxicity values (oral, dermal, or inhalation LD50/LC50) for AOD-9604 (CAS 66004-57-7) have been identified in NIOSH, ECHA, EPA, or PubChem (CID 71300630) registries. The substance is not listed in the ECHA C&L Inventory with a harmonized acute toxicity classification. Published human clinical data (Stier H. et al., 'Safety and Tolerability of the Hexadecapeptide AOD9604 in Humans,' Journal of Endocrinology and Metabolism, 2013, pooling six trials in 893 subjects) reported a tolerability profile indistinguishable from placebo, but those data describe controlled therapeutic dosing and do not constitute a quantitative occupational acute toxicity assessment. Acute toxicity is not classified based on currently available data; hazards cannot be excluded (GHS Rev.8, S1.3.2.4 weight-of-evidence). The toxicological properties of this substance are not fully characterized; treat as a substance of unknown acute toxicity and avoid ingestion, inhalation of dust/aerosol, and dermal contact.

Skin Corrosion / Irritation: No in vivo or validated in vitro skin corrosion/irritation study (OECD TG 404, 431, or 439) for AOD-9604 has been located in ECHA, EPA, or PubChem registry data. Skin corrosion/irritation is not classified based on currently available data; hazards cannot be excluded. The toxicological properties of this substance are not fully characterized.

Serious Eye Damage / Irritation: No in vivo or validated in vitro eye irritation/serious eye damage study (OECD TG 405, 437, 438, 460, 491, or 492) for AOD-9604 has been located in ECHA, EPA, or PubChem registry data. Serious eye damage/eye irritation is not classified based on currently available data; hazards cannot be excluded. The toxicological properties of this substance are not fully characterized.

Skin / Respiratory Sensitization: No skin or respiratory sensitization study (OECD TG 406, 429, 442A/B/C/D/E, or guideline-equivalent human data) for AOD-9604 has been located in ECHA, EPA, or PubChem registry data. As a synthetic polypeptide containing a disulfide-bridged sequence, the potential for protein-mediated respiratory or dermal sensitization upon repeated occupational exposure to dust or aerosol cannot be excluded on the basis of available information. Respiratory and skin sensitization are not classified based on currently available data; hazards cannot be excluded (GHS Rev.8, S1.3.2.4).

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: AOD-9604 is not listed by IARC, the U.S. National Toxicology Program (NTP) Report on Carcinogens, OSHA (29 CFR 1910 Subpart Z), the U.S. EPA IRIS database, or the ACGIH carcinogen notations. No long-term carcinogenicity bioassay (OECD TG 451/453) has been identified in PubChem CID 71300630 or ECHA registry data. Carcinogenicity is not classified based on currently available data; hazards cannot be excluded. The toxicological properties of this substance are not fully characterized.

Reproductive Toxicity: No reproductive or developmental toxicity studies (OECD TG 414, 416, 421, 422, or 443) for AOD-9604 have been located in ECHA, EPA, NTP, or PubChem registry data. The substance does not appear on the California Proposition 65 list of chemicals known to cause reproductive toxicity. Reproductive toxicity (including effects on fertility and the developing offspring) and effects on or via lactation are not classified based on currently available data; hazards cannot be excluded. The toxicological properties of this substance are not fully characterized.

Specific Target Organ Toxicity (STOT): Specific target organ toxicity - single exposure (STOT-SE) and specific target organ toxicity - repeated exposure (STOT-RE): No authoritative STOT-SE or STOT-RE classification has been assigned in the ECHA C&L Inventory or other regulatory inventories for AOD-9604, and no subacute (OECD TG 407), subchronic (OECD TG 408/411), or chronic (OECD TG 452) toxicity study has been identified in PubChem CID 71300630 or peer-reviewed databases. Human safety data published by Stier et al. (J Endocrinol Metab, 2013) reported no serious adverse events attributable to the substance across pooled clinical trials, but those data are not a substitute for an occupational STOT evaluation. STOT-SE and STOT-RE are not classified based on currently available data; 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 AOD-9604 (CAS 66004-57-7) in authoritative sources including PubChem, the U.S. EPA

ECOTOX database, or ECHA. The substance has not been classified under GHS as hazardous to the aquatic environment based on a weight-of-evidence assessment in the absence of authoritative experimental data. Owing to its high molecular weight (1799.1 g/mol) and polypeptide character, significant environmental exposure of aquatic organisms is not anticipated under intended laboratory use; however, releases to surface water, sewers, or the environment should be avoided.

Persistence and Degradability: No substance-specific experimental data on ready biodegradability (e.g., OECD 301 series), hydrolysis, or photolysis have been identified for AOD-9604 in authoritative regulatory sources (PubChem, EPA, ECHA). Environmental half-lives in water, soil, sediment, or air have not been established. A definitive persistence classification therefore cannot be made.

Bioaccumulative Potential: No substance-specific bioaccumulation data (e.g., BCF, log Kow) identified. Not experimentally verified.

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	c640d15a-ac59-4e88-9233-d5c0b8a04017
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).