AICAR

CAS: 3031-94-5
Formula: C9H15N4O8P

Document ID: 0b9845fa
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Version: 1.0

Section 1 — Product and Company Identification

Product Name	AICAR
Synonyms	AICA ribonucleotide; 3031-94-5; Z-nucleotide
CAS Number	3031-94-5
Molecular Formula	C9H15N4O8P
IUPAC Name	[(2R,3S,4R,5R)-5-(5-amino-4-carbamoylimidazol-1-yl)-3,4-dihydroxyoxolan-2-yl]methyl dihydrogen phosphate
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
AICAR	3031-94-5	C9H15N4O8P	338.21 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 AICA ribonucleotide (CAS 3031-94-5) only in a well-ventilated area, preferably within a certified chemical fume hood or equivalent local exhaust ventilation, in accordance with OSHA 29 CFR 1910.1450 (Laboratory Standard) and 29 CFR 1910.1200 (Hazard Communication). Because no OSHA PEL, ACGIH TLV, or NIOSH REL has been established for this substance, treat it as a potentially bioactive compound of unknown toxicity and apply the precautionary principle: minimize all routes of exposure (inhalation, skin/eye contact, ingestion). Wear chemically resistant nitrile gloves, ANSI Z87.1-compliant safety eyewear, and a buttoned laboratory coat as the minimum PPE specified in Section 8; use a NIOSH-approved N95 or higher particulate respirator when weighing or transferring the dry powder if engineering controls cannot reliably control airborne dust. Weigh and dispense the solid in a balance enclosure or fume hood to prevent dust generation; avoid creating aerosols, dust clouds, or splashes. The compound is reported (per PubChem CID 65110 and supplier data) to be hygroscopic and light-sensitive, so keep the container tightly closed and minimize exposure to atmospheric moisture and direct light during handling. Do not eat, drink, smoke, or apply cosmetics in areas where the substance is handled, per 29 CFR 1910.141 and 29 CFR 1910.1450. Wash hands and exposed skin thoroughly with soap and water immediately after handling and before leaving the work area. Use grounded, non-sparking tools and follow good laboratory hygiene practices. Decontaminate work surfaces, balances, and reusable equipment with an appropriate solvent (e.g., aqueous detergent followed by ethanol or water rinse) after each use. Avoid release to the environment and collect all waste in clearly labeled, closed containers for disposal in accordance with Section 13 and applicable EPA RCRA (40 CFR 260-273) and local regulations.

Storage Conditions

Store AICA ribonucleotide in its original tightly closed container, desiccated and protected from light, in a cool, dry, well-ventilated location away from direct sunlight, heat sources, and ignition sources. Because the compound is reported to be hygroscopic (PubChem CID 65110), include a suitable desiccant (e.g., silica gel) in the secondary storage container and ensure the primary container is sealed under dry conditions; consider purging headspace with an inert gas (nitrogen or argon) when feasible to limit moisture and oxidative degradation. Long-term storage of the solid is generally recommended at -20 degC in a freezer designated for chemical (non-food) storage; brief working aliquots may be kept refrigerated. Reconstituted aqueous or buffered solutions are less stable than the dry solid and should be prepared fresh or stored frozen in single-use aliquots to avoid repeated freeze-thaw cycles. Allow sealed containers to equilibrate to room temperature before opening to prevent condensation of atmospheric moisture onto the hygroscopic solid. Label all containers in compliance with OSHA HazCom 2012 (29 CFR 1910.1200(f)), including identity, hazard information, and date of receipt/opening. Store away from incompatible materials (see below), foodstuffs, and biological samples. Restrict access to trained personnel only and maintain an up-to-date chemical inventory. Do not return unused material to the original container. Shelf life should follow the date and conditions specified by the manufacturer's Certificate of Analysis; no independent regulatory shelf-life value has been established.

Incompatibilities

Keep AICA ribonucleotide away from strong oxidizing agents (e.g., peroxides, perchlorates, concentrated nitric acid, chromates, permanganates, hypochlorites), which can react with the organic ribose, imidazole, and amide functionalities to generate heat, decomposition products, and potentially hazardous gases. Avoid contact with strong acids and strong bases, which can hydrolyze the phosphate ester and glycosidic linkages, and with strong reducing agents. Protect from moisture (the substance is hygroscopic), heat, and direct light, all of which can promote degradation. Avoid prolonged exposure to elevated temperatures, which may cause thermal decomposition. Hazardous decomposition products may include carbon oxides (CO, CO2), nitrogen oxides (NO), and phosphorus oxides (POy) as indicated by the elemental composition (C9H15N4O8P); see Section 10 for additional stability and reactivity information. No specific reactive incompatibilities beyond these general classes have been reported in the peer-reviewed literature or in PubChem (CID 65110) for this compound.

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. AICA ribonucleotide (CAS 3031-94-5) is not listed in OSHA 29 CFR 1910.1000 Table Z-1, the NIOSH Pocket Guide, the ACGIH TLV list, or the IARC monographs. Handle as a potentially bioactive substance of unknown toxicity.

Engineering Controls

Use in a well-ventilated area. Weighing, transfer, and manipulation of the dry powder or concentrated stock solutions should be performed inside a certified laboratory fume hood, ventilated balance enclosure, or Class II biological safety cabinet to keep airborne concentrations as low as reasonably achievable. Where dust or aerosol generation is possible, supplement with local exhaust ventilation in accordance with ANSI/AIHA Z9.5 laboratory ventilation guidance. Provide an emergency eyewash and safety shower (ANSI Z358.1) within the immediate work area. Apply good laboratory practice consistent with the OSHA Laboratory Standard (29 CFR 1910.1450): no eating, drinking, smoking, or cosmetic application in areas where this substance is handled; wash hands thoroughly after handling. Closed-system handling and HEPA-filtered exhaust are recommended for larger-scale operations.

Personal Protective Equipment

Respiratory Protection: Respiratory protection is not normally required when handling small quantities within a properly functioning fume hood or biosafety cabinet. If engineering controls are unavailable, inadequate, or if dust/aerosol may be generated (e.g., weighing dry powder on the open bench, large-scale handling), wear a NIOSH-approved (42 CFR Part 84) air-purifying respirator equipped with N95 or P100 particulate filters. Respirator use must comply with the OSHA Respiratory Protection Standard (29 CFR 1910.134), including written program, medical evaluation, and fit testing. For unknown airborne concentrations or oxygen-deficient atmospheres, use a supplied-air respirator or SCBA in positive-pressure mode.

Hand Protection: Wear chemically resistant, disposable laboratory gloves that are compatible with aqueous and DMSO-based solutions. Nitrile rubber gloves (minimum thickness 0.11 mm / 4 mil) are recommended for incidental contact; consult glove manufacturer permeation/breakthrough data and select gloves meeting EN 374 / ANSI/ISEA 105 standards. Double-gloving is recommended when handling DMSO stock solutions, since DMSO can enhance dermal penetration of dissolved solutes. Inspect gloves before use, change immediately if contaminated, torn, or punctured, and wash hands thoroughly with soap and water after removal.

Eye / Face Protection: Wear tight-fitting safety glasses with side shields, or preferably chemical splash goggles, meeting ANSI/ISEA Z87.1. Where splash potential exists (e.g., handling solutions, large volumes), use indirectly vented chemical-splash goggles together with a face shield (worn over goggles, not as a substitute). Contact lenses should not be relied upon as eye protection. An ANSI Z358.1-compliant emergency eyewash station must be readily accessible in the work area.

Skin Protection: Wear a laboratory coat (preferably a flame-resistant or chemical-resistant lab coat that closes at the neck and wrists with knit cuffs) over long pants and closed-toe, non-absorbent footwear. For operations where splash or substantial contact is possible, wear a chemical-resistant apron or disposable chemical-protective sleeves/coveralls. Remove and launder contaminated clothing before reuse; do not take contaminated PPE outside the work area. Skin that contacts the substance should be washed promptly with soap and water.

Section 9 — Physical and Chemical Properties

Physical State	Solid (research-grade lyophilised powder or crystalline solid)
Appearance	White to off-white solid
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
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	338.21 g/mol
Molecular Formula	C9H15N4O8P

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: Keep AICA ribonucleotide away from strong oxidizing agents (e.g., peroxides, perchlorates, concentrated nitric acid, chromates, permanganates, hypochlorites), which can react with the organic ribose, imidazole, and amide functionalities to generate heat, decomposition products, and potentially hazardous gases. Avoid contact with strong acids and strong bases, which can hydrolyze the phosphate ester and glycosidic linkages, and with strong reducing agents. Protect from moisture (the substance is hygroscopic), heat, and direct light, all of which can promote degradation. Avoid prolonged exposure to elevated temperatures, which may cause thermal decomposition. Hazardous decomposition products may include carbon oxides (CO, CO2), nitrogen oxides (NO), and phosphorus oxides (POy) as indicated by the elemental composition (C9H15N4O8P); see Section 10 for additional stability and reactivity information. No specific reactive incompatibilities beyond these general classes have been reported in the peer-reviewed literature or in PubChem (CID 65110) for this compound.

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

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 AICA ribonucleotide (CAS 3031-94-5) have been identified in authoritative sources such as ECHA, NIOSH, NTP, or peer-reviewed toxicological literature. The toxicological properties of this substance are not fully characterized. Not classified for acute toxicity based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). As a fine organic powder, handle to minimize dust generation and avoid ingestion or inhalation.

Skin Corrosion / Irritation: No experimental skin irritation or corrosion studies for AICA ribonucleotide have been located in authoritative regulatory databases (ECHA, PubChem hazard records). Not classified for skin corrosion/-irritation based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). The substance contains a free phosphate group that can lower local pH on moist skin; direct contact with skin should be avoided as a precaution.

Serious Eye Damage / Irritation: No experimental eye irritation or serious eye damage data for AICA ribonucleotide have been identified in authoritative sources. Not classified for serious eye damage/eye irritation based on currently available data; hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4). Mechanical and acidic-phosphate irritation of ocular tissues cannot be ruled out; eye contact with the solid or its solutions should be avoided.

Skin / Respiratory Sensitization: No data from human patch testing, guinea pig maximization, or Local Lymph Node Assay (LLNA) studies for AICA ribonucleotide have been located in ECHA, NIOSH, or peer-reviewed literature. Respiratory and skin sensitization potential have not been fully characterized. Not classified for skin or respiratory sensitization based on currently available data; sensitization hazards cannot be excluded (GHS Rev.8, Chapter 1.3.2.4).

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: AICA ribonucleotide (CAS 3031-94-5) is not listed as a carcinogen by IARC, the U.S. National Toxicology Program (NTP) Report on Carcinogens, OSHA (29 CFR 1910 Subpart Z), ACGIH, or the U.S. EPA IRIS database. No long-term carcinogenicity bioassays have been identified in authoritative sources. Not classified for carcinogenicity based on currently available data; carcinogenic potential cannot be excluded in the absence of adequate chronic studies (GHS Rev.8, Chapter 1.3.2.4).

Reproductive Toxicity: No reproductive toxicity, developmental toxicity, or fertility studies for AICA ribonucleotide have been located in ECHA registration dossiers, NTP databases, or peer-reviewed literature meeting OECD test guideline standards. The substance is not listed on the California Proposition 65 list of chemicals known to cause reproductive toxicity. Not classified for reproductive toxicity based on currently available data; effects on fertility or the developing offspring cannot be excluded (GHS Rev.8, Chapter 1.3.2.4).

Specific Target Organ Toxicity (STOT): Specific target organ toxicity - single exposure (STOT-SE) and repeated exposure (STOT-RE): No subacute, subchronic, or chronic repeated-dose toxicity studies for AICA ribonucleotide conducted per OECD Test Guidelines 407, 408, or 410 have been identified in authoritative sources (ECHA, NTP, NIOSH). No specific target organs have been identified from human occupational exposure data. The toxicological properties are not fully characterized for STOT endpoints. Not classified for STOT-SE or STOT-RE based on currently available data; target-organ hazards from single or repeated exposure cannot be excluded (GHS Rev.8, Chapter 1.3.2.4).

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 ecotoxicity data (e.g., fish, aquatic invertebrate, or algal LC50/EC50 values) were identified in authoritative sources (ECHA, EPA, PubChem) for AICA ribonucleotide (CAS 3031-94-5). Not classified as hazardous to the aquatic environment under GHS based on weight-of-evidence assessment in the absence of authoritative experimental data. As a phosphorylated nucleotide intermediate of endogenous purine biosynthesis, the substance is ionized at environmentally relevant pH (phosphate and imidazole groups), which is expected to limit partitioning into biota and sediment. Prevent release to the environment as a precautionary measure; avoid discharge to surface water, groundwater, soil, or municipal sewer systems without appropriate treatment.

Persistence and Degradability: No substance-specific experimental data on ready biodegradability (e.g., OECD 301-series testing) or abiotic degradation (hydrolysis, photolysis) were identified in authoritative regulatory databases (ECHA, EPA) for CAS 3031-94-5. AICA ribonucleotide is a naturally occurring intermediate in the de novo purine biosynthesis pathway and is metabolized by ubiquitous cellular enzymes; however, this biological turnover should not be read across to environmental persistence in the absence of standardized test data. Persistence in environmental compartments cannot be reliably characterized from currently available authoritative information.

Bioaccumulative Potential: No measured bioconcentration factor (BCF) or experimental log Kow (octanol-water partition coefficient) values from authoritative regulatory sources were identified for AICA ribonucleotide (CAS 3031-94-5). The molecule is highly polar and ionizable, containing a dihydrogen phosphate group, two hydroxyl groups, a primary amine, and a carboxamide; such physicochemical features are generally associated with low octanol-water

partitioning and low potential for bioaccumulation in aquatic organisms. A definitive bioaccumulation classification cannot be assigned 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	0b9845fa-fc94-4380-be0a-b4f01e295094
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).