










Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
    	<p>THIS MATERIAL IS TOXIC BY INHALATION. Highly toxic; do not ingest or inhale. Avoid all contact with this material. Flammable material; avoid heat and sources of ignition. May form explosive peroxides. Irritating to skin, eyes, and the respiratory system. This compound is a skin sensitizer. Readily absorbed through skin. Lachrymator. CARCINOGEN. MINIMIZE EXPOSURE. MUTAGEN. MINIMIZE EXPOSURE. Environmental hazard. This material is very toxic to aquatic organisms. Air and heat sensitive material. Store under argon. Refrigerate.</p>	   

Section I. Chemical Product and Company Identification

Chemical Name	Crotonaldehyde		
Catalog Number	C0414	Supplier	TCI America 9211 N. Harbortgate St. Portland OR 1-800-423-8616
Synonym	2-Butenal (CA INDEX NAME); 2-Buten-1-al		
Chemical Formula	C ₄ H ₆ O		
CAS Number	4170-30-3	In case of Emergency Call	Chemtrec® (800) 424-9300 (U.S.) (703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
Crotonaldehyde	4170-30-3	Min. 98.0 (GC,T)	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen. This compound is classified as a mutagen. There is no acceptable exposure limit for a mutagen.	Rat LD ₅₀ (oral) 80 mg/kg Rabbit LD ₅₀ (dermal) 380 µL/kg Rat LD ₅₀ (inhalation) 200 mg/m ³ /2H

Section III. Hazards Identification

Acute Health Effects	<p>Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.</p> <p>Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material.</p> <p>Readily absorbed through skin.</p> <p>Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.</p>
Chronic Health Effects	<p>CARCINOGENIC EFFECTS : Carcinogenic by RTECS criteria..</p> <p>MUTAGENIC EFFECTS : Not available.</p> <p>TERATOGENIC EFFECTS : Tumorigenic effects.</p> <p>Rat TDLo Oral 2664 mg/kg for 2 years continuous</p> <p>Toxic Effects:</p> <p>Tumorigenic - Carcinogenic by RTECS criteria</p> <p>Liver - Tumors</p> <p>DEVELOPMENTAL TOXICITY: Not available.</p> <p>Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.</p>

Section IV. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If the victim is not breathing, perform mouth-to-mouth resuscitation. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, oxygen can be administered. Seek medical attention if respiration problems do not improve.

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Emergency phone number (800) 424-9300

Ingestion

INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive.

Section V. Fire and Explosion Data

Flammability	Flammable.	Auto-Ignition	232 °C (449.6 °F)
Flash Points	11 °C (51.8 °F)	Flammable Limits	LOWER: 2.1% UPPER: 15.5%
Combustion Products	These products are toxic carbon oxides (CO, CO ₂).		
Fire Hazards	Not available.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.		
Fire Fighting Media and Instructions	Flammable liquid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Consult with local fire authorities before attempting large scale fire-fighting operations.		


Section VI. Accidental Release Measures

Spill Cleanup Instructions	This material is toxic by inhalation. Highly toxic material. Flammable material. May form explosive peroxides. Irritating material. This material is a skin sensitizer. Lachrymatory material. Readily absorbed through skin. Carcinogenic material. Mutagenic material. Environmentally hazardous material. Air and heat sensitive material. Keep away from heat. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT get water inside container. DO NOT touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Consult federal, state, and/or local authorities for assistance on disposal.
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Section VII. Handling and Storage

Handling and Storage Information	TOXIC BY INHALATION. HIGHLY TOXIC. FLAMMABLE. MAY FORM EXPLOSIVE PEROXIDES. IRRITANT. SENSITIZER. LACHRYMATOR. READILY ABSORBED THROUGH SKIN. CARCINOGEN. MUTAGEN. ENVIRONMENTAL HAZARD. AIR AND HEAT SENSITIVE. STORE UNDER ARGON. REFRIGERATE. Keep locked up. Keep away from heat. Mechanical exhaust required. Avoid excessive heat and light. DO NOT ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively. Always store away from incompatible compounds such as oxidizing agents, reducing agents, acids, alkalis (bases).
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Section VIII. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.
Personal Protection	Splash goggles. Lab coat. Vapor respirator. Boots. Gloves. A MSHA/NIOSH approved respirator must be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product. 
Exposure Limits	This chemical is classified as a carcinogen. There is no acceptable exposure limit for a carcinogen. This compound is classified as a mutagen. There is no acceptable exposure limit for a mutagen.

Section IX. Physical and Chemical Properties

Physical state @ 20 °C	Liquid. (Clear, colorless ~ slightly pale yellow.)	Solubility	Miscible with alcohol, ether, benzene, toluene. Soluble in water (18.1g/100mL, 20 °C).
Specific Gravity	0.85 (water=1)		
Molecular Weight	70.09	Partition Coefficient	LOG P _{ow} : 0.63
Boiling Point	104 °C (219.2 °F)	Vapor Pressure	4.0 kPa (@ 20 °C)
Melting Point	-74 °C (-101.2 °F)	Vapor Density	2.41 (Air = 1)
Refractive Index	1.44	Volatility	Not available.
Critical Temperature	Not available.	Odor	Pungent, suffocating.
Viscosity	Not available.	Taste	Not available.

Section X. Stability and Reactivity Data

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light. Air and heat sensitive. Polymerization may occur. Protect from heat and light. Avoid long storage periods.
Incompatibilities	Reactive with oxidizing agents, reducing agents, acids, alkalis (bases), metal powders. Reacts violently with nitric acid.

Section XI. Toxicological Information

RTECS Number	GP9499000
Routes of Exposure	Eye Contact. Ingestion. Inhalation.
Toxicity Data	Rat LD ₅₀ (oral) 80 mg/kg Rabbit LD ₅₀ (dermal) 380 µL/kg Rat LD ₅₀ (inhalation) 200 mg/m ³ /2H
Chronic Toxic Effects	CARCINOGENIC EFFECTS : Carcinogenic by RTECS criteria.. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Tumorigenic effects. Rat TDLo Oral 2664 mg/kg for 2 years continuous Toxic Effects: Tumorigenic - Carcinogenic by RTECS criteria Liver - Tumors DEVELOPMENTAL TOXICITY : Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	Toxic if ingested or inhaled. Avoid prolonged contact with this material. Overexposure may result in serious illness or death. Irritating to eyes and skin on contact. Inhalation causes irritation of the lungs and respiratory system. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. Skin contact may result in sensitization. Always cover all exposed skin with an impermeable layer and use proper eye protection. A OSHA/MSHA approved dust and vapor respirator is required when working with this material. Readily absorbed through skin. Follow safe industrial hygiene practices and always wear proper protective equipment when handling this compound.



Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Crotonaldehyde is released to the atmosphere from the combustion of wood, polymers, and tobacco, in gasoline, diesel, and turbine engine exhausts, and in volcanic gases. It also may be released to the environment in emissions or wastewater resulting from its manufacture and use as a chemical intermediate. If released to the atmosphere, crotonaldehyde degrades rapidly (typical half-life of 11-12 hr) via reaction with photochemically produced hydroxyl radicals. If released to water, crotonaldehyde can degrade via reaction with photochemically produced oxidants (estimated half-life of 120 sunlight hr) and volatilize (estimated half-lives of 40 hours from a model river one meter deep and 15 days from a model lake). If released to soil, crotonaldehyde is susceptible to significant leaching. Evaporation from dry surfaces can be expected to occur. Based on limited data, this compound may biodegrade in both soil and water under aerobic and anaerobic conditions. If released to the environment in a spill situation, a significant fraction of the spill may polymerize. The general population may be exposed to crotonaldehyde through inhalation of tobacco smoke, gasoline and diesel engine exhausts, and wood combustion. Occupational exposure via inhalation and dermal contact is possible at sites of its commercial production and use.

Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state and local regulations when disposing of the substance.
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Section XIV. Transport Information

DOT Classification	DOT CLASS 6.1: Toxic material DOT CLASS 3: Flammable liquid
PIN Number	UN1143
Proper Shipping Name	Crotonaldehyde
Packing Group (PG)	I ZONE B RQ = 3 (45.4) MARINE POLLUTANT
DOT Pictograms	 

Section XV. Other Regulatory Information and Pictograms

TSCA Chemical Inventory (EPA)	This compound is ON the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC). On DSL.
EINECS Number (EEC)	224-030-0
EEC Risk Statements	R11- Highly flammable. R18- In use, may form flammable/explosive vapor-air mixture. R19- May form explosive peroxides. R26/27/28- Very toxic by inhalation, in contact with skin and if swallowed. R36/37/38- Irritating to eyes, respiratory system and skin. 43- May cause sensitization by skin contact. R45- May cause cancer. R46- May cause heritable genetic damage. R47- May cause birth defects. R50- Very toxic to aquatic organisms.
Japanese Regulatory Data	ENCS No. 2-524

Section XVI. Other Information

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Notice to Reader

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. Neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.

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