



SIGMA-ALDRICH

Material Safety Data Sheet

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Version 2.0

Section 1 - Product and Company Information

Product Name	ACETALDEHYDE, 99.5+%, A.C.S. REAGENT		
Product Number	402788		
Brand	Aldrich Chemical		
Company	Sigma-Aldrich		
Street Address	3050 Spruce Street		
City, State, Zip, Country	St. Louis, MO 63103 US		
Technical Phone:	314 771 5765	Emergency Phone:	414 273 3850 Ext.5996
Fax:	800 325 5052		

Section 2 - Composition/Information on Ingredient

<u>Substance Name</u>	<u>CAS #</u>	<u>SARA 313</u>
ACETALDEHYDE	75-07-0	Yes
Formula	C ₂ H ₄ O	
Synonyms	Acetaldehyd (German), Acetaldehyde (ACGIH:OSHA), Acetic aldehyde, Acetylaldehyde, Aldehyde acetique (French), Aldeide acetica (Italian), Ethanal, NCI-C56326, Octowy aldehyd (Polish), RCRA waste number U001	

Section 3 - Hazards Identification

Emergency Overview

Flammable (USA) Extremely Flammable (EU). Toxic.
May cause cancer. Risk of serious damage to eyes. Irritating to eyes, respiratory system, and skin. May cause sensitization by skin contact. Possible risk of harm to the unborn child. Possible risk of irreversible effects. Harmful if swallowed.
Possible mutagen. Lachrymator. Target organ(s): Blood. Kidneys. Lungs. Cardiovascular system. May develop pressure.

HMIS Rating

Health: 2* Flammability: 4 Reactivity: 0

NFPA Ratings

Health: 2 Flammability: 4 Reactivity: 0

*Chronic hazards present. For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

Oral Exposure

If swallowed, wash out mouth with water provided person is conscious. Call a physician.

Inhalation Exposure

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

Dermal Exposure

In case of contact, immediately wash skin with soap and copious amounts of water.

Eye Exposure

In case of contact, immediately flush eyes with copious amounts of water for at least 15 minutes.

Section 5 - Fire Fighting Measures

Explosion Hazards

May explode when heated.

Closed containers may rupture and explode during runaway polymerization.

Vapors may form explosive mixtures with air.

Flash Point:	-40 °F	-40 °C
Explosion Limits:	Lower: 4 %	Upper: 60 %
Autoignition Temp:	175 °C	Flammability: Yes

Extinguishing Media**Suitable**

Carbon dioxide, dry chemical powder, or appropriate foam.

Unsuitable

Water may be effective for cooling, but may not effect extinguishment.

Firefighting**Protective Equipment**

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

Specific Hazard(s)

Extremely flammable. Emits toxic fumes under fire conditions. Vapor may travel considerable distance to source of ignition and flash back.

Specific Method(s) of Fire Fighting

Use water spray to cool fire-exposed containers.

Section 6 - Accidental Release Measures

Procedure to be Followed in Case of Leak or Spill

Evacuate area. Shut off all sources of ignition. Use nonsparking tools.

Procedure(s) of Personal Precaution(s)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

Methods for Cleaning Up

Cover with an activated carbon adsorbent, take up and place in closed containers. Transport outdoors. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

Handling**User Exposure**

Do not breathe vapor. Do not get in eyes, on skin, on clothing. Open carefully. Avoid all contamination. Always open containers slowly to allow any excess pressure to vent.

Storage**Suitable**

Keep container closed. Keep away from heat, sparks, and open flame. Store under nitrogen. Refrigerate.

Section 8 - Exposure Controls / PPE

Engineering Controls

Safety shower and eye bath. Use nonsparking tools. Mechanical exhaust required.

Personal Protective Equipment

Respiratory

NIOSH/MSHA-approved respirator.

Hand

Compatible chemical-resistant gloves.

Eye

Chemical safety goggles.

General Hygiene Measures

Remove and wash contaminated clothing promptly. Wash thoroughly after handling.

Exposure Limits, RTECS

Country	Source	Type	Value	Remarks
USA	ACGIH	Ceiling concentration	45 MG/M3 (25 PPM)	
USA	MSHA Standard-air	TWA	100 PPM (180 MG/M3)	check ACGIH TLV
USA	OSHA.	PEL	8H TWA 200 PPM (360 MG/M3)	
New Zealand	OEL		(18 PPM LOQ)	
USA	NIOSH			

Section 9 - Physical/Chemical Properties**Appearance****Physical State**

Clear liquid

Color

Colorless

Molecular Weight: 44.05 AMU

Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	21 °C	760 mmHg
MP/MP Range	-125 °C	
Freezing Point	N/A	
Vapor Pressure	756.4 mmHg	20 °C
	2,415.4 mmHg	55 °C
Vapor Density	1.52 g/l	
Saturated Vapor Conc.	N/A	
SG/Density	0.785 g/cm3	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point °F	-40 °F	
Flash Point °C	-40 °C	
Explosion Limits	Lower: 4 % Upper: 60 %	
Autoignition Temp	175 °C	
Refractive Index	1.3320	
Solubility	N/A	

Section 10 - Stability and Reactivity**Stability****Stable**

Unstable.

Conditions of Instability

Oxidized readily in air to form unstable peroxides that can lead to spontaneous explosion.

Conditions to Avoid

Sensitive to air. Sensitive to heat.

Materials to Avoid

Oxidizing agents, Reducing agents, Acids, Nitric acid, Peroxides, Bases, Caustic soda, Amines, Ammonia, Oxygen, Chemical contamination..

Hazardous Decomposition Products**Hazardous Decomposition Products**

Carbon monoxide, Carbon dioxide.

Hazardous Polymerization**Hazardous Polymerization**

May undergo autopolymerization, Uncontrolled polymerization can cause rapid evolution of heat and increased pressure which can result in violent rupture of storage vessels or containers..

Section 11 - Toxicological Information

Route of Exposure**Skin Contact**

Causes skin irritation.

Skin Absorption

May be harmful if absorbed through the skin.

Eye Contact

Causes severe eye irritation. Lachrymator.

Inhalation

May be harmful if inhaled. Material is irritating to mucous membranes and upper respiratory tract.

Ingestion

Harmful if swallowed.

Sensitization**Skin**

May cause allergic skin reaction.

Target Organ(s) or System(s)

Blood. Kidneys. Lungs. Cardiovascular system.

Signs and Symptoms of Exposure

Exposure can cause: Pulmonary edema. Effects may be delayed. Nausea. Vomiting. Headache. Blurred vision. Unconsciousness.

RTECS Number: AB1925000

Toxicity Data

Oral - Rat: 661 mg/kg (LD50)

Remarks: Peripheral Nerve and Sensation:Spastic paralysis with or without sensory change.

Behavioral:Altered sleep time (including change in righting reflex).

Lungs, Thorax, or Respiration:Dyspnea.

Inhalation - Rat: 13,300 ppm (LC50)

Remarks: Behavioral:Excitement.

Lungs, Thorax, or Respiration:Dyspnea.

Subcutaneous - Rat: 640 MG/KG (LD50)

Remarks: Behavioral:General anesthetic.

Oral - Mouse: 900 mg/kg (LD50)

Inhalation - Mouse: 23,000 mg/m³ (LC50)

Intraperitoneal - Mouse: 500 MG/KG (LD50)

Subcutaneous - Mouse: 560 MG/KG (LD50)

Remarks: Behavioral:General anesthetic.

Skin - Rabbit: 3,540 mg/kg (LD50)

Inhalation - Hamster: 17,000 ppm (LC50)

Intratracheal - Hamster: 96 MG/KG (LD50)

Inhalation - Mammal: 20,100 mg/m³ (LC50)

Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other.

Behavioral:Excitement.

Lungs, Thorax, or Respiration:Dyspnea.

Irritation Data

Eyes - Human: 50 ppm 15M

Skin - Rabbit: 500 mg

Remarks: Open irritation test

Eyes - Rabbit: 40 mg

Remarks: Severe irritation effect

Chronic Exposure Carcinogen

Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Rat - Inhalation: 735 PPM 6H/2Y I

Result: Tumorigenic:Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Hamster - Inhalation: 2040 PPM 7H/52W I

Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors. Lungs, Thorax, or Respiration:Tumors.

Rat - Inhalation: 1410 PPM 6H/65W I

Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

IARC Carcinogen List

Rating

Group 2B

NTP Carcinogen List

Rating

Anticipated to be a carcinogen.

Chronic Exposure - Teratogen

<u>Species</u>	<u>Dose</u>	<u>Route of Application</u>	<u>Exposure Time</u>
Rat	4800 MG/KG	Oral	(1-20D PREG)
	Result:Possible risk of congenital malformation in the fetus.		
	Result:Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).		
	Specific Developmental Abnormalities: Respiratory system.		
	Specific Developmental Abnormalities: Hepatobiliary system.		
Rat	5040 MG/KG	Oral	(1-21D PREG)
	Result:Specific Developmental Abnormalities: Central nervous system.		
	Specific Developmental Abnormalities: Endocrine system.		
	Specific Developmental Abnormalities: Urogenital system.		
Rat	100 MG/KG	Intraperitoneal	(12D PREG)
	Result:Specific Developmental Abnormalities: Homeostasis		
Rat	400 MG/KG	Intraperitoneal	(8-15D PREG)
	Result:Specific Developmental Abnormalities: Eye, ear.		
	Specific Developmental Abnormalities: Musculoskeletal system.		
Rat	600 MG/KG	Intraperitoneal	(8-15D PREG)
	Result:Specific Developmental Abnormalities: Craniofacial (including nose and tongue).		
Mouse	640 UG/KG	Intraperitoneal	(10D PREG)
	Result:Specific Developmental Abnormalities: Musculoskeletal system.		

Chronic Exposure - Mutagen

<u>Species</u>	<u>Dose</u>	<u>Route</u>	<u>Exposure Time</u>	<u>Cell Type</u>	<u>Mutation test</u>
	Result: Laboratory experiments have shown mutagenic effects.				

Human	1560 UMOL/L			lymphocyte	DNA damage
Human	3 MMOL/L			Other cell types	DNA damage
Human	30 MMOL/L			Other cell types	DNA inhibition
Human	30 MMOL/L			Other cell types	Other mutation test systems
Human	10 MMOL/L			HeLa cell	DNA inhibition
Human	1000 PPM		72H	leukocyte	Cytogenetic analysis
Human	1200 UMOL/L			lymphocyte	Sister chromatid exchange
Human	40 UMOL/L			fibroblast	Sister chromatid exchange
Human	5 MMOL/L			fibroblast	Mutation in mammalian somatic cells.
Rat	500 UMOL/L			fibroblast	Micronucleus test
Rat	3 MMOL/L		3H	kidney	Morphological transformation.
Rat	100 UMOL/L			fibroblast	Morphological transformation.
Rat	200 MMOL/L			liver	DNA damage
Rat	1000 PPM	Inhalation	6H/5D		DNA damage
Rat	500 MMOL/L			Other cell types	DNA damage
Rat	12500 UMOL/L			Other cell types	Other mutation test systems
Rat	1 MMOL/L			fibroblast	DNA inhibition
Rat	1 MMOL/L			fibroblast	Other mutation test systems
Rat	100 UMOL/L			fibroblast	Cytogenetic analysis
Mouse	95 MG/KG	Intraperitoneal			Micronucleus test
Mouse	10 MG/L			Embryo	Morphological transformation.
Mouse	15 NG/KG	Intraperitoneal			Sister chromatid exchange
Mouse	4 MMOL/L			lymphocyte	Mutation in mammalian somatic cells.
Hamster	40 PPM			Embryo	Cytogenetic analysis
Hamster	500 UG/KG	Intraperitoneal			Sister chromatid exchange
Hamster	30 UMOL/L			ovary	Sister chromatid exchange
Hamster	20 PPM			Embryo	SLN
Mammal	1 MOL/L		30M	lymphocyte	DNA damage

Chronic Exposure - Reproductive Hazard

<u>Species</u>	<u>Dose</u>	<u>Route of Application</u>	<u>Exposure Time</u>
Rat	5040 MG/KG	Oral	(1-21D PREG)
	Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).		
Rat	300 MG/KG	Intraperitoneal	(8-13D PREG)
	Result: Effects on Newborn: Behavioral.		
Rat	50 MG/KG	Intraperitoneal	(12D PREG)
	Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Extra embryonic structures (e.g., placenta, umbilical cord). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).		
Mouse	120 MG/KG	Intravenous	(7-9D PREG)
	Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).		
Mouse	4 GM/KG	Intravenous	(6D PREG)
	Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Specific Developmental Abnormalities: Central nervous system.		

Section 12 - Ecological Information

Section 13 - Disposal Considerations

Appropriate Method of Disposal of Substance or Preparation

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable.

Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT

Proper Shipping Name: Acetaldehyde
UN#: 1089
Class: 3
Packing Group: Packing Group I
PIH: Not PIH

IATA

Proper Shipping Name: Acetaldehyde
IATA Number: 1089
Hazard Class: 3
Packing Group: I

Section 15 - Regulatory Information

EU Directives Classification

Symbol of Danger: F+ Xn

Indication of Danger

Extremely Flammable. Harmful.

Risk Statements R: 12 36/37 40

Extremely flammable. Irritating to eyes and respiratory system. Possible risk of irreversible effects.

Safety Statements S: 16 33 36/37

Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. Wear suitable protective clothing and gloves.

US Classification and Label Text

Indication of Danger

Flammable (USA) Extremely Flammable (EU). Toxic.

Risk Statements

May cause cancer. Risk of serious damage to eyes. Irritating to eyes, respiratory system, and skin. May cause sensitization by skin contact. Possible risk of harm to the unborn child. Possible risk of irreversible effects. Harmful if swallowed.

Safety Statements

Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US Statements

Possible mutagen. Lachrymator. Target organ(s): Blood. Kidneys. Lungs. Cardiovascular system. May develop pressure.

Handling and Storage

Store under nitrogen. Refrigerate. Air sensitive. Heat-sensitive.

United States Regulatory Information

SARA 313 Listed: Yes

Deminimis: 0.1 %

Notes: This product is subject to SARA section 313 reporting requirements.

TSCA Inventory Item: Yes

United States - State Regulatory Information

California Prop - 65

California Proposition 65: This product is or contains chemical(s) known to the state of California to cause cancer.

Section 16 - Other Information

Warranty

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of

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