

Material Safety Data Sheet

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Version 1.8

According to 91/155/EEC

1 - Product and Company Information

Product Name ACETALDEHYDE, 99.5+%, A.C.S. REAGENT
Product Number 402788

Company Sigma-Aldrich Pte Ltd
#08-01 Citilink Warehouse
Singapore 118529
Singapore

Technical Phone # 65 271 1089
Fax 65 271 1571

2 - Composition/Information on Ingredients

| Product Name | CAS # | EC no | Annex I Index Number |
|--------------|---------|-----------|-------------------------|
| ACETALDEHYDE | 75-07-0 | 200-836-8 | 605-003-00-6 |

Formula C2H4O
Molecular Weight 44.05 AMU
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

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT
Extremely flammable. Irritating to eyes and respiratory system.
Limited evidence of a carcinogenic effect.
Carc. Cat.3

4 - First Aid Measures

AFTER INHALATION

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

AFTER SKIN CONTACT

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

AFTER EYE CONTACT

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

AFTER INGESTION

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

5 - Fire Fighting Measures

EXTINGUISHING MEDIA

Suitable: Carbon dioxide, dry chemical powder, or appropriate foam.

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

SPECIAL RISKS

Specific Hazard(s): Extremely flammable. Emits toxic fumes under fire conditions. Vapor may travel considerable distance to source of ignition and flash back.

Explosion Hazards: May explode when heated. Closed containers may rupture and explode during runaway polymerization. Vapors may form explosive mixtures with air.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

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

SPECIFIC METHOD(S) OF FIRE FIGHTING

Use water spray to cool fire-exposed containers.

6 - Accidental Release Measures

PERSONAL PRECAUTION PROCEDURES 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

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

7 - Handling and Storage

HANDLING

Directions for Safe Handling: 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

Conditions of Storage: Keep container closed. Keep away from heat, sparks, and open flame. Store under nitrogen. Store at 2-8°C

SPECIAL REQUIREMENTS: Store under inert gas. May develop pressure. Air sensitive.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS

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

GENERAL HYGIENE MEASURES

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

| EXPOSURE LIMITS | | | |
|-----------------|--------|-------|---------|
| Country | Source | Type | Value |
| Poland | | NDS | 5 MG/M3 |
| Poland | | NDSch | - |
| Poland | | NDSP | 45 |

| EXPOSURE LIMITS - DENMARK | | | |
|---------------------------|--------|------|----------|
| | Source | Type | Value |
| | OEL | TWA | 45 mg/m3 |
| | | | 25 ppm |

Remarks: LK

| EXPOSURE LIMITS - GERMANY | | | |
|---------------------------|----------|------|----------|
| | Source | Type | Value |
| | TRGS 900 | OEL | 90 mg/m3 |
| | | | 50 ppm |

Remarks: =1=

| EXPOSURE LIMITS - NORWAY | | | |
|--------------------------|--------|------|----------|
| | Source | Type | Value |
| | | OEL | 45 mg/m3 |
| | | | 25 ppm |

Remarks: K

| EXPOSURE LIMITS - SWEDEN | | | |
|--------------------------|--------|------------|----------|
| | Source | Type | Value |
| | | LLV (Level | 45 mg/m3 |
| | | | 25 ppm |

Remarks: K

| EXPOSURE LIMITS - SWITZERLAND | | | |
|-------------------------------|--------|------|----------|
| | Source | Type | Value |
| | OEL | OEL | 90 mg/m3 |
| | | | 50 ppm |

Remarks: D

| EXPOSURE LIMITS - UNITED KINGDOM | | | |
|----------------------------------|--------|------|----------|
| | Source | Type | Value |
| | OEL | OEL | 37 mg/m3 |
| | | | 20 ppm |
| | OEL | STEL | 92 mg/m3 |
| | | | 50 ppm |

PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection: Government approved respirator.

Hand Protection: Compatible chemical-resistant gloves.

Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

| | | |
|-------------------|------------------------------|----------------------------|
| Appearance | Physical State: Clear liquid | |
| | Color: Colorless | |
| Property | Value | At Temperature or Pressure |
| pH | N/A | |
| BP/BP Range | 21 °C | 760 mmHg |
| MP/MP Range | -125 °C | |
| Flash Point | -40 °C | Method: closed cup |
| Flammability | N/A | |
| Autoignition Temp | 175 °C | |

| | |
|-----------------------|---------------------------------------|
| Oxidizing Properties | N/A |
| Explosive Properties | N/A |
| Explosion Limits | Lower: 4 % Upper: 60 % |
| Vapor Pressure | 756.4 mmHg 2415.4 mm20 °C 55 °C Hg |
| SG/Density | 0.785 g/cm3 |
| Partition Coefficient | Log Kow: 0.5 |
| Viscosity | 0.24 Pas 20 °C |
| Vapor Density | 1.52 g/l |
| Saturated Vapor Conc. | N/A |
| Evaporation Rate | N/A |
| Bulk Density | N/A |
| Decomposition Temp. | N/A |
| Solvent Content | N/A |
| Water Content | N/A |
| Surface Tension | N/A |
| Conductivity | N/A |
| Miscellaneous Data | N/A |
| Solubility | N/A |

10 - Stability and Reactivity

STABILITY

Stable: Unstable.

Conditions to Avoid: Air.

Materials to Avoid: Oxidizing agents, Reducing agents, Acids, Nitric acid, Peroxides, Bases, Caustic soda, Amines, Ammonia, Oxygen, Chemical contamination
Warning: acetaldehyde is oxidized rapidly and exothermically by air, to acetic acid.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION

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

11 - Toxicological Information

RTECS NUMBER: AB1925000

ACUTE TOXICITY

LD50

Oral

Rat

661 mg/kg

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.

LC50

Inhalation

Rat

13,300 ppm

4H

Remarks: Behavioral: Excitement. Lungs, Thorax, or

Respiration:Dyspnea.

LD50
Subcutaneous
Rat
640 MG/KG
Remarks: Behavioral:General anesthetic.

LD50
Oral
Mouse
900 mg/kg

LC50
Inhalation
Mouse
23,000 mg/m³
4H

LD50
Intraperitoneal
Mouse
500 MG/KG

LD50
Subcutaneous
Mouse
560 MG/KG
Remarks: Behavioral:General anesthetic.

LD50
Skin
Rabbit
3540 mg/kg

LC50
Inhalation
Hamster
17,000 ppm
4H

LD50
Intratracheal
Hamster
96 MG/KG

LC50
Inhalation
Mammal
20,100 mg/m³
Remarks: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Other. Behavioral:Excitement. Lungs, Thorax, or Respiration:Dyspnea.

IRRITATION DATA

Skin
Rabbit
500 mg
Remarks: Mild irritation effect

Eyes
Human

50 ppm
15M

Skin
Rabbit
500 mg
Remarks: Open irritation test

Eyes
Rabbit
40 mg
Remarks: Severe irritation effect

SENSITIZATION

Sensitization: Photosensitizer.
Skin: May cause allergic skin reaction.

SIGNS AND SYMPTOMS OF EXPOSURE

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

ROUTE OF EXPOSURE

Skin Contact: May cause 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.

TARGET ORGAN INFORMATION

Blood. Kidneys. Lungs. Cardiovascular system. Liver. Central nervous system.

CHRONIC EXPOSURE - CARCINOGEN

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

Rat

Route of Application: Inhalation
Exposure Time: 6H/2Y
Result: Tumorigenic: Carcinogenic by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste): Olfaction: Tumors.

Hamster

Route of Application: Inhalation
Exposure Time: 7H/52W
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

Route of Application: Inhalation
Exposure Time: 6H/65W
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

CHRONIC EXPOSURE - MUTAGEN

Result: Laboratory experiments have shown mutagenic effects.

Human
1560 UMOL/L
Cell Type: lymphocyte
DNA damage

Human
3 MMOL/L
Cell Type: Other cell types
DNA damage

Human
30 MMOL/L
Cell Type: Other cell types
DNA inhibition

Human
30 MMOL/L
Cell Type: Other cell types
Other mutation test systems

Human
10 MMOL/L
Cell Type: HeLa cell
DNA inhibition

Human
1000 PPM
72H
Cell Type: leukocyte
Cytogenetic analysis

Human
1200 UMOL/L
Cell Type: lymphocyte
Sister chromatid exchange

Human
40 UMOL/L
Cell Type: fibroblast
Sister chromatid exchange

Human
5 MMOL/L
Cell Type: fibroblast
Mutation in mammalian somatic cells.

Rat
500 UMOL/L
Cell Type: fibroblast
Micronucleus test

Rat
3 MMOL/L
3H
Cell Type: kidney
Morphological transformation.

Rat
100 UMOL/L

Cell Type: fibroblast
Morphological transformation.

Rat
200 MMOL/L
Cell Type: liver
DNA damage

Rat
1000 PPM
Inhalation
6H/5D
DNA damage

Rat
500 MMOL/L
Cell Type: Other cell types
DNA damage

Rat
12500 UMOL/L
Cell Type: Other cell types
Other mutation test systems

Rat
1 MMOL/L
Cell Type: fibroblast
DNA inhibition

Rat
1 MMOL/L
Cell Type: fibroblast
Other mutation test systems

Rat
100 UMOL/L
Cell Type: fibroblast
Cytogenetic analysis

Mouse
95 MG/KG
Intraperitoneal
Micronucleus test

Mouse
10 MG/L
Cell Type: Embryo
Morphological transformation.

Mouse
15 NG/KG
Intraperitoneal
Sister chromatid exchange

Mouse
4 MMOL/L
Cell Type: lymphocyte
Mutation in mammalian somatic cells.

Hamster
40 PPM
Cell Type: Embryo

Cytogenetic analysis

Hamster
500 UG/KG
Intraperitoneal
Sister chromatid exchange

Hamster
30 UMOL/L
Cell Type: ovary
Sister chromatid exchange

Hamster
20 PPM
Cell Type: Embryo
SLN

Mammal
1 MOL/L
30M
Cell Type: lymphocyte
DNA damage

CHRONIC EXPOSURE - TERATOGEN

Result: Laboratory experiments have shown teratogenic effects.

Species: Rat
Dose: 4800 MG/KG
Route of Application: Oral
Exposure Time: (1-20D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Respiratory system. Specific Developmental Abnormalities: Hepatobiliary system.

Species: Rat
Dose: 5040 MG/KG
Route of Application: Oral
Exposure Time: (1-21D PREG)
Result: Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Endocrine system. Specific Developmental Abnormalities: Urogenital system.

Species: Rat
Dose: 100 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (12D PREG)
Result: Specific Developmental Abnormalities: Homeostasis

Species: Rat
Dose: 400 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (8-15D PREG)
Result: Specific Developmental Abnormalities: Eye, ear. Specific Developmental Abnormalities: Musculoskeletal system.

Species: Rat
Dose: 600 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (8-15D PREG)
Result: Specific Developmental Abnormalities: Craniofacial (including nose and tongue).

Species: Mouse
Dose: 640 UG/KG
Route of Application: Intraperitoneal
Exposure Time: (10D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 5040 MG/KG
Route of Application: Oral
Exposure Time: (1-21D PREG)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain).

Species: Rat
Dose: 300 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (8-13D PREG)
Result: Effects on Newborn: Behavioral.

Species: Rat
Dose: 50 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (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).

Species: Mouse
Dose: 120 MG/KG
Route of Application: Intravenous
Exposure Time: (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).

Species: Mouse
Dose: 4 GM/KG
Route of Application: Intravenous
Exposure Time: (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.

CMR CAT.: Carc. Cat.3

12 - Ecological Information

ECOTOXICOLOGICAL EFFECTS

Test Type: EC50 Algae
Time: 24 h
Value: 270 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h

Value: 48 mg/l

Test Type: LC50 Fish
Species: Pimephales promelas (Fathead minnow)
Time: 96 h
Value: 31 mg/l

Test Type: LC50 Fish
Species: Lepomis macrochirus (Bluegill)
Time: 96 h
Value: 53 mg/l

Test Type: LC100 Fish
Species: Leuciscus idus
Time: 48 h
Value: 124 - 156 mg/l

13 - Disposal Considerations

SUBSTANCE DISPOSAL

Contact a licensed professional waste disposal service to dispose of this material. 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.

14 - Transport Information

RID/ADR

UN#: 1089
Class: 3
PG: I
Proper Shipping Name: Acetaldehyde

IMDG

UN#: 1089
Class: 3
PG: I
Proper Shipping Name: Acetaldehyde
Marine Pollutant: No
Severe Marine Pollutant: No

IATA

UN#: 1089
Class: 3
PG: I
Proper Shipping Name: Acetaldehyde
Inhalation Packing Group I: No

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

ANNEX I INDEX NUMBER: 605-003-00-6
INDICATION OF DANGER: F+ Xn
Extremely Flammable. Harmful.
R-PHRASES: 12 36/37 40
Extremely flammable. Irritating to eyes and respiratory system.
Limited evidence of a carcinogenic effect.
S-PHRASES: 16 33 36/37
Keep away from sources of ignition - no smoking. Take precautionary measures against static discharges. Wear suitable protective clothing and gloves.

COUNTRY SPECIFIC INFORMATION

Germany

WGK: 1

SWITZERLAND

SWISS POISON CLASS: 4

NORWAY

Labelling for organic solvents where the package is 1liter or more.

YL-tall m3/l: 34667

YL-group: 5

Risk phrases: 20

Harmful by inhalation.

Safety phrases: 38 42 210

In case of insufficient ventilation, wear suitable respiratory equipment. During fumigation/spraying wear suitable respiratory equipment. Use compressed air- or fresh air line breathing apparatus in confined spaces.

Labelling for organic solvents where the package is 1liter or more.

YL-tall m3/l: 34666

YL-group: 5

Risk phrases: 20

Harmful by inhalation.

Safety phrases: 38 42 210

In case of insufficient ventilation, wear suitable respiratory equipment. During fumigation/spraying wear suitable respiratory equipment. Use compressed air- or fresh air line breathing apparatus in confined spaces.

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. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. 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 invoice or packing slip for additional terms and conditions of sale. Copyright 2004 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

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