



Laboratory safety and health training at National Taipei Univ. of Technology

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Is your laboratory safe?

- What do you do in the laboratory?
- Is there anything in the lab that might become harmful under certain condition?
- Are you doing anything about the potential problem?

What's going on in the picture? Can you see anything wrong?



There is no such thing as absolute safety

But how safe is your laboratory?

- What are the sources of potential danger?
- What can you do about the risks?
 - Accept the consequences?
 - Control for damages?
 - Lower the chance of unsafe conditions?

A laboratory is not a place for fun

- A laboratory may present environmental conditions that can be hazardous in certain conditions (e.g., “slippery when wet”)
 - Fire, explosion, electric shock
 - Contact with hazardous substances
 - Injuries from equipment, fallen objects, etc.
 - Injuries due to improper movements
 - What else?

Accidents do occur in the laboratories

- Leading primary causes of lab accidents
 - Fire/explosion
 - Improper equipment use
 - Use of faulty instrument
 - Improper work posture/procedures
- Leading indirect-causes of lab accidents
 - Unsafe environment
 - Unsafe behavior

Lab safety and health

Why do you have to know about it...

- Because anything that can go wrong will go wrong.
- Better knowledge helps protect yourself and others while working in the lab
- Required by law
 - Occupational Safety and Health Law requires safety and health training; students working in lab also need to be trained

What do you need to do?

- Look and think carefully before you start working
 - What's going on in the lab?
 - Is there any potential hazard?
 - What can you do to reduce getting hurt while working in the lab?



What's in the laboratory?

- Chemicals, microbes/plants/animals
- Tools, equipment
- Machines, computers
- Desks, chairs
- What else?
- When might these become hazards, and what kind of hazards?



Basic laboratory safety and health practice

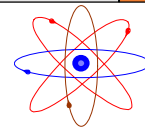
- General directions
- Hazard recognition & assessment
- Hazard prevention & control

Hazard recognition & assessment

- To identify potential hazards and their likelihood of harm.
- General questions
 - What are the potential hazards?
 - How likely are the hazards to occur?

Hazard recognition & assessment

- In general, potential hazards in a laboratory (workplace) may be categorized as
 - Physical hazards
 - Chemical hazards
 - Biological hazards
 - Ergonomic hazards
 - Safety hazards



Physical hazards

- Direct/indirect contact with excess forces or energy
 - Heat, light, sound, pressure, movement
- May present immediate danger, cause discomfort and impair productivity, or lead to long-term health effects
 - Heat: extreme (high or low) ambient temperature
 - Light: too much (or too little) light
 - Ionizing radiation
 - Electromagnetic/microwave radiation
 - Extreme air pressure
 - Noise (too loud)
 - Vibration

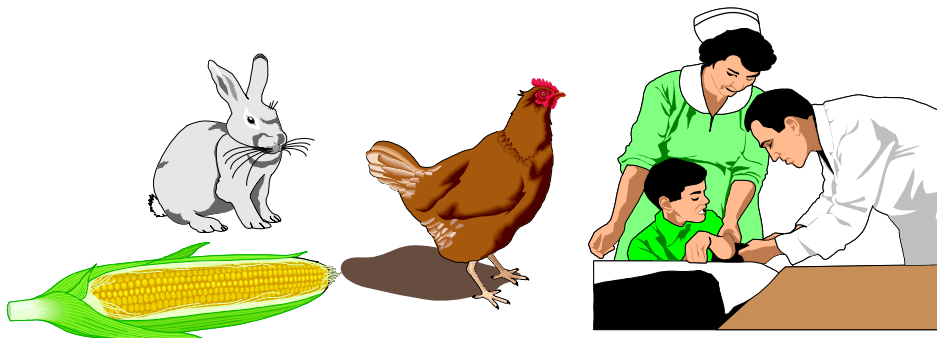


Chemical hazards

- Contact with chemical substances
- Hazards differ with chemical properties (melting/boiling point, water solubility, reactivity, etc.) and exposure characteristics
 - Direct contact, ingestion or inhalation
 - Amount, duration and frequency of contact

Biological hazards

- Hazards from animals, plants, microbes or their derivatives (metabolite, excreta, etc.)
- Potential effects include infection, poisoning, allergy

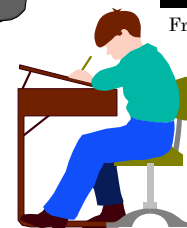


Ergonomic hazards

- Factors related to work area layout, tool design, work procedure, and personal characteristics that, improperly designed or used, may cause injuries, discomforts and/or poor work performance
 - Poor work posture/procedure
 - Unsafe work environment
 - Improper human-device interface
- Typical issues include lower back pain, carpal-tunnel syndrome, sore/stiff neck, shoulders, eye strains, etc.



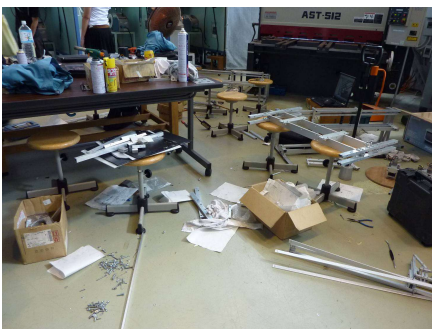
From Wikipedia



Safety hazards

- Unsafe environment or unsafe work practice that may cause injuries or immediate danger to workers or nearby individuals
 - Electricity
 - Mechanical equipment
 - Fire and explosion
 - Confined space

So, what type(s) of hazard(s) do you see in the picture?



Laboratory safety and health rules

- Before starting to work in a laboratory, you should always look for safety and health guidelines and carefully follow through
 - Look for potential hazards in the lab
 - Follow safety and health rules for lab works

How to identify potential hazards in the lab

- Look for signs of “what might go wrong”
 - Mechanical equipment: electrical hazards, injuries from moving parts
 - Noise, vibration, heat, pressure, radiation
 - Chemical & biological hazards
 - Ergonomic hazards: strained arms, back, neck, eyes, prone to accidents/failure, reduced productivity, etc.

Observe warning signs for potential hazards

- Some potential hazards may be labeled outside the lab.
Identify the hazards and follow recommended procedures



Watch out for hazardous chemicals

- Check out for hazard labels on container
- Nine **pictograms**
- Read safety data sheet before use



Example of GHS hazard label



Example of Hazard Posting

- Mostly in industrial areas where large amount may be stored and/or used.
- Whenever space permitted, complete labels should be used
- Always refer to **Safety Data Sheet** for further information

對二氯苯 (p-Dichlorobenzene)



警告

危害成分：對二氯苯

危害警告訊息：

可燃液體
吞食有害
造成皮膚刺激
造成眼睛刺激
懷疑致癌
對水生生物毒性非常大並具有長期持續影響

危害防範措施：

勿吸入粉塵
避免與眼睛接觸
若吞食，立即洽詢醫務，並出示此容器或標籤
避免釋放至環境中

製造商或供應商：(1)名稱：台灣默克股份有限公司

(2)地址：台北市南京東路五段188號6樓之5

(3)電話：總公司：02-27422788

試藥部客服：0800-068-222

※更詳細的資料，請參考物質安全資料表

本資料僅供參考，使用者需自行判斷其實際可用性。
GHS標示分類可能因採信不同參考資料及其他特殊考量，而有不同之分類結果。

Safety data sheet (SDS)

- Sixteen (16) sections on safety, health hazards of chemicals, safe storage, transportation, handling and disposal, and emergency response measures, etc.
- Standardized format across languages

Example SDS

SIGMA-ALDRICH REDACTED
SAFETY DATA SHEET
 according to Regulation (EC) No. 1272/2008
 Version 2.5 November 2016
 Version 2.5 November 2016
 Product Name: SIGMA-ALDRICH
 CAS No.: 100-101-700

SECTION 1 Identification of the substance/mixture and of the company/manufacturing

1.1 Product identifier
 Product name: 2-Propanol
 Product Number: 27875
 Brand: Sigma-Aldrich
 Molecular Weight: 60.10
 Molecular Weight: 60.10
 CAS No.: 100-101-700

1.2 Relevant identified uses of the substance or mixture and uses advised against
 Identified uses: Laboratory chemical, Manufacture of substances

1.3 Details of the supplier of the safety data sheet
 Company: Sigma-Aldrich Chemie GmbH
 Headquarters: 6-8, BREITENBURGER STRASSE
 Telephone: +49 69 455 14 00
 Fax: +49 69 455 14 10
 E-mail address: sigma@sigmaaldrich.com
 Emergency telephone number: +49 69 455 14 10 (24h/7d/365d)
 Emergency Phone # +49 69 455 14 10 (24h/7d/365d)

SECTION 2 Hazard identification

2.1 Classification of the substance or mixture
 Classification according to Regulation (EC) No 1272/2008
 Hazardous (Category 2), 0202
 Skin Irritation (Category 2), 0310
 Specific Target Organ Toxicity - Single Exposure (Category 3), Central Nervous System, 0330
 For the full list of the H-statements mentioned in this Section, see Section 10.
 Classification according to GHS (European Union) or 1272/2008
 H: H302, H312, H332
 P: P201, P202, P273
 For the full list of the P-phrases mentioned in this Section, see Section 10.

2.2 Label elements
 Labeling according to Regulation (EC) No 1272/2008
 Pictogram: 
 Signal word: Danger
 Precedence: 0202

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In case of emergency

Familiarize yourself with the locations of

- Emergency exit
- Fire alarm/hose/extinguisher
- Emergency eye wash/shower
- First aid kit



Protecting yourself while working in the lab

- Familiarize with laboratory layout and location of emergency response equipment
- Follow ALL safety rules in the lab
- Follow standard operating and experimental procedures
- Use personal protective equipment whenever called for
 - right type, in good condition, correct usage

Personal protective equipment

- Hard hats
- Safety shoes
- Safety glasses
- Ear plugs/ earmuffs
- Gloves
- Clothing
- Respirator

USE properly when called for

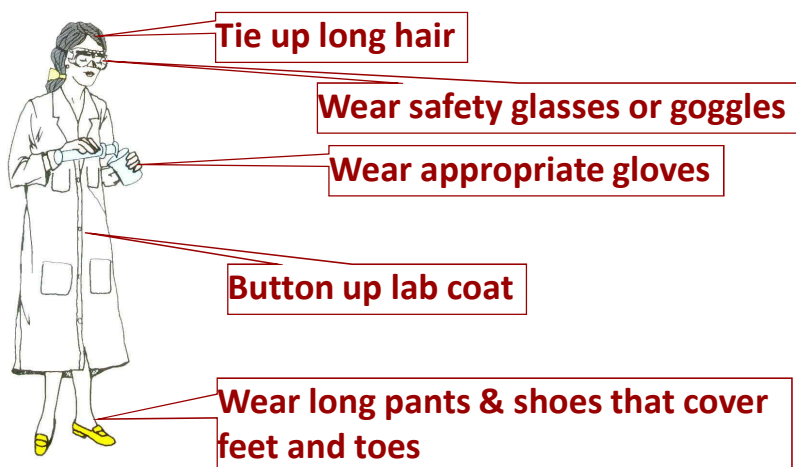


Something about lab coat



- Front opening- easy to put on & take off
- All white- easy to identify possible spray, splash
- Covers most torso and limbs
- Provide (limited) protection from direct contact with chemicals

Lab coat is mostly compatible with other protective gears



Tips on lab safety and health

- Keep things in order
- Watch out for incompatible wastes
- When using chemicals, direct vessel opening away from nearby individuals
- Label potential hazards, including chemicals and moving (or stopped) mechanical equipments (to avoid accidental contact)
- Watch out for electrical hazards (wire grounding, electric overloading, etc.)

Before starting an experiment:

- Check out for dangerous materials and their requirements for safe handling
- Check out emergency response in case of spills and releases
- Look for emergency exit, alternate retreat route
- Look for fire extinguisher, emergency eye wash, emergency shower, first aid kit, etc.
- Check for internal and external phone number in case of emergency



General rules on lab safety and health



1. Observe emergency retreat procedures
2. Keep areas of emergency eye wash, shower, fire extinguisher free of obstruction
3. No eating, drinking or smoking in the lab
4. Do not wear sandals, slippers in the lab
5. Follow rules on the use of personal protective equipment
6. Report fires and/or chemical spills if unable to control properly

General rules on lab safety and health (2)

7. Report any work-related injuries or diseases
8. Get permission to perform potentially dangerous experiments
9. Label ALL chemical containers for major substance, potential hazards, who owns it, and date of production/package
10. Follow all safety requirements when handling chemical and/or biological materials.
11. Follow safety requirements when handling hazardous chemicals

Something about contact lens use

- In laboratories handling chemical or biological materials, contact lenses should not be used
 - Chemicals may be absorbed onto contact lenses, causing material degradation or chemical irritation to the eyes
 - Biological material may contaminate contact lens, causing irritation or even eye infection
 - In case of chemical splashes, additional injuries may result to contact lens wearer

Summary: Laboratory Safety and Health

- | | |
|--|--|
| <ul style="list-style-type: none">■ Potential hazards<ul style="list-style-type: none">➤ Chemical hazards➤ Physical hazards➤ Biological hazards➤ Ergonomic hazards➤ Safety hazards | <ul style="list-style-type: none">■ Safety and health requirements<ul style="list-style-type: none">➤ Hazard identification➤ Safety requirement➤ Hazardous chemicals & SDS➤ Personal protection |
|--|--|

Observe potential hazards and follow safety & health guidelines.

GHS pictogram



For more information...

- American Chemical Society (ACS, USA):
Chemical safety and practices & recommendations
<https://www.acs.org/content/acs/en/about/governance/committees/chemicalsafety/safetypractices.html>
- The UC Center for Laboratory Safety: Chemical safety
<https://ehs.ucla.edu/chemical-safety>
- National Institute for Occupational Safety and Health (NIOSH, USA)
<http://www.cdc.gov/niosh/homepage.html>

SAFETY DATA SHEET

according to Regulation (EC) No. 1907/2006

Version 5.5 Revision Date 15.01.2015

Print Date 17.04.2017

GENERIC EU MSDS - NO COUNTRY SPECIFIC DATA - NO OEL DATA

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifiers

Product name : 2-Propanol

Product Number : 278475

Brand : Sigma-Aldrich

Index-No. : 603-117-00-0

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No. : 67-63-0

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich Chemie GmbH
Riedstrasse 2
D-89555 STEINHEIM

Telephone : +49 89-6513-1444

Fax : +49 7329-97-2319

E-mail address : eurtechserv@sial.com

1.4 Emergency telephone number

Emergency Phone # : 0800 181 7059 (CHEMTREC Deutschland)
+49 (0)696 43508409 (CHEMTREC weltweit)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Flammable liquids (Category 2), H225

Eye irritation (Category 2), H319

Specific target organ toxicity - single exposure (Category 3), Central nervous system, H336

For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to EU Directives 67/548/EEC or 1999/45/EC

F	Highly flammable	R11
Xi	Irritant	R36
		R67

For the full text of the R-phrases mentioned in this Section, see Section 16.

2.2 Label elements

Labelling according Regulation (EC) No 1272/2008

Pictogram



Signal word

Danger

Hazard statement(s)	
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
Precautionary statement(s)	
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261	Avoid breathing vapours.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Supplemental Hazard Statements	none

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substances

Synonyms	:	sec-Propyl alcohol Isopropyl alcohol Isopropanol
Formula	:	C ₃ H ₈ O
Molecular weight	:	60,10 g/mol
CAS-No.	:	67-63-0
EC-No.	:	200-661-7
Index-No.	:	603-117-00-0

Hazardous ingredients according to Regulation (EC) No 1272/2008

Component	Classification	Concentration
2-Propanol		
CAS-No. 67-63-0 EC-No. 200-661-7 Index-No. 603-117-00-0	Flam. Liq. 2; Eye Irrit. 2; STOT SE 3; H225, H319, H336	<= 100 %

Hazardous ingredients according to Directive 1999/45/EC

Component	Classification	Concentration
2-Propanol		
CAS-No. 67-63-0 EC-No. 200-661-7 Index-No. 603-117-00-0	F, Xi, R11 - R36 - R67	<= 100 %

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance.

If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

4.3 Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting measures**5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture

Carbon oxides

5.3 Advice for firefighters

Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information

Use water spray to cool unopened containers.

SECTION 6: Accidental release measures**6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

6.4 Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage**7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Store in cool place. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Handle and store under inert gas. hygroscopic
Storage class (TRGS 510): Flammable liquids

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Components with workplace control parameters

8.2 Exposure controls

Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

Personal protective equipment

Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Full contact

Material: Nitrile rubber

Minimum layer thickness: 0,4 mm

Break through time: 480 min

Material tested: Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact

Material: Nitrile rubber

Minimum layer thickness: 0,2 mm

Break through time: 60 min

Material tested: Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

impervious clothing, Flame retardant antistatic protective clothing., The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

a) Appearance	Form: liquid Colour: colourless
b) Odour	alcohol-like
c) Odour Threshold	No data available
d) pH	No data available
e) Melting point/freezing point	Melting point/range: -89,5 °C
f) Initial boiling point and boiling range	82 °C
g) Flash point	12,0 °C - closed cup
h) Evaporation rate	3,0
i) Flammability (solid, gas)	No data available
j) Upper/lower flammability or explosive limits	Upper explosion limit: 12,7 %(V) Lower explosion limit: 2 %(V)
k) Vapour pressure	43,2 hPa at 20,0 °C 58,7 hPa at 25,0 °C
l) Vapour density	No data available
m) Relative density	0,785 g/mL at 25 °C
n) Water solubility	completely soluble
o) Partition coefficient: n-octanol/water	log Pow: 0,05
p) Auto-ignition temperature	425,0 °C
q) Decomposition temperature	No data available
r) Viscosity	No data available
s) Explosive properties	No data available
t) Oxidizing properties	No data available

9.2 Other safety information

Surface tension	20,8 mN/m at 25,0 °C
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SECTION 10: Stability and reactivity

10.1 Reactivity

No data available

10.2 Chemical stability

Stable under recommended storage conditions.

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

No data available

10.4 Conditions to avoid

Heat, flames and sparks.

10.5 Incompatible materials

Oxidizing agents, Acid anhydrides, Aluminium, Halogenated compounds, Acids

10.6 Hazardous decomposition products

Other decomposition products - No data available

In the event of fire: see section 5

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - 5.045 mg/kg

Remarks: Behavioral: Altered sleep time (including change in righting reflex). Behavioral: Somnolence (general depressed activity).

LC50 Inhalation - Rat - 8 h - 16000 ppm

LD50 Dermal - Rabbit - 12.800 mg/kg

Skin corrosion/irritation

Skin - Rabbit

Result: Mild skin irritation

Serious eye damage/eye irritation

Eyes - Rabbit

Result: Eye irritation - 24 h

Respiratory or skin sensitisation

No data available

Germ cell mutagenicity

No data available

Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (2-Propanol)

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

Inhalation, Oral - May cause drowsiness or dizziness.

Specific target organ toxicity - repeated exposure

No data available

Aspiration hazard

No data available

Additional Information

RTECS: NT8050000

Central nervous system depression, prolonged or repeated exposure can cause: Nausea, Headache, Vomiting, narcosis, Drowsiness, Overexposure may cause mild, reversible liver effects., Aspiration may lead to: Lung oedema, Pneumonia

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney - Irregularities - Based on Human Evidence

SECTION 12: Ecological information

12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 9.640,00 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 5.102,00 mg/l - 24 h
	Immobilization EC50 - Daphnia magna (Water flea) - 6.851 mg/l - 24 h
Toxicity to algae	EC50 - Desmodesmus subspicatus (green algae) - > 2.000,00 mg/l - 72 h
	EC50 - Algae - > 1.000,00 mg/l - 24 h

12.2 Persistence and degradability

No data available

12.3 Bioaccumulative potential

No bioaccumulation is to be expected (log Pow ≤ 4).

12.4 Mobility in soil

No data available

12.5 Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company.

Contaminated packaging

Dispose of as unused product.

SECTION 14: Transport information

14.1 UN number

ADR/RID: 1219

IMDG: 1219

IATA: 1219

14.2 UN proper shipping name

ADR/RID: ISOPROPANOL

IMDG: ISOPROPANOL

IATA: Isopropanol

14.3 Transport hazard class(es)

ADR/RID: 3

IMDG: 3

IATA: 3

14.4 Packaging group

ADR/RID: II

IMDG: II

IATA: II

14.5 Environmental hazards

ADR/RID: no

IMDG Marine pollutant: no

IATA: no

14.6 Special precautions for user

No data available

SECTION 15: Regulatory information

This safety datasheet complies with the requirements of Regulation (EC) No. 1907/2006.

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

No data available

15.2 Chemical Safety Assessment

For this product a chemical safety assessment was not carried out

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3.

Eye Irrit.	Eye irritation
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H319	Causes serious eye irritation.
H336	May cause drowsiness or dizziness.
STOT SE	Specific target organ toxicity - single exposure

Full text of R-phrases referred to under sections 2 and 3

F	Highly flammable
Xi	Irritant
R11	Highly flammable.
R36	Irritating to eyes.
R67	Vapours may cause drowsiness and dizziness.

Further information

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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 Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.