

1. Product Identification.

Name of product: 1,4-Dioxane
Recommended use: Fine chemical for synthesis.

2. Composition/ Information on Ingredients.

CAS number: 000123-91-1 1,4-Dioxane.
EC number: 204-661-8
Index number: 603-024-00-5

3. Hazards Identification.

R-phrases: 11 Highly flammable.
19 May form explosive peroxides.
36/37 Irritating to eyes and respiratory system.
40 Limited evidence of a carcinogenic effect.
66 Repeated exposure may cause skin dryness or cracking.

4. First Aid Measures.

General information: Remove contaminated soaked clothing immediately. Consult a physician.

In case of inhalation: Move to fresh air in case of accidental inhalation of vapours. Seek medical advice immediately.

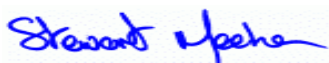
In case of skin contact: Wash off with soap and plenty of water. Consult a doctor if skin irritation persists.

In case of eye contact: Rinse immediately with plenty of water, also under the eyelids. Seek medical treatment by eye specialist.

In case of ingestion: Induce vomiting only upon the advice of a physician. Summon a doctor immediately. Immediately give plenty of water, if possible charcoal slurry.

5. Fire Fighting Measures.

Suitable extinguishing material: Foam, carbon dioxide (CO₂), dry chemical, water spray.
Unsuitable extinguishing material: Full water jet.
Hazardous decomposition products: Fire may produce: carbon monoxide and carbon dioxide.
Special fire-fighting equipment: Wear self-contained breathing apparatus and protective suit.



Additional information: Vapours are heavier than air and spread along ground. The vapour/air mixture is explosive, even in empty, uncleaned receptacles. Cool containers at risk with water spray jet.

6. Accidental Release Measures.

Personal precautions: In case of vapour formation use respirator. Ensure adequate ventilation. Remove persons to safety. Use personal protective clothing. Keep away from sources of ignition. Observe protective instructions (see section 7 and 8).

Environmental precautions: Do not discharge into the drains/surface waters/groundwater.

Methods for cleaning up/taking up: Soak with inert absorbent material (e.g. sand, silical gel, acid binder, universal binder). Shovel into suitable container for disposal.

7. Handling & Storage.

Advice on safe handling: Keep container tightly closed. Do not breathe vapours. In case of free handling thoroughly sucking off vapours if necessary. Use only in thoroughly ventilated areas. Avoid contact with skin, eyes and clothing.

Protection against fire and explosion: Keep product and empty container away from heat and sources of ignition. Do not smoke. Take precautionary measures against static discharges.

Storage rooms and vessels conditions: Keep container tightly closed in a dry, cool and well-ventilated place.

Advice on storage compatibility: Incompatible with: bases, acids and oxidising agents.

Information on storage conditions: Keep away from food, drink and animal feeding stuffs.

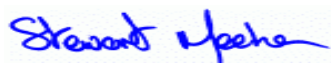
8. Exposure Controls and Personal Protection.

Additional advice on system design: Ensure adequate ventilation, especially in confined areas.

Ingredients with occupational exposure limits to be monitored:

CAS no	Name	Code	mg/m ³	ml/m ³	Remark
000123-91-1	1,4-Dioxane	TLV	91	25	

Respiratory protection: In case of sufficient ventilation wear suitable respiratory equipment (gas filter type A).



Hand protection: Protective gloves resistant to chemicals made of butyl, minimum coat thickness 0.7mm, permeation resistance (wear duration) approx. 480 minutes, i.e. protective glove <Butoject 898> made by KCL. This recommendation refers exclusively to the chemical compatibility and the lab test conforming to EN 374 carried out under lab conditions. Requirements can vary as a function of the use. Therefore it is necessary to adhere additionally to the recommendations given by the manufacturer of the protective gloves.

Eye protection: Eye wash bottle with pure water. Safety goggles with side protection.

Skin protection: Long sleeved clothing.

General protective measures: Do not inhale vapours. Wash hands before breaks and immediately after handling the product. When using, do not eat, drink or smoke. Take off immediately all contaminated clothing. Avoid contact with skin, eyes and clothing.

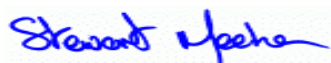
9. Physical and Chemical Properties.

Form: Liquid.
Colour: Colourless.
Odour: Ethereal.
Data for relevant safety:

	Value	Temperature at	Method	Remark
Boiling point:	101.3°C			
Melting point:	11.8°C			
Flash point:	12°C		CC	
Combustion temperature:	180°C			
Lower explosion limit:	2.0 vol-%			
Upper explosion limit:	22.2 vol-%			
Vapour pressure:	41 hPa	20°C		
Density:	1.0356 g/ml	20°C		
Relative vapour density:	3			
Solubility in water:	100%			
Solubility/other:		alcohol		miscible
Partition coefficient (log P _{ow}):	- 0.27			
Viscosity 1 dynamic:	1.3 mPa.s	20°C		

10. Stability & Reactivity.

Conditions to avoid: To avoid thermal decomposition, do not overheat. Reacts with air to form peroxides. Stable under normal conditions.



Materials to avoid: Bases, acids and oxidising agents.

Hazardous decomposition products: Carbon monoxide and carbon dioxide.

Additional information: No decomposition if stored and applied as directed.

11. Toxicological Information.

Acute toxicity/irritability/sensitisation:

	Value/validation	Species	Method	Remark
LD ₅₀ acute oral	7120 mg/kg	rat		
LD ₅₀ acute dermal	7600 mg/kg	rabbit		
LC ₅₀ acute inhalation	46 mg/l (2 h)	rat		

Experiences made from practice: Irritating to eyes and respiratory system. Repeated exposure may cause skin dryness or cracking. Limited evidence of a carcinogenic effect.

Additional information: Ingestion causes irritation to the respiratory system and gastrointestinal disturbance. Inhalation of high vapour concentration may cause symptoms like headache, dizziness, tiredness, nausea and vomiting. Inhalation of vapours in high concentration may cause irritation of respiratory system. Higher exposure may cause lung edema, circulatory collapse and unconsciousness.

12. Ecological Information.

Ecotoxicological effects:

	Value	Species	Method	Validation
Fish	LC ₅₀ > 10000 mg/l (86 h)			
Daphnia	EC ₅₀ 8450 mg/l (24 h)			

Additional ecological information

	Value	Species	Method	Remark
BOD 10 d	0%			

General regulation: Do not flush into surface water or sanitary sewer system. Hazard to waters. Not biodegradable.

13. Disposal Considerations.

Waste code number: 07 01 04*

Name of waste: Other organic solvents, washing liquids and mother liquors.



Recommendations for the product: Can be incinerated, when in compliance with local regulations. Where possible recycling is preferred to disposal.

Recommendations for packaging: Empty containers should be take for local recycling, recovery or waste disposal. Contaminated packaging should be emptied as far as possible and after appropriate cleansing may be taken for reuse. Packaging that cannot be cleaned should be disposed of like the product.

Recommended cleansing agent: Water.

General information: Wastes marked with an asterisk (*) are considered to be hazardous waste pursuant to Directive 91/689/EEC on hazardous waste.

14. Transport Information.

Land and inland navigation transport (ADR/RID/GGVS/GGVE/ADNR)
 Identification: 1165 – 1,4-dioxane
 UN number: 1165
 Class: 3
 Packing group: II
 Hazard number: 33
 Remarks: LQ 4:combination packaging:3l; trays: 11/12l (20 kg total gross mass).

Marine transport IMDG/GGV See:
 Proper shipping name: 1,4-dioxane.
 UN number: 1165
 Class: 3
 Packing group: II
 Marine pollutant: No.
 EmS-number: F-E; S-D.
 Remarks: Limited quantities (chapter 3.4): combination packaging: 11/30 kg (total gross mass); trays: 11/20 kg (total gross mass).

Air transport ICAO/IATA:
 Proper shipping name: 1,4-dioxane.
 UN/ID number: 1165
 Class: 3
 Packing group: II
 Remarks: PAC 305 (5l), CAC 307 (60l)

15. Regulatory Information.

Remarks for classification: According to EC-regulations the product is to be labelled as follows:



Classification:	F	Highly flammable.
	Xn	Harmful.
Risk phrases:	11	Highly flammable.
	19	May form explosive peroxides.
	36/37	Irritating to eyes and respiratory system.
	40	Limited evidence of a carcinogenic effect.
	66	Repeated exposure may cause skin dryness or cracking.
Safety phrases:	16	Keep away from sources of ignition – no smoking.
	36/37	Wear suitable protective clothing and gloves.
	46	If swallowed, seek medical advice immediately and show this container or label.
	9	Keep container in a well-ventilated place.

Hazardous ingredients for labelling: 1,4-dioxane.

Special labelling for certain preparations: EC-label.

VOC standard: VOC content: 100%

16. Other Information.

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