SAFETY DATA SHEET

According to Regulation (EC) No. 1907/2006 (REACH) Article 31, Annex II as amended 2015/830.

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

1.1 Product identifier

Product name: 1,4-Dioxane

Product No. 5413

Additional identification

Chemical name:	Dioxane
Chemical formula:	C4H8O2
INDEX No.	603-024-00-5
CAS-No.	123-91-1
EC No.	204-661-8
REACH Registration No.	

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

Identified uses: For Laboratory, Research or Manufacturing Use.
Uses advised against: Not determined.

1.3 Details of the supplier of the safety data sheet

Avantor Performance Materials Poland S.A.
Sowinskiego 11str., 44-101 Gliwice,
Poland

Telephone: 48 32 239-20-00
Fax: 48 32 239-23-70

Contact person: Product Information Compliance
E-mail: export@avantormaterials.com

E-mail address of person responsible for this SDS: SDS@avantormaterials.com

1.4 Emergency telephone number: CHEMTREC: (44)-870-8200418

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

The product has been classified according to the legislation in force.

Classification according to Regulation (EC) No 1272/2008 as amended.

Physical Hazards		
Flammable liquids	Category 2	H225: Highly flammable liquid and vapour.
Health Hazards		
Serious eye irritation	Category 2	H319: Causes serious eye irritation.
Carcinogenicity	Category 2	H351: Suspected of causing cancer.
Specific Target Organ Toxicity - Single Exposure	Category 3	H335: May cause respiratory irritation.

2.2 Label Elements

Contains: Dioxane

Signal Word: Danger

Hazard Statement(s):
H225: Highly flammable liquid and vapour.
H319: Causes serious eye irritation.
H335: May cause respiratory irritation.
H351: Suspected of causing cancer.

Precautionary Statements

Prevention:
P201: Obtain special instructions before use.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233: Keep container tightly closed.
P260: Do not breathe dust/fume/gas/mist/vapours/spray.
P280: Wear protective gloves/protective clothing/eye protection/face protection.

Response:
P304+P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTRE/doctor if you feel unwell.
P337+P313: If eye irritation persists: Get medical advice/attention.
P308+P313: IF exposed or concerned: Get medical advice/attention.
P370+P378: In case of fire: Use to extinguish.

Supplemental label information
EUH066: Repeated exposure may cause skin dryness or cracking.
EUH019: May form explosive peroxides.

2.3 Other hazards No data available.

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Concentration	CAS-No.	EC No.	REACH Registration No.	M-Factor:	Notes
Dioxane	50 - <100%	123-91-1	204-661-8	No data available.	No data available.	#

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.
# This substance has workplace exposure limit(s).

SECTION 4: First Aid Measures

General: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.

4.1 Description of first aid measures

Inhalation: Move to fresh air. Call a POISON CENTRE/doctor if you feel unwell.

Skin Contact:	Wash skin thoroughly with soap and water. If skin irritation occurs: Get medical advice/attention.
Eye contact:	Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a doctor or poison control centre immediately.
Ingestion:	Immediately call a POISON CENTER/doctor. Rinse mouth. Do NOT induce vomiting.
4.2 Most important symptoms and effects, both acute and delayed:	Harmful if swallowed. Irritating to eyes, respiratory system and skin. Narcotic effect.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards:	No data available.
Treatment:	Treat symptomatically. Symptoms may be delayed.

SECTION 5: Firefighting Measures

General Fire Hazards:	Flammable liquid and vapour.
5.1 Extinguishing media **Suitable extinguishing media:**	Water spray, foam, dry powder or carbon dioxide.
Unsuitable extinguishing media:	Avoid water in straight hose stream; will scatter and spread fire.
5.2 Special hazards arising from the substance or mixture:	Vapours may cause a flash fire or ignite explosively. Vapours may travel considerable distance to a source of ignition and flash back. Prevent buildup of vapours or gases to explosive concentrations. Heat may cause the containers to explode.
5.3 Advice for firefighters **Special fire fighting procedures:**	Use water spray to keep fire-exposed containers cool. Water may be ineffective in fighting the fire. Fight fire from a protected location. Move containers from fire area if you can do so without risk.
Special protective equipment for firefighters:	Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA.

SECTION 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures:	ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Keep unauthorised personnel away. Keep upwind. Use personal protective equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ventilate closed spaces before entering them. See Section 8 of the SDS for Personal Protective Equipment.
6.2 Environmental Precautions:	Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so.
6.3 Methods and material for containment and cleaning up:	In case of leakage, eliminate all ignition sources. Take precautionary measures against static discharges. Stop leak if possible without any risk. Use non-sparking tools. Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dyke far ahead of larger spill for later recovery and disposal.

6.4 Reference to other sections: No data available.

SECTION 7: Handling and Storage:

7.1 Precautions for safe handling: DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Take precautionary measures against static discharges. Ground and bond container and receiving equipment. Use explosion-proof [electrical/ventilating/lighting] equipment. Use non-sparking tools. Wear protective gloves/protective clothing/eye protection/face protection. Avoid contact with eyes, skin, and clothing. Use only with adequate ventilation. Wash hands thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities: Keep away from food, drink and animal feeding stuffs. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

7.3 Specific end use(s): No data available.

SECTION 8: Exposure Controls/Personal Protection

8.1 Control Parameters

Occupational Exposure Limits

Chemical name	Type	Exposure Limit Values		Source
Dioxane	TWA	20 ppm	73 mg/m3	UK. EH40 Workplace Exposure Limits (WELs) (12 2011)
	TWA	20 ppm	73 mg/m3	EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU (12 2009)
	TWA	20 ppm	73 mg/m3	EU. Scientific Committee on Occupational Exposure Limit Values (SCOELs), European Commission - SCOEL (2014)

DNEL-Values

Critical component	Type	Route of Exposure	Health Warnings	Remarks

PNEC-Values

Critical component	Environmental compartment	PNEC-Values
Dioxane	Aquatic (freshwater)	10 mg/l
	Aquatic (marine water)	0,67 mg/l
	Soil	0,153 mg/kg
	Sediment (freshwater)	37 mg/kg

8.2 Exposure controls

Appropriate Engineering Controls: No data available.

Individual protection measures, such as personal protective equipment

General information:	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area. Use explosion-proof ventilation equipment.
Eye/face protection:	Wear safety glasses with side shields (or goggles) and a face shield.
Skin protection	
Hand Protection:	Material: Wear protective gloves.
Other:	Wear suitable protective clothing.
Respiratory Protection:	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
Hygiene measures:	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.
Environmental Controls:	No data available.

SECTION 9: Physical And Chemical Properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	Liquid Liquid
Form:	Liquid
Colour:	Colourless
Odour:	No data available.
Odour Threshold:	No data available.
pH:	No data available.
Freezing point:	11,8 - 12 °C
Boiling Point:	100,8 - 101,5 °C
Flash Point:	12 °C (Pensky-Martens Closed Cup)
Evaporation Rate:	2,7 (butyl acetate=1)
Flammability (solid, gas):	Class IB Flammable Liquid
Flammability limit - upper (%)	No data available.
Flammability limit - lower (%)	No data available.
Vapour pressure:	47,5 - 51,46 hPa (25 °C)
Vapour density (air=1):	3,03
Density:	1,03 g/ml (20 °C)
Relative density:	1,03 (20 °C)
Solubility(ies)	
Solubility in Water:	Miscible
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	-0,27
Autoignition Temperature:	375 °C
Decomposition Temperature:	No data available.

Viscosity:	1,27 mm2/s (20 °C) | 0,93 mm2/s (40 °C)
Explosive properties:	No data available.
Oxidising Properties:	No data available.

9.2 Other information

Molecular weight:	88,1 g/mol (C4H8O2)
VOC content:	EC Directive 2004/42: 1.000 g/l ~100 % (calculated)

SECTION 10: Stability and Reactivity

10.1 Reactivity:	No dangerous reaction known under conditions of normal use.
10.2 Chemical Stability:	Material is stable under normal conditions.
10.3 Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
10.4 Conditions to Avoid:	Heat, sparks, flames. Sunlight.
10.5 Incompatible Materials:	Strong oxidising agents. Strong acids. Halogens.
10.6 Hazardous Decomposition Products:	Thermal decomposition may release oxides of carbon.

SECTION 11: Toxicological Information

Information on likely routes of exposure

Inhalation:	May cause respiratory irritation.
Skin Contact:	None known or expected under normal use.
Eye contact:	Causes serious eye irritation.
Ingestion:	None known or expected under normal use.

11.1 Information on toxicological effects

Acute toxicity

Oral

Product:	LD 50 (Rat): 5.150 mg/kg

Dermal

Product:	LD 50 (Rabbit) 7.600 mg/kg

Inhalation

Product:	LC 0 (Rat, 1 h): 155 mg/l

Repeated dose toxicity

Product:	No data available.

Skin Corrosion/Irritation:

Product:	Causes mild skin irritation.

Serious Eye Damage/Eye Irritation:

Product:	Causes serious eye irritation.

Respiratory or Skin Sensitisation:
Product: Not a skin sensitiser.

Germ Cell Mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Carcinogenicity
Product: Suspected of causing cancer.

Reproductive toxicity
Product: No components toxic to reproduction

Specific Target Organ Toxicity - Single Exposure
Product: Inhalation - vapour: Narcotic effect. Respiratory tract irritation.

Specific Target Organ Toxicity - Repeated Exposure
Product: Target organs Liver, Kidney, Central nervous system. - May cause damage to organs through prolonged or repeated exposure.

Aspiration Hazard
Product: Not classified

Other Adverse Effects: None known.

SECTION 12: Ecological Information

12.1 Toxicity

Acute toxicity

Fish
Product: No data available.

Specified substance(s)
Dioxane — LC 50 (Fathead minnow, 96 h): 9.851 - 10.300 mg/l
LC 50 (Menidia beryllina, 96 h): 6.700 mg/l

Aquatic Invertebrates
Product: No data available.

Specified substance(s)
Dioxane — LC 50 (Scud (Gammarus pseudolimnaeus), 96 h): 1.800 - 2.872 mg/l
EC 50 (Daphnia magna, 48 h): > 1.000 mg/l

Chronic toxicity

Fish
Product: No data available.

Specified substance(s)
Dioxane — NOAEL (Pimephales promelas, 32 d): > 103 mg/l

Aquatic Invertebrates
Product: No data available.

Specified substance(s)

Dioxane	NOAEL (Daphnia magna, 21 d): 1.000 mg/l

Toxicity to aquatic plants

Product:	No data available.

Specified substance(s)

Dioxane	No data available.

12.2 Persistence and Degradability

Biodegradation

Product:	There is no data on the degradability of this product.

Specified substance(s)

Dioxane	No data available.

BOD/COD Ratio

Product	No data available.

Specified substance(s)

Dioxane	No data available.

12.3 Bioaccumulative Potential

Product:	No data available on bioaccumulation.

Specified substance(s)

Dioxane	Cyprinus carpio, Bioconcentration Factor (BCF): 0,3 - 0,7 Cyprinus carpio, Bioconcentration Factor (BCF): 0,2 - 0,6

12.4 Mobility in Soil:	The product is water soluble and may spread in water systems.

Known or predicted distribution to environmental compartments

Dioxane	No data available.

12.5 Results of PBT and vPvB assessment:	Not available.
Dioxane	No data available.
12.6 Other Adverse Effects:	No data available.
12.7 Additional Information:	No data available.

SECTION 13: Disposal Considerations

13.1 Waste treatment methods

General information:	No data available.
Disposal methods:	Discharge, treatment, or disposal may be subject to national, state, or local laws. Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

SECTION 14: Transport Information

ADR

14.1 UN Number:	UN 1165
14.2 UN Proper Shipping Name:	DIOXANE
14.3 Transport Hazard Class(es)	
Class:	3
Label(s):	3
Hazard No. (ADR):	33
Tunnel restriction code:	(D/E)
14.4 Packing Group:	II
14.5 Environmental Hazards:	No
14.6 Special precautions for user:	Not determined.

RID

14.1 UN Number:	UN 1165
14.2 UN Proper Shipping Name	DIOXANE
14.3 Transport Hazard Class(es)	
Class:	3
Label(s):	3
14.4 Packing Group:	II
14.5 Environmental Hazards:	No
14.6 Special precautions for user:	Not determined.

IMDG

14.1 UN Number:	UN 1165
14.2 UN Proper Shipping Name:	DIOXANE
14.3 Transport Hazard Class(es)	
Class:	3
Label(s):	3
EmS No.:	F-E, S-D
14.4 Packing Group:	II
14.5 Environmental Hazards:	No
14.6 Special precautions for user:	Not determined.

IATA

14.1 UN Number:	UN 1165
14.2 Proper Shipping Name:	Dioxane
14.3 Transport Hazard Class(es):	
Class:	3
Label(s):	3
14.4 Packing Group:	II
14.5 Environmental Hazards:	No
14.6 Special precautions for user:	Not determined.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code: Not applicable

SECTION 15: Regulatory information

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

EU Regulations

Regulation (EC) No. 2037/2000 Substances that deplete the ozone layer: none

Regulation (EC) No. 850/2004 on persistent organic pollutants: none

Regulation (EC) No. 649/2012 Import and export of dangerous chemicals: none

Regulation (EC) No. 1907/2006 REACH Annex XIV Substance subject to authorisation, as amended: none

Regulation (EC) No. 1907/2006 Annex XVII Substances subject to restriction on marketing and use:

Chemical name	CAS-No.	Concentration
Dioxane	123-91-1	100%

Directive 2004/37/EC on the protection of workers from the risks related to exposure to carcinogens and mutagens at work.: none

Directive 92/85/EEC: on the safety and health of pregnant workers and workers who have recently given birth or are breast feeding.:

Chemical name	CAS-No.	Concentration
Dioxane	123-91-1	100%

Directive 2012/18/EU (Seveso III): on the control of major accident hazards involving dangerous substances:

Chemical name	CAS-No.	Concentration
Dioxane	123-91-1	100%

EU. Regulation No. 166/2006 PRTR (Pollutant Release and Transfer Registry), Annex II: Pollutants: none

Directive 98/24/EC on the protection of workers from the risks related to chemical agents at work:

Chemical name	CAS-No.	Concentration
Dioxane	123-91-1	100%

15.2 Chemical safety assessment: No Chemical Safety Assessment has been carried out.

SECTION 16: Other Information

Revision Information: Not relevant.

References

PBT	PBT: persistent, bioaccumulative and toxic substance.
vPvB	vPvB: very persistent and very bioaccumulative substance.

Key literature references and sources for data: No data available.

Wording of the H-statements in sections 2 and 3

H225	Highly flammable liquid and vapour.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.

Training information: No data available.

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SDS No.:
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