

Safety Data Sheet

1. Chemical product and company identification

Product name : 1,4-Dioxane

Company information

Name of manufacturer : KANTO CHEMICAL CO., INC.
 Address : 2-1, Nihonbashi, Muromachi 2-Chome, Chuo-Ku, Tokyo, 103-0022, JP
 Name of section : Business Administration Department, Reagent Division
 Telephone number : +81-3-6214-1090
 Facsimile number : +81-3-3241-1047
 Mail address : BC32@kanto.co.jp
 Reference No : 10425
 Product numbers applied by the SDS : 10294, 10425, 11337, 2967-1B
 Recommended use : For research use only
 Restrictions on use : Seek expert judgment when using the product for applications other than those recommended.

2. Hazards identification

GHS classification

Physical hazards	Flammable liquids	Category 2
Health hazards	Acute toxicity (inhalation:vapors)	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Carcinogenicity	Category 1B
	Specific target organ toxicity (single exposure)	Category 1 (central nervous system)
	Specific target organ toxicity (single exposure)	Category 3 (narcosis)
	Specific target organ toxicity (single exposure)	Category 3 (respiratory tract irritation.)
	Specific target organ toxicity (repeated exposure)	Category 1 (kidney, liver, central nervous system)
	Specific target organ toxicity (repeated exposure)	Category 2 (respiratory organs)

Hazard pictograms



Signal word : Danger

Hazard statements : Highly flammable liquid and vapor
 Causes skin irritation
 Causes serious eye irritation
 Harmful if inhaled



May cause respiratory irritation
May cause drowsiness or dizziness
May cause cancer
Causes damage to organs (central nervous system)
Causes damage to organs (kidney, liver, central nervous system)
through prolonged or repeated exposure
May cause damage to organs (respiratory organs) through prolonged
or repeated exposure

Precautionary statements

Prevention	: Do not handle until all safety precautions have been read and understood. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep container tightly closed. Ground and bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting equipment. Use only non-sparking tools. Take action to prevent static discharges. Do not breathe mist/vapors. Wash hands, forearms and face thoroughly after handling. Do not eat, drink or smoke when using this product. Use only outdoors or in a well-ventilated area. Wear protective gloves/protective clothing/eye protection/face protection.
Response	: IF ON SKIN: Wash with plenty of water. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water . IF INHALED: Remove person to fresh air and keep comfortable for breathing. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. IF exposed or concerned: Call a POISON CENTER or doctor. IF exposed or concerned: Get medical advice/attention. Call a POISON CENTER or doctor if you feel unwell. Get medical advice/attention if you feel unwell. If skin irritation occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	: Store in a well-ventilated place. Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.
Disposal	: Dispose of contents/container to hazardous or special waste collection point, in accordance with local, regional, national and/or international regulation.

3. Composition/information on ingredients

Distinction of substance or mixture	: Substance
Synonyms	: Diethylene dioxide



Chemical name	Concentration (%)	Formula	TSCA	EC-No.	CAS RN
1,4-Dioxane	≥ 99	C4H8O2	Listed	204-661-8	123-91-1

Stabilized with BHT.

4. First aid measures

First aid measures

- First-aid measures after inhalation : Remove the victim to fresh air, and make him blow his nose and gargle. If necessary, get medical treatment.
- First-aid measures after skin contact : Wash the affected areas under running water.
- First-aid measures after eye contact : Wash the affected areas under running water for at least 15 minutes. If necessary, get medical treatment.
- First-aid measures after ingestion : The chemical is volatile. Do not induce vomiting because it increases the risk of aspiration into the lungs. Get medical attention immediately. If necessary, rinse mouth with water.
- Personal Protection in First Aid and Measures : Rescuers should wear proper protective equipment like rubber gloves, goggles.

5. Fire fighting measures

- Suitable extinguishing media : Water, dry chemical powder, carbon dioxide, dry sand, foam
- Unsuitable extinguishing media : None
- Firefighting instructions : Move containers from fire area if it can be done without risk, if not possible, apply water from a safe distance to cool and protect surrounding area.
Fight fire from windward.
Dry chemical powder, carbon dioxide or dry sand should be used for small fires. Foam extinguisher is effective for a large scale fire.
- Personal protection (Emergency response) : Wear breathing apparatus.

6. Accidental release measures

Personal Precautions, Protective Equipment and Emergency Procedures

- General measures : Wear proper protective equipment and avoid contact with skin and inhalation of vapor. Conduct operations from upwind and evacuate people downwind. Remove all sources of ignition. Keep away personnel except for authorized ones from spillage area by stretching ropes.

Environmental precautions

- Environmental precautions : Attention should be given to avoid discharge of spilled product into rivers and resulting environmental damage. When diluting spill with large amounts of water, discharge of untreated wastewater into the environment must be avoided.

Methods and Equipment for Containment and Cleaning up

- For containment : Absorb spill with inert material (e.g, diatomaceous earth, sand) and flush spillage area with copious amounts of water.
- Prevention Measures for : Remove nearby sources of ignition and prepare extinguishing



Secondary Accidents

media.

7. Handling and storage

Handling

- Technical measures : Wear proper protective equipment to avoid contact with skin or inhalation of vapor. Fire is strictly prohibited.
Ventilate well at working places.
- Precautions for safe handling : Use with an enclosed system or a local exhaust ventilation. Use in well-ventilated areas.
Do not allow contact with oxidizing substances.

Storage

- Storage conditions : Store in a dark, cool place and tightly closed.
- Material used in packaging/containers : Glass, fluorine resin, stainless steel.
Do not use vinyl chloride resin, polystyrene, copper etc.

8. Exposure controls / Personal protection equipment

ACGIH TWA	20 ppm
Remark (ACGIH)	Skin

- Appropriate engineering controls : Use with an enclosed system or a local exhaust ventilation.

Protective equipment

- Respiratory protection : If necessary, wear gas mask for organic solvents or airline respirator.
- Hand protection : Impervious protective gloves
- Eye protection : Safety goggles
- Skin and body protection : Protective clothing, protective boots

9. Physical and chemical properties

- Physical state : Liquid
- Color : Colorless.
- Odor : Ether like odor
- pH : No data available
- Melting point : 11.8 ° C
- Freezing point : ≥ 11 ° C
- Boiling point : 101.32 ° C
- Flash point : 12.2 ° C (C.C.)
- Auto-ignition temperature : 180 ° C
- Decomposition temperature : No data available
- Flammability : Flammable
- Vapor pressure : 38.7 hPa (20°C)
- Relative density : No data available
- Density : 1.030 - 1.035 g/cm³ (20°C)
- Relative gas density : 3
- Solubility : Water: Miscible. Organic solvents: Soluble in many kinds of organic solvents.



Partition coefficient n-octanol/water (log Pow)	: -2.7
Explosive limits (vol %)	: 1.97 - 22.5 vol %
Viscosity, kinematic	: 1.27 mm ² /s (20°C)
Particle characteristics	: No data available

10. Stability and reactivity

Reactivity	: Although it is a relatively stable compound, it reacts with strong acids and strong oxidizing agents under high temperature and high pressure conditions to open the ring.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: Reacts with oxygen in the air to produce explosive peroxides.
Conditions to avoid	: Light, heat.
Incompatible materials	: Strong acids, strong oxidizing substances.
Hazardous decomposition products	: Carbon monoxide.

11. Toxicological information

Acute toxicity (oral)	: No classification rat LD50=4200mg/kg
Acute toxicity (dermal)	: No classification rat LD50=2100mg/kg
Acute toxicity (inhalation)	: No classification (gas) Harmful if inhaled (vapor) rat LC50=9158ppm/4h Classification not possible (dust, mist)
Skin corrosion/irritation	: Causes skin irritation Based on results of "moderately irritating" in a rabbit skin irritation test (open Draize test) and "slightly irritating" in a rabbit, rat and mouse skin irritation tests, the substance was classified into category 2.
Serious eye damage/irritation	: Causes serious eye irritation Although obvious positive reactions are reported for exposed humans, there is no report of corrosive. In a rabbit eye irritation test, "severe chemosis, slight corneal opacity and conjunctival redness (conjunctival redness persisted to day 8 in one animal)" were observed. Based on the data, the substance was classified into category 2A.
Respiratory sensitization	: Classification not possible
Skin sensitization	: Classification not possible In a guinea pig skin sensitizing test (Directive 84/449/EEC, B.6) (GLP), a negative result is reported. On the other hand, positive results are reported in human patch tests. Classification was not possible.
Germ cell mutagenicity	: No classification Although there are positive and negative results in micronucleus test by oral gavage to mice, the substance was not classified based on decision for reliability of the test. There are reports of positive rat hepatic cell DNA damage test, DNA synthesis test and DNA repair test and negative Ames test, mouse lymphoma test and chromosomal aberration test.



Carcinogenicity	: May cause cancer There is no sufficient data on carcinogenicity in humans. In carcinogenicity tests in rats (drinking water administration for 2 years), increased incidences of malignant tumors of nasal cavity (mainly squamous cell carcinomas), hepatocellular adenomas and hepatocellular carcinoma were observed in rats of both sexes, and increased incidence of peritoneal mesothelioma was also observed in the male treatment group. In male F344 rats exposed by inhalation to vapor of the substance for 2 years, increased incidences of squamous cell carcinoma of nasal cavity, hepatocellular adenomas, and peritoneal mesothelioma were observed. Thus, it was classified into category 1B.
Reproductive toxicity	: Classification not possible In developmental toxicity tests in rats by oral administration or inhalation exposure during the organogenesis period, no adverse effects on fetal development were seen while decreased fetal weight and delayed ossification were observed in some tests. However, classification was not possible due to lack of data for sexual function and fertility.
STOT-single exposure	: Causes damage to organs (central nervous system) May cause drowsiness or dizziness May cause respiratory irritation Based on findings of dizziness, sleepiness and unconsciousness in humans following inhalation exposure, the substance was classified into category 1 (central nervous system). Narcotic effects are reported in rats following inhalation at 155 mg/L and rabbits following oral exposure at 6600 mg/kg. The substance was classified into category 3 (narcosis). The substance is irritating to the nose and throat in humans. In an inhalation test in rats, irritation of mucous membranes of the respiratory tract was observed. Based on these results, the substance was classified into category 3 (respiratory tract irritation).
STOT-repeated exposure	: Causes damage to organs (kidney, liver, central nervous system) through prolonged or repeated exposure May cause damage to organs (respiratory organs) through prolonged or repeated exposure In a case report of 5 workers who died following exposure to the substance, hemorrhage and necrosis in the kidney and necrosis in the liver are reported. There is a case report that a worker who had been exposed for one week in a closed, non ventilated room without respiratory equipment showed hypertonia, neurological symptoms, kidney failure, renal cortex necrosis, severe centrilobular necrosis in the liver and demyelination and partial loss of nerve fibre tissue in the brain. Based on the data, the substance was classified into category 1 (kidney, liver, central nervous system). In a 2-year oral test in rats, degeneration of airway epithelium was observed at 16 mg/kg/day. Based on this data, the substance was classified into category 2 (respiratory organs).
Aspiration hazard	: Classification not possible

12. Ecological information

Ecotoxicity

Aquatic acute	: No classification Oryzias latipes LC50>100mg/L/96h
Aquatic chronic	: No classification



Persistence and degradability

Not readily biodegradable
BOD : 0%

Bioaccumulative potential

Low bioconcentration
BCF : 0.23-0.6 (10mg/L), 0.3-0.7 (1mg/L)

Mobility in soil

High mobility
Koc : 1.23

Hazardous to the ozone layer

Ozone : Classification not possible

13. Disposal considerations

Ecological waste information : Burn in a chemical incinerator equipped with an afterburner and a scrubber. Or entrust approved waste disposal companies with the disposal.

Contaminated container and packaging : In case of disposal of empty bottles, dispose bottles after removing the content thoroughly.

14. Transport information**International Regulations****Transport by sea(IMDG)**

UN-No. (IMDG) : 1165
Proper Shipping Name (IMDG) : DIOXANE
Packing group (IMDG) : II
Transport hazard class(es) : 3

(IMDG)

Air transport(IATA)

UN-No. (IATA) : 1165
Proper Shipping Name (IATA) : Dioxane
Packing group (IATA) : II
Transport hazard class(es) : 3

(IATA)

Marine pollutant : Not applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollutant category : Y
MFAG-No : 127

15. Regulatory information

Regulatory information with regard to this substance in your country or region should be examined by your own responsibility.

16. Other information

Data sources : Solvents Handbook, T, Asahara et al, Kodansha Scientific Ltd.
(1976) .
Handbook of Dangerous Substances Springer-Verlag Tokyo
(1991) .
Handbook of 17322 Chemical Products, The Chemical Daily Co.
(2022) .



NITE Chemical Risk Information Platform (NITE-CHRIP), National
Institute of Technology and Evaluation.

The information contained herein is based on several references and the present state of our knowledge. However the SDS does not always cover all information about the product, handle the product carefully. The information is intended to ordinary usage, in case of particular handlings, conduct appropriate safety measurements. The information herein is only provision of information, and it does not represent a guarantee the properties of the product. The Safety Data Sheet (SDS) is prepared based on JIS Z7253.

