

According to Regulation (EC) No 1907/2006

According to Regulation (EC) No 2020/878

Hydrogen Chloride 4M in 1,4-Dioxane



Version number: 3
 Issued: 2024-03-06
 Replaces SDS: 2022-09-09

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

1.1. Product identifier

Trade name

Hydrogen Chloride 4M in 1,4-Dioxane

CAS number

7647-01-0

EC number

231-595-7

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

Relevant identified uses

Research and development. Laboratory Chemicals. Manufacture of substances.

Not suitable for use in

Not suitable for human consumption or veterinary purposes.

1.3. Details of the supplier of the safety data sheet

Supplier

Molekula Group

Address

Molekula Ltd, Lingfield Way, Darlington,
 DL1 4XX Darlington
 United Kingdom

Telephone

+44 (0) 3302 000 333

Email

info@molekula.com

Web site

www.molekula.com

Contact person

Kevin Banks

Email

+44 (0) 7769276927

1.4. Emergency telephone number

Poison center/Additional emergency number

0344 892 0111 - National Poisons Information Service (Newcastle Centre)

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SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Classification

Flammable liquids, hazard category 2
 Skin corrosion, hazard category 1B
 Serious eye damage, hazard category 1
 Acute toxicity, oral, hazard category 4
 Specific Target Organ Toxicity — Single exposure, hazard category 3
 Carcinogenicity, hazard category 2

Hazard statements

H225, H314, H318, H332, H335, H351

2.2. Label elements

Labelling according to Regulation (EC) No 1272/2008

Hazard pictograms



Signal word

Danger

Hazard statements

H225 Highly flammable liquid and vapour.
 H314 Causes severe skin burns and eye damage.
 H332 Harmful if inhaled.
 H335 May cause respiratory irritation.
 H351 Suspected of causing cancer.

Supplemental hazard statements

EUH019 May form explosive peroxides.
 EUH066 Repeated exposure may cause skin dryness or cracking.

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Precautionary statements

P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
 P240 Ground and bond container and receiving equipment.
 P241 Use explosion-proof equipment.
 P242 Use non-sparking tools.
 P243 Take action to prevent static discharges.
 P260 Do not breathe dust/fumes/gas/mist/vapours/spray.
 P264 Wash skin thoroughly after handling.
 P271 Use only outdoors or in a well-ventilated area.
 P280 Wear protective gloves/protective clothing/eye protection/face protection.
 P301 + P330 + P331 IF SWALLOWED: rinse mouth. Do NOT induce vomiting.
 P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
 P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
 P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 P308 + P313 IF exposed or concerned: Get medical advice/attention.
 P310 Immediately call a POISON CENTER/doctor.
 P363 Wash contaminated clothing before reuse.
 P370 + P378 In case of fire: Use Water spray, dry powder or carbon dioxide. to extinguish.
 P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
 P405 Store locked up.
 P501 Dispose of contents/container to local regulations.

2.3. Other hazards

No data available

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SECTION 3: Composition/information on ingredients

3.2. Mixtures

| Chemical name | CAS No. EC No. REACH No. Index No. | Concentration | Classification | H-phrase M factor acute M factor chronic | Note |
|-------------------|---|---------------|---|--|------|
| 1,4-dioxane | 123-91-1 204-661-8 01-2119462837-26 603-024-00-5 | 83 - 85% | Flam. Liq. 2, Eye Irrit. 2, STOT SE 3 - resp. tract irrit., Carc. 1B | H225, H319, H335, H350 - - | D |
| Hydrochloric acid | 7647-01-0 231-595-7 - - | 15 - 17% | Met. Corr. 1, Skin Corr. 1B, Eye Dam. 1, STOT SE 3 | H290, H314, H318, H335 - - | - |

Molecular weight

36.46

Substance additional information

For the complete text of H- / EUH-statements mentioned in this section, see section 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

Get medical attention if any discomfort continues. Show this Safety Data Sheet (SDS) to medical personnel. Chemical burns must be treated by a physician.

Inhalation

IF INHALED: Remove person to fresh air and keep comfortable for breathing. Maintain an open airway. Loosen any tight clothing, such as a collar, tie or belt. When breathing is difficult, properly trained personnel may assist affected person by administering oxygen. Get medical attention. Place unconscious person on the side in the recovery position and ensure breathing can take place.

Skin contact

IF ON SKIN: Rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Continue to rinse for at least 15 minutes and seek medical attention. Chemical burns must be treated by a physician.

Eye contact

Remove contact lenses if present. Rinse eyes with water. Continue to rinse for at least 15 minutes and seek medical attention. Do not rub eye.

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Ingestion

Rinse mouth thoroughly. Drink a few glasses of water or milk. Stop if the affected person feels sick as vomiting may be dangerous. Never give anything by mouth to an unconscious person. Place unconscious person on the side in the recovery position and ensure breathing can take place.

NOTE! Effects may be delayed. Keep affected person under observation. Get medical attention if any discomfort continues.

Information for doctors

It may be dangerous for first aid personnel to carry out mouth-to-mouth resuscitation.

4.2. Most important symptoms and effects, both acute and delayed

The severity of the symptoms described will vary dependant of the concentration and the length of exposure.

Inhalation

Single exposure may cause the following adverse effects: Difficulty in breathing. Severe irritation in nose and throat.

Symptoms following overexposure may include the following: Corrosive to the respiratory tract.

Prolonged or repeated exposure may cause: Suspected of causing cancer.

Skin contact

Causes severe burns. Symptoms following overexposure may include the following: May cause stomach pain or vomiting.

Prolonged or repeated exposure may cause: Suspected of causing cancer.

Eye contact

Causes serious eye damage.

Symptoms following overexposure may include the following: Pain. Redness. Profuse watering of the eyes.

Ingestion

May cause chemical burns in mouth, oesophagus and stomach.

Symptoms following overexposure may include the following: May cause stomach pain or vomiting.

Prolonged or repeated exposure may cause: Suspected of causing cancer.

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically. No special treatment requirement.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media

Extinguish with alcohol-resistant foam, carbon dioxide, dry powder or water fog.

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Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

5.2. Special hazards arising from the substance or mixture

Specific hazards: FLAMMABLE. Toxic. Corrosive. Combustible.

Containers can burst violently when heated, due to excess pressure build-up.

Flammable liquid and vapour.

Vapours may be ignited by a spark, a hot surface or an ember.

Vapours may form explosive mixture with air at room temperature.

Do not allow to enter drains, sewers or watercourses. Risk of explosion.

Water used for fire extinguishing, which has been in contact with the product, may be corrosive.

Development of hazardous combustion gases or vapours possible in the event of fire. Vapours are heavier than air and may travel along the floor and in the bottom of containers.

Thermal decomposition or combustion may liberate carbon oxides and other toxic gases or vapours.

Carbon monoxide (CO). Carbon dioxide (CO₂).

Hydrogen chloride (HCl).

5.3. Advice for firefighters

Special protective equipment for fire-fighters

Evacuate area. Avoid breathing gas, fume, vapours or spray. Prevent skin contact by maintaining a safe distance and by wearing suitable protective equipment/ clothing. Cool containers exposed to heat with water spray and remove container, if no risk is involved. Keep upwind.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Avoid inhalation of vapours and spray mist and contact with skin and eyes. For personal protection, see section 8. Provide adequate ventilation. Remove sources of ignition. Beware of the explosion danger. Take action to prevent static discharges.

6.2. Environmental precautions

Avoid discharge into drains, water courses or onto the ground. Risk of explosion.

6.3. Methods and material for containment and cleaning up

Collect with absorbent, non-combustible material into suitable containers. Remove sources of ignition. Beware of the explosion danger. Use spark-proof tools and explosion-proof equipment.

6.4. Reference to other sections

For personal protection, see section 8. For waste disposal, see section 13.

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SECTION 7: Handling and storage

7.1. Precautions for safe handling

Preventive handling precautions

For precautions see section 2.2. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Take action to prevent static discharges. Use spark-proof tools and explosion-proof equipment. Wear protective clothing, gloves, eye and face protection. Avoid contact with skin and eyes. Avoid ingestion and inhalation.

General hygiene

Observe good chemical hygiene practices. Keep away from food, drink and animal feeding stuffs. Do not eat, drink or smoke when using this product. Remove contaminated clothing and launder thoroughly before re-use. Wash skin thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Store at room temperature. Store in a dry place. Store in a closed container.
 Handle and store contents under inert gas. Moisture Sensitive.

7.3. Specific end use(s)

No specific usage precautions noted.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Exposure limits

TWA. 1ppm. 2mg/m³ Gas and aerosol mists. WEL = Workplace Exposure Limit.
 5ppm. 8mg/m³. Gas and aerosol mists. WEL = Workplace Exposure Limit.

DNEL/DMEL

| Product/Substance name (CAS No./EC No.) | Type | Exposure | Value | Population | Effects |
|--|------|-----------------------------------|-----------------------|------------|----------|
| 1,4-dioxane (123-91-1/204-661-8) | DNEL | Chronic (long term) Inhalation | 144 mg/m ³ | Workers | Systemic |
| 1,4-dioxane (123-91-1/204-661-8) | DNEL | Chronic (long term) Inhalation | 73 mg/kg bw/day | Workers | Systemic |
| 1,4-dioxane (123-91-1/204-661-8) | DNEL | Chronic (long term) Dermal | 21 mg/m ³ | Workers | Systemic |

PNEC/PEC

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| Product/Substance name (CAS No./EC No.) | Type | Environmental compartment | Value |
|--|------|---------------------------|-------------|
| 1,4-dioxane (123-91-1/204-661-8) | PNEC | Soil | 0.153 mg/kg |
| 1,4-dioxane (123-91-1/204-661-8) | PNEC | Marine water | 0.67 mg/l |
| 1,4-dioxane (123-91-1/204-661-8) | PNEC | Freshwater | 10 mg/l |
| 1,4-dioxane (123-91-1/204-661-8) | PNEC | Sediment (freshwater) | 37 mg/kg |
| 1,4-dioxane (123-91-1/204-661-8) | PNEC | Sewage Treatment Plant | 2700 mg/l |
| 1,4-dioxane (123-91-1/204-661-8) | PNEC | Intermittent releases | 10 mg/l |

8.2. Exposure controls

Personal Protective Equipment Symbols



Eye / face protection

Wear eye protection.

Hand protection

Wear protective gloves. Recommended gloves: Butyl rubber.

Glove Thickness: 0.3mm

Breakthrough time: 8 hours

Always inspect gloves before use. If signs of wear and tear are noticed then the gloves should be replaced.

No specific hygiene procedures noted, but good personal hygiene practices are always advisable, especially when working with chemicals. Wash contaminated skin thoroughly after handling.

Other skin protection

Wash skin thoroughly after handling.

Respiratory protection

Provide adequate ventilation. If ventilation is insufficient, suitable respiratory protection must be provided.

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Environmental exposure controls

Avoid discharge into drains.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state

Liquid

Colour

Colourless.

Odour

No data available

Melting point / freezing point

No data available

Boiling point or initial boiling point and boiling range

No data available

Flammability

No data available

Lower and upper explosion limit

No data available

Flash point

17 °C

Method

CC (Closed cup).

Auto-ignition temperature

No data available

Decomposition temperature

No data available

pH

No data available

Kinematic viscosity

No data available

Solubility

No data available

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Partition coefficient n-octanol/water

No data available

Vapour pressure

No data available

Density and/or relative density

1.05 g/cm³

Relative vapour density

No data available

Particle characteristics

No data available

9.2. Other information

No data available

SECTION 10: Stability and reactivity

10.1. Reactivity

Forms explosive mixtures with air on intense heating. May form explosive peroxides.

10.2. Chemical stability

Stable under normal temperature conditions. Stable under the prescribed storage conditions.

Handle and store contents under inert gas.

10.3. Possibility of hazardous reactions

oxidising agents

10.4. Conditions to avoid

Heat, sparks, flames. Closed containers can burst violently when heated, due to excess pressure build-up. Static electricity and formation of sparks must be prevented. Moisture.

10.5. Incompatible materials

Amines.
 Reducing Agents.
 Strong bases
 oxidising agents
 Strong alkalis.

10.6. Hazardous decomposition products

See section 5.

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SECTION 11: Toxicological information

11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

| Product / Substance name CAS / EC no. | Dose descriptor | Value / Dose | Exposure route | Test animals |
|--|-----------------|--------------|----------------|--------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | LD50 | 5,150 mg/kg | Oral | Rat |
| 1,4-dioxane 123-91-1 / 204-661-8 | LD50 | 7,378 mg/kg | - | Rabbit |

Skin corrosion/irritation

| Product / Substance name CAS / EC no. | Result | Duration of exposure | Species |
|--|---------------------|----------------------|-------------------------------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | No skin irritation. | 20 hours | Rabbit |
| Hydrochloric acid 7647-01-0 / 231-595-7 | CAUSES BURNS. | - | - |
| Hydrochloric acid 7647-01-0 / 231-595-7 | Corrosive. | - | reconstructed human epidermis (RhE) |

Serious eye damage/irritation

| Product / Substance name CAS / EC no. | Result | Species |
|--|----------------------------|---------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | Causes eye irritation. | Rabbit |
| Hydrochloric acid 7647-01-0 / 231-595-7 | Causes serious eye damage. | - |
| Hydrochloric acid 7647-01-0 / 231-595-7 | Risk of: Blindness. | - |
| Hydrochloric acid 7647-01-0 / 231-595-7 | Corrosive. | Bovine cornea |

Respiratory or skin sensitisation

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| Product / Substance name CAS / EC no. | Result | Species | Method / Guideline |
|--|-----------|------------|--------------------------------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | Negative. | Guinea Pig | Maximization Test |
| Hydrochloric acid 7647-01-0 / 231-595-7 | Negative. | Guinea Pig | Guinea pig maximization test (GPMT): |

Germ cell mutagenicity

| Product / Substance name CAS / EC no. | Result | Exposure route | Metabolic activation / Exposure | Species | Method / Guideline |
|--|--|----------------|---------------------------------------|------------------------------|---|
| 1,4-dioxane 123-91-1 / 204-661-8 | Negative. | - | with and without metabolic activation | Salmonella typhimurium | Ames test |
| 1,4-dioxane 123-91-1 / 204-661-8 | Negative. | - | with and without metabolic activation | Chinese Hamster cells: Ovary | In vitro mammalian cell gene mutation test. |
| 1,4-dioxane 123-91-1 / 204-661-8 | Negative. | - | with and without metabolic activation | Chinese Hamster cells: Ovary | Chromosome aberration: In Vitro Test |
| 1,4-dioxane 123-91-1 / 204-661-8 | Negative. | Oral | - | Rat Liver. | unscheduled DNA synthesis assay |
| Hydrochloric acid 7647-01-0 / 231-595-7 | Conflicting results have been seen in different studies. | - | - | - | - |

Carcinogenicity

| Product / Substance name CAS / EC no. | Other |
|--|--|
| 1,4-dioxane 123-91-1 / 204-661-8 | Potentially carcinogenic to humans. |
| Hydrochloric acid 7647-01-0 / 231-595-7 | No evidence of carcinogenicity in animal studies |

STOT-single exposure

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| Product / Substance name CAS / EC no. | Result |
|--|-----------------------------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | May cause respiratory irritation. |
| Hydrochloric acid 7647-01-0 / 231-595-7 | May cause respiratory irritation. |

Aspiration hazard

Based on available data, the classification criteria are not met.

11.2. Information on other hazards

No data available

SECTION 12: Ecological information

12.1. Toxicity

Acute fish toxicity

| Product / Substance name CAS / EC no. | Measurement type | Value / Result | Duration of exposure | Species |
|--|------------------|----------------|----------------------|----------------------------------|
| Hydrochloric acid 7647-01-0 / 231-595-7 | LC50 | - | 48 hours | Leuciscus idus |
| Hydrochloric acid 7647-01-0 / 231-595-7 | LC50 | 282 mg/l | 96 hours | Gambusia affinis (Mosquito fish) |

Acute algae toxicity

| Product / Substance name CAS / EC no. | Measurement type | Value / Result | Duration of exposure | Species |
|--|------------------|----------------|----------------------|---------------------------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | ErC50 | >1000 mg/l | 72 hours | Pseudokirchneriella subcapitata |

Acute crustacean toxicity

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| Product / Substance name CAS / EC no. | Measurement type | Value / Result | Duration of exposure | Species |
|--|------------------|----------------|----------------------|---------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | EC50 | >1000 mg/l | 48 hours | Daphnia magna |
| Hydrochloric acid 7647-01-0 / 231-595-7 | EC50 | 56 mg/l | 72 hours | Daphnia magna |

Chronical toxicity

| Product / Substance name CAS / EC no. | Measurement type | Value / Result | Duration of exposure | Species |
|--|------------------|----------------|----------------------|--|
| 1,4-dioxane 123-91-1 / 204-661-8 | NOEC | 1000 mg/l | 21 days | Daphnia magna |
| 1,4-dioxane 123-91-1 / 204-661-8 | NOEC | 103 mg/l | 32 days | Pimephales promelas (Fat-head Minnow) |

12.2. Persistence and degradability

Persistence and degradability

| Product / Substance name CAS / EC no. | Type of test | Duration | Result | Degradation |
|--|--------------|----------|--------|---|
| 1,4-dioxane 123-91-1 / 204-661-8 | aerobic | 29 days | <10% | The product is not readily biodegradable. |

12.3. Bioaccumulative potential

Bioaccumulative potential

| Product / Substance name CAS / EC no. | Bioconcentration factor (BCF) | Result | Species |
|--|----------------------------------|---------|-------------------------------|
| 1,4-dioxane 123-91-1 / 204-661-8 | 0.3-0.7 | 10 mg/l | Cyprinus carpio (Common carp) |

12.4. Mobility in soil

No data available

12.5. Results of PBT and vPvB assessment

No data available

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12.6. Endocrine disrupting properties

This product does not contain any known or suspected endocrine disruptors.

12.7. Other adverse effects

No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

Disposal considerations

Dispose of contents/container in accordance with local/regional/national/international regulations.

SECTION 14: Transport information

14.1. UN number

2924

14.2. UN proper shipping name

ADR / RID / ADN proper shipping name

FLAMMABLE LIQUID, CORROSIVE, N.O.S. (Hydrogen Chloride 4M in 1,4-Dioxane)

IMDG proper shipping name

FLAMMABLE LIQUID, CORROSIVE, N.O.S. (Hydrogen Chloride 4M in 1,4-Dioxane)

IATA proper shipping name

Flammable liquid, corrosive, n.o.s. (Hydrogen Chloride 4M in 1,4-Dioxane)

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14.3. Transport hazard class(es)

Label

ADR/RID/ADN



3



8

IMDG



3



8

IATA



3



8

ADR / RID Class

3

ADR / RID Classification code

FC

ADR / RID hazard identification number

338

IMDG Class

3 (8)

IATA Class

3 (8)

ADN Class

3

ADN Class Code

FC

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14.4. Packing group

ADR / RID / ADN: II
 IMDG: II
 IATA: II

14.5. Environmental hazards

Not applicable

14.6. Special precautions for user

Special precautions for user

Tunnel restriction code: D/E
 Transport category: 2

IMDG EmS

F-E, S-C

14.7. Maritime transport in bulk according to IMO instruments

IBC Instruction: IBC02

SECTION 15: Regulatory information

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

EU regulations

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.
 This material safety data sheet complies with the requirements of Regulation (EU) 2020/878.

National regulations

No data available

15.2. Chemical safety assessment

No chemical safety assessment has been carried out.

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SECTION 16: Other information

Phrase meaning

Flam. Liq. 2 - Flammable liquids, hazard category 2
 Skin Corr. 1B - Skin corrosion, hazard category 1B
 Eye Dam. 1 - Serious eye damage, hazard category 1
 Acute Tox. 4 - oral - Acute toxicity, oral, hazard category 4
 STOT SE 3 - Specific Target Organ Toxicity — Single exposure, hazard category 3
 Carc. 2 - Carcinogenicity, hazard category 2
 Eye Irrit. 2 - Eye irritation, hazard category 2
 STOT SE 3 - resp. tract irrit. - Specific Target Organ Toxicity — Single exposure, hazard category 3 - respiratory tract irritation
 Carc. 1B - Carcinogenicity, hazard category 1B
 Met. Corr. 1 - Corrosive to metals, hazard category 1
 H225 Highly flammable liquid and vapour.
 H290 May be corrosive to metals.
 H314 Causes severe skin burns and eye damage.
 H318 Causes serious eye damage.
 H319 Causes serious eye irritation.
 H332 Harmful if inhaled.
 H335 May cause respiratory irritation.
 H350 May cause cancer.
 H351 Suspected of causing cancer.
 EUH019 May form explosive peroxides.
 EUH066 Repeated exposure may cause skin dryness or cracking.