

Chemical Safety Data Sheet MSDS / SDS

Nitrogen dioxide SDS

Revision Date:2024-04-25 Revision Number:1

Section 1	Section 2	Section 3	Section 4	Section 5	Section 6	Section 7	Section 8
Section 9	Section 10	Section 11	Section 12	Section 13	Section 14	Section 15	Section 16

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

Product name: Nitrogen dioxide

CAS: 10102-44-0

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

Relevant identified uses: For R&D use only. Not for medicinal, household or other use.

Uses advised against: none

Company Identification

Company: Chemicalbook.in

Address: 5 vasavi Layout Basaveswara Nilayam Pragathi Nagar Hyderabad, India -500090

Telephone: +91 9550333722

SECTION 2: Hazards identification**Classification of the substance or mixture**

Gases under pressure: Liquefied gas

Oxidizing gases, Category 1

Skin corrosion, Sub-category 1B
Acute toxicity - Category 2, Inhalation

GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H270 May cause or intensify fire; oxidizer
H314 Causes severe skin burns and eye damage
H330 Fatal if inhaled

Precautionary statement(s)

Prevention

P220 Keep away from clothing and other combustible materials.
P244 Keep valves and fittings free from oil and grease.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P264 Wash ... thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P271 Use only outdoors or in a well-ventilated area.
P284 [In case of inadequate ventilation] wear respiratory protection.

Response

P370+P376 In case of fire: Stop leak if safe to do so.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P363 Wash contaminated clothing before reuse.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P316 Get emergency medical help immediately.
P321 Specific treatment (see ... on this label).
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P320 Specific treatment is urgent (see ... on this label).

Storage

P410+P403 Protect from sunlight. Store in a well-ventilated place.

P403 Store in a well-ventilated place.
P405 Store locked up.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.

Disposal

P501 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.

Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

Substance

Chemical name:	Nitrogen dioxide
Common names and synonyms:	Nitrogen dioxide
CAS number:	10102-44-0
EC number:	233-272-6
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Administration of oxygen may be needed. Refer immediately for medical attention.

Following skin contact

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again. Refer immediately for medical attention.

Following eye contact

Rinse with plenty of water for several minutes (remove contact lenses if easily possible). Refer immediately for medical attention.

Following ingestion

Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

Most important symptoms/effects, acute and delayed

Severe exposures may be fatal. Contact may cause burns to skin and eyes. Contact with liquid may cause frostbite. This compound was reported to react with blood to form methemoglobin. The lowest lethal human inhalation dose has been reported at 200 ppm/1 min. (EPA, 1998)

Indication of immediate medical attention and special treatment needed, if necessary

Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR as necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. Nitrogen Oxides (NO_x) and Related Compounds

SECTION 5: Firefighting measures

Suitable extinguishing media

Nitrogen dioxide is non-flammable but supports combustion. Wearing proper equipment, shut off flow of gas. Use water spray to keep containers cool and to direct escaping gas away from those effecting shut off. Do not extinguish the fire unless the flow of gas can be stopped and any remaining gas is out of the line. Specially trained personnel may use fog lines to cool exposures and let the fire burn itself out. Vapors are heavier than air and will collect in low areas. Vapors may travel long distances to ignition sources and flashback. Vapors in confined areas may explode when exposed to fire. Containers may explode in fire. Storage containers and parts of containers may rocket great distances, in many directions. If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated waters. Notify local health and fire officials and pollution control agencies. From a secure, explosion-proof location, use water spray to cool exposed containers. If cooling streams are ineffective (venting sound increases in volume and pitch, tank discolors or shows any signs of deforming), withdraw immediately to a secure position. If cylinders are exposed to excessive heat from fire or flame contact, withdraw immediately to a secure location ... The only respirators recommended for fire fighting are self-contained breathing apparatuses that have full facepieces and are operated in a pressure-demand or other positive-pressure mode.

Specific hazards arising from the chemical

When heated to decomposition, toxic fumes of nitrogen oxides are emitted. May ignite other combustible materials (wood, paper, oil, etc.). Mixture with fuels may explode. Container may explode in heat of fire. Vapor explosion and poison hazard may occur

indoors, outdoors or in sewers. Decomposes in water, forming nitric acid and nitric oxide. Avoid moisture and physical damage to storage container. Incompatible with combustible matter, chlorinated hydrocarbons, ammonia, carbon disulfide. Reacts with alkalis to form nitrates and nitrites. Violent reaction with cyclohexane, fluorine, formaldehyde, alcohols, nitrobenzene, petroleum, and toluene. (EPA, 1998)

Special protective actions for fire-fighters

In case of fire in the surroundings, use appropriate extinguishing media. In case of fire: keep cylinder cool by spraying with water.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Do NOT absorb in saw-dust or other combustible absorbents. Remove vapour with fine water spray. Neutralize used water with chalk or soda.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation. Do NOT absorb in saw-dust or other combustible absorbents. Remove vapour with fine water spray. Neutralize used water with chalk or soda.

Methods and materials for containment and cleaning up

Spill handling: keep unnecessary people away. Isolate hazard area and deny entry. Stay upwind. Keep out of low areas. Ventilate closed spaces before entering them. Evacuate area endangered by gas. For water spills, neutralize with agricultural lime (slaked lime), crushed limestone, or sodium bicarbonate. For an air spill, apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if you can do so without risk. Use water spray to reduce vapor but do not put water on leak or spill area. Isolate area until gas has dispersed. It may be necessary to contain and dispose of this chemical as a hazardous waste. If material or contaminated runoff enters waterways, notify downstream users of potentially contaminated waters. Contact your Department of Environmental Protection or your regional office of the federal EPA for specific recommendations ... Initial isolation and protective action distances: Distances shown are likely to be affected during the first 30 min after materials are spilled and could increase with time. If more than one tank car, cargo tank, portable tank, or large cylinder involved in the incident is leaking, the protective action distance may need to be increased ... Small spills (from a small package or a small leak from a large package): first isolate in all directions 200 ft, then protect persons downwind, 0.1 mile (day), 0.3 mile (night). Large spills (from a large package or from many small packages): first isolate in all directions 500 ft, then protect persons downwind 0.1 mile (day), 2.5 miles (night).

SECTION 7: Handling and storage

Precautions for safe handling

NO contact with combustible substances. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Ventilation along the floor. Separated from combustible substances and reducing agents. Corrosive to steel when wet, but may be stored in steel cylinders when moisture content is 0.1% or less.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 0.2 ppm as TWA; A4 (not classifiable as a human carcinogen). MAK: 0.95 mg/m³, 0.5 ppm; peak limitation category: I(1); carcinogen category: 3B; pregnancy risk group: D. EU-OEL: 0.96 mg/m³, 0.5 ppm as TWA; 1.91 mg/m³, 1 ppm as STEL

Biological limit values

no data available

Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear safety goggles or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use breathing protection, closed system or ventilation.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Nitrogen dioxide is a reddish brown gas or yellowish-brown liquid when cooled or compressed. Shipped as a liquefied gas under own vapor pressure. Vapors are heavier than air. Toxic by inhalation (vapor) and skin absorption. Noncombustible, but accelerates the burning of combustible materials. Cylinders and ton containers may not be equipped with a safety relief device.
Colour:	Red to brown gas above 21.1 deg C; brown liquid below 21.1 deg C; colorless solid at approx -11 deg C
Odour:	Irritating odor
Melting point/freezing point:	-11°C
Boiling point or initial boiling point and boiling range:	21°C(lit.)
Flammability:	Noncombustible Liquid/Gas, but will accelerate the burning of combustible materials.
Lower and upper explosion limit/flammability limit:	no data available
Flash point:	< 20°C
Auto-ignition temperature:	no data available
Decomposition temperature:	no data available
pH:	no data available

Kinematic viscosity:	0.0142 at 26.8 deg C (gas): 0.42 CP at 20 deg C (liquid)
Solubility:	Reacts with water (NIOSH, 2016)
Partition coefficient n-octanol/water:	no data available
Vapour pressure:	14.33 psi (20 °C)
Density and/or relative density:	2.62g/mL at 25°C (lit.)
Relative vapour density:	1.58 (21 °C, vs air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

The substance is a strong oxidant. It reacts violently with combustible and reducing materials. Reacts with water. This produces nitric acid and nitric oxide. Attacks many metals in the presence of water.

Chemical stability

no data available

Possibility of hazardous reactions

It is noncombustible but it will accelerate the burning of combustible materials. The gas is heavier than air. Nitrogen Dioxide (nitrogen peroxide) is a strong oxidizing agent. Powdered aluminum burns in the vapor of carbon disulfide, sulfur dioxide, sulfur dichloride, nitrous oxide, nitric oxide, or nitrogen peroxide [Mellor 5:209-212. 1946-47]. Boron trichloride reacts energetically with nitrogen peroxide, phosphine, or fat and grease [Mellor 5:132. 1946-47]. Nitrogen peroxide and acetic anhydride reacted to form tetranitromethane, but resulted in an explosion [Van Dolah 1967]. Nitrogen peroxide forms explosive mixtures with incompletely halogenated hydrocarbons [Chem. Eng. News 42(47):53. 1964]. During an experiment to produce lactic acid by oxidizing propylene with nitrogen peroxide, a violent explosion occurred. These mixtures (olefins and nitrogen peroxide) form extremely unstable nitrosates or nitrosites [Comp. Rend. 116:756. 1893]. Contact of very cold liquefied gas with water may result in vigorous or violent boiling of the product and extremely rapid vaporization due to the large temperature differences involved. If the water is hot, there is the possibility that a liquid "superheat" explosion may occur. Pressures may build to dangerous levels if liquid gas

contacts water in a closed container [Handling Chemicals Safely 1980]. Corrosive to steel when wet, but may be stored in steel cylinders when moisture content is 0.1% or less.

Conditions to avoid

no data available

Incompatible materials

A strong oxidizer. Reacts violently with combustible matter, chlorinated hydrocarbons, ammonia, carbon disulfide, reducing materials. Reacts with water, forming nitric acid and nitric oxide. Attacks steel in the presence of moisture.

Hazardous decomposition products

When heated to decomposition it emits toxic fumes of /nitroxides/.

SECTION 11: Toxicological information

Acute toxicity

Oral: no data available

Inhalation: LC50 Rat inhalation 88 ppm/4 hr

Dermal: no data available

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

A4; Not classifiable as a human carcinogen.

Reproductive toxicity

no data available

STOT-single exposure

The substance is corrosive to the eyes, skin and respiratory tract. Exposure at high concentrations could cause asphyxiation due to swelling in the throat. Inhalation of the gas or vapour may cause lung oedema. See Notes. Exposure far above the OEL could cause death. The effects may be delayed. Severe effects may occur following a prolonged symptom-free period. Medical observation is indicated.

STOT-repeated exposure

The substance may have effects on the lungs. This may result in impaired functions and decreased resistance to infection.

Aspiration hazard

A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: no data available

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

Persistence and degradability

no data available

Bioaccumulative potential

no data available

Mobility in soil

no data available

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN1067 (For reference only, please check.)

IMDG: UN1067 (For reference only, please check.)

IATA: UN1067 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: DINITROGEN TETROXIDE (NITROGEN DIOXIDE) (For reference only, please check.)

IMDG: DINITROGEN TETROXIDE (NITROGEN DIOXIDE) (For reference only, please check.)

IATA: DINITROGEN TETROXIDE (NITROGEN DIOXIDE) (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 2.3 (For reference only, please check.)

IMDG: 2.3 (For reference only, please check.)

IATA: 2.3 (For reference only, please check.)

Packing group, if applicable

ADR/RID: (For reference only, please check.)

IMDG: (For reference only, please check.)

IATA: (For reference only, please check.)

Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Listed.

(PICCS)

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC)

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>

HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>

ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>

Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

Other Information

The commercial brown liquid under pressure is an equilibrium mixture of nitrogen dioxide and the colourless nitrogen tetroxide (CAS 10544-72-6). Non irritant concentration may cause lung oedema. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor, or by an authorized person, should be considered. Rinse contaminated clothing with plenty of water because of fire hazard. Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.

Disclaimer: 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. We as supplier shall not be held liable for any