Chemical Safety Data Sheet MSDS / SDS

Fluorine SDS

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

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

Product identifier

Product name: Fluorine

CAS: 7782-41-4

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

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SECTION 2: Hazards identification

Classification of the substance or mixture

Gases under pressure: Compressed gas
Oxidizing gases, Category 1

Skin corrosion, Sub-category 1A
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:	Fluorine
Common names and synonyms:	Fluorine
CAS number:	7782-41-4
EC number:	231-954-8
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer 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 for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth with water. Do not induce vomiting. Never give anything by mouth to an unconscious person. Call a doctor or Poison Control Center immediately.

Most important symptoms/effects, acute and delayed

Poisonous; may be fatal if inhaled. Vapor extremely irritating. Contact may cause burns to skin and eyes. Chronic absorption may cause osteosclerosis and calcification of ligaments. (EPA, 1998)

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

Call for medical aid. ... Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. ... Will cause frostbite. Flush affected areas with plenty of water. If in eyes, hold eyelids open, and flush with plenty of water. Do not rub affected areas.

SECTION 5: Firefighting measures

Suitable extinguishing media

If material involved in fire: Do not extinguish fire unless flow can be stopped. Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Do not use water on material itself. Use water spray to knock-down vapors. Fluorine, compressed

Specific hazards arising from the chemical

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 indoors, outdoors, or in sewers. Poisonous gas is produced in fire. Avoid contact with all oxidizable materials, including organic materials. Will react violently with water and most organic materials to produce heat and toxic fumes. Keep gas in tank, avoid exposure to all other materials. (EPA, 1998)

Special protective actions for fire-fighters

NO water. In case of fire in the surroundings, use appropriate extinguishing media. See Notes. In case of fire: keep cylinder cool by spraying with water. NO direct contact with water. Combat fire from a sheltered position. See Notes.

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.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Ventilation.

Methods and materials for containment and cleaning up

Keep water away from release. Approach release from upwind. Stop or control the leak, if this can be done without undue risk. Control runoff and isolate discharged material for proper disposal.

SECTION 7: Handling and storage

Precautions for safe handling

NO contact with water, combustible substances or reducing agents. 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

Fireproof if in building. Cool.Store in cool, dry, well-ventilated location. Outside or detached storage is preferred. Isolate from all other storage.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 1 ppm as TWA; 2 ppm as STEL.EU-OEL: 1.58 mg/m3, 1 ppm as TWA; 3.16 mg/m3, 2 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 face shield or eye protection in combination with breathing protection.

Skin protection

Cold-insulating gloves. Protective clothing.

Respiratory protection

Use ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Fluorine is a pale yellow gas with a pungent odor. It is commonly shipped as a cryogenic liquid. It is toxic by inhalation and skin absorption. Contact with skin in lower than lethal concentrations causes chemical burns. It reacts with water to form hydrofluoric acid and oxygen. It is corrosive to most common materials. It reacts with most combustible materials to the point that ignition occurs. Under prolonged exposure to fire or intense heat the containers may violently rupture and rocket.
Colour:	Pale yellow, diatomic gas or liquid
Odour:	Sharp penetrating odor
Melting point/freezing point:	-220°C
Boiling point or initial boiling point and boiling range:	-188°C

Flammability:	Nonflammable Gas, but an extremely strong oxidizer.
Lower and upper explosion limit/flammability limit:	no data available
Flash point:	no data available
Auto-ignition temperature:	Not flammable (USCG, 1999)
Decomposition temperature:	no data available
pH:	no data available
Kinematic viscosity:	0.257 mPa-s liquid at 85 deg K; 0.0218 mPa-s gas
Solubility:	Reacts with water (NIOSH, 2016)
Partition coefficient n-octanol/water:	no data available
Vapour pressure:	760 mm Hg at -306.2° F (EPA, 1998)
Density and/or relative density:	1.695（15°C）
Relative vapour density:	1.695 (EPA, 1998) (Relative to Air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

The substance is a strong oxidant. It reacts with combustible and reducing materials. Reacts violently with water. This produces toxic and corrosive vapours of ozone (see ICSC 0068) and hydrogen fluoride (see ICSC 0283). Reacts violently with ammonia, metals, oxidants and many other materials. This generates fire and explosion hazard.

Chemical stability

Conditions contributing to instability: Elevated temp may cause cylinders to burst.

Possibility of hazardous reactions

Not flammableThe gas is heavier than air.Propellant; ignites upon contact with alcohols, amines, ammonia, beryllium alkyls, boranes, dicyanogen, hydrazines, hydrocarbons, hydrogen, nitroalkanes, powdered metals, silanes, or thiols [Bretherick, 1979 p.174]; Aluminum powder and iodine in close contact will ignite spontaneously, Fluorine with metals requires added heat for ignition, [NFPA 491M]. Antimony is spontaneously flammable in fluorine, chlorine, and bromine. With iodine, the reaction produces heat, which can cause flame or even an explosion if the quantities are great enough, [Mellor 9:379(1946-1947)]. The oxides of the alkalis and alkaline earths are vigorously attacked by fluorine gas with incandescence, [Mellor 2:13(1946-1947)]. Fluorine causes aromatic hydrocarbons and unsaturated alkanes to ignite spontaneously, [Mellor 2, Supp. 1:55(1956)]. Fluorine vigorously reacts with arsenic and arsenic trioxide at ordinary temperatures, [Mellor 9:34(1946-1947)]. Bromine mixed with fluorine at ordinary temperatures yields bromine trifluoride, with a luminous flame, [Mellor 2:12(1946-1947)]. Calcium silicide burns readily in fluorine, [Mellor 6:663(1946-1947)]. The carbonates of sodium, lithium, calcium, and lead in contact with fluorine are decomposed at ordinary temperatures with incandescence, [Mellor 2:13(1946-1947)]. A mixture of fluorine and carbon disulfide ignites at ordinary temperatures, [Mellor 2:13(1946-1947)]. The reaction between fluorine and carbon tetrachloride is violent and sometimes explosive, [Mellor 2, Supp. 1, 198(1956)]. The uncontrolled reaction between fluorine and chlorine dioxide is explosive, [Mellor 2, Supp. 1, 532(1956)]. Fluorine and silver cyanide react with explosive violence at ordinary temperatures, [Mellor 2, Supp. 1:63(1956)]. Fluorine and sodium acetate produce an explosive reaction involving the formation of diacetyl peroxide, [Mellor 2, Supp. 1:56(1956)]. Selenium, silicon, or sulfur ignites in fluorine gas at ordinary temperatures, [Mellor 2:11-13(1946-1947)]. Each bubble of sulfur dioxide gas led into a container of fluorine produces an explosion, [Mellor 2:1(1946-1947)]. Fluorine and thallous chloride react violently, melting the product, [Mellor, Supp. 1:63(1956)].

Conditions to avoid

no data available

Incompatible materials

Strong oxidizer. Reacts with every known element except, helium, neon, argon. Reacts with all materials except for some Teflons and some metals at low temperatures. Water reactive. Reacts with water to form hydrogen fluoride and oxygen.

Hazardous decomposition products

Decomposes in water, giving hydrofluoric acid, HF, oxygen fluoride, OF2, hydrogen peroxide, oxygen and ozone.

SECTION 11: Toxicological information

Acute toxicity

Oral: no data available

Inhalation: LC50 Rat inhalation 185 ppm/1 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

no data available

Reproductive toxicity

no data available

STOT-single exposure

The substance is very corrosive to the eyes, skin and respiratory tract. Inhalation of this gas may cause lung oedema. See Notes. The liquid may cause frostbite. The effects may be delayed. Medical observation is indicated.

STOT-repeated exposure

no data available

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

Fluorine decomposes in water to form hydrofluoric acid (HF), hydrogen peroxide (H2O2) and oxygen fluoride (OF2)(1). Therefore, bioconcentration in aquatic organisms is not expected to be an important fate process(SRC).

Mobility in soil

Elemental fluorine was found to be very mobile in both sandy and sandy loam soils(1). Fluorine decomposes in water to form hydrofluoric acid (HF), hydrogen peroxide (H2O2) and oxygen fluoride (OF2)(2); therefore, fluorine is expected to decompose in moist soils as it reacts with water(SRC).

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: UN1045 (For reference only, please check.)
IMDG: UN1045 (For reference only, please check.)
IATA: UN1045 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: FLUORINE, COMPRESSED (For reference only, please check.)
IMDG: FLUORINE, COMPRESSED (For reference only, please check.)
IATA: FLUORINE, COMPRESSED (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

Reacts violently with fire extinguishing agents such as water. 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 a person authorized by him/her, should be considered. Do NOT spray water on leaking cylinder (to prevent corrosion of cylinder). Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.