

United States Hazard Communication Standard 29 CFR 1910.1200 (2012)
Canada Hazardous Products Regulations (SOR/2015-17)
NORMA MEXICANA NOM-018-STPS-2015

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product name	Hydrogen Fluoride – Aqueous (70%)
Synonym(s)	Hydrofluoric Acid Solution 70%; Dilute Hydrofluoric Acid 70%
CAS number	7664-39-3
EC number	231-634-8

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

Recommended use(s):	Catalyst in alkylation reaction Intermediate chemical product Metal cleaning agent
Restrictions on use(s):	Industrial/professional uses only; all other uses forbidden

1.3 Details of the supplier of the safety data sheet

Suppliers:	Mexichem Fluor, S.A. de C.V. Matamoros-Reynosa Km. 4.5 Ejido Las Rusias Matamoros, Tam. Mexico. C.P. 87560
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Telephone:	+52 (868) 811-10-05 (Office) +52 (868) 811-10-45 (Plant)
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1.4 Emergency telephone number

24-hour Emergency Telephone:	+1 (225) 642-6316 (USA) +52 (868) 811-10-05 (Mexico)
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Alternative Emergency Telephone:	CHEMTREC: +1 (800) 424-9300 (USA) International CHEMTREC: +1 (703) 527-3887
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2. HAZARDS IDENTIFICATION:

2.1 Classification of substance or mixture

Classification in accordance with GHS as implemented by United States Hazard Communication Standard 29 CFR 1910.1200 (2012), Canada Hazardous Products Regulations (SOR/2015-17), and NORMA MEXICANA NOM-018-STPS-2015

2.3 Hazards not otherwise classified

Highly toxic by inhalation, by ingestion and by skin contact; May cause chemical gastrointestinal burns. May cause chemical respiratory tract burns. Causes severe skin burns

Dangerous products can be formed by product decomposition during fire. When heated, product emits highly corrosive fumes of fluorides. Toxic and irritating vapors of hydrogen fluoride (HF) are generated when heated

3. COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substance

Ingredient	C.A.S. Number	Percent (%) by Weight
Hydrogen Fluoride (anhydrous)	7664-39-3	70
Water		30

3.2 Mixture

This product is a mixture

4. FIRST AID MEASURES

4.1. Description of first aid measures

General Advice:

Consult a physician. Show this safety data sheet to the doctor in attendance.

- Eye contact:** Irrigate each eye with 1000 cc of a 1% calcium gluconate solution for 15 minutes or if necessary, until medical aid is available. Hold the eyelids open and away from the eye during irrigation to allow thorough flushing of the eyes. If the person is wearing contact lenses, the lenses should be removed, if possible. However, flushing should not be interrupted, and the lenses should be removed by a person who is qualified to do so. Seek medical attention immediately
- Skin contact:** Immediately wash skin with soap and large amounts of cool water. If product penetrates clothing, immediately remove clothing and flush skin with water. Using acid resistant gloves, continuously rub calcium gluconate 2.5% gel on the exposed area until medical assistance is reached. Seek medical attention promptly
- Inhalation:** Move person to fresh air. If breathing stops, provide artificial respiration. Administer oxygen by mask (12 l/min); nebulize with calcium gluconate 2.5% solution continuously until medically evaluated. If respiratory assistance is needed, use indirect methods such as MICROSHIELDS® or Ambu® bag
- Ingestion:** Never give anything by mouth to an unconscious person. Rinse mouth with water. Prevention of absorption of the fluoride ion in cases of ingestion can be obtained by giving milk, chewable calcium carbonate tablets or Milk of Magnesia to conscious person. Seek medical attention promptly

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

General information: Exposure to Hydrogen Fluoride (HF) requires immediate and specialized first aid and medical treatment. Symptoms may be delayed up to 24 hours depending on the concentration of HF. After decontamination with water, further damage can occur due to penetration/absorption of the fluoride ion. Treatment should be directed toward binding the fluoride ion. See Section 11 for additional information on health hazards.

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

Systemic effects (Hypocalcemia, Hypomagnesaemia and Hyperkalemia) may present in case of inhalation, ingestion or in the case of skin burns on areas with over 2% of body surface, which may cause arrhythmia and involuntary muscle spasms (tetany); a strict serum electrolytes monitoring (calcium and magnesium, every 30 minutes) and electrocardiogram are indicated.

HF is highly corrosive, and its exposure can lead to severe local damage, hypocalcemia, hypomagnesemia and the development of cardiac arrhythmias, which are the primary cause of death in HF exposures. To significantly reduce or prevent HF dermal absorption, immediate irrigation of the affected area with copious amounts of either water or saline followed by the application of a calcium gluconate-containing gel is recommended. Intravenous (IV) access, serum electrolyte concentrations, an electrocardiogram, and cardiac monitoring should be obtained in patients exposed to HF. Patients with inhalation injuries are treated with oxygen and nebulized calcium gluconate (4 mL of 2.5-5%). Succinylcholine is best avoided if rapid sequence intubation must be performed in the setting of HF exposure due to the possibility of hyperkalemia. If systemic toxicity is suspected (due to QTc prolongation, cardiac arrhythmia, or obvious systemic illness), calcium is administered intravenously as part of the medical management

Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

5. FIRE-FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media	Foam, dry powder, carbon dioxide
Unsuitable extinguishing media	Water must NOT be used. 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	When heated, emits highly corrosive fumes of fluorides. Formation of dangerous gas on contact with water or humid air. Contact with water may produce heat release and present risks of splashing
	Formation of flammable gas on contact with certain metals

Hazardous combustion products Inorganic; the product is nonflammable/noncombustible. When heated, product emits highly corrosive fumes of fluorides. Toxic gases of hydrogen fluoride (HF) can develop on heating/fire

5.3. Advice for firefighters

Special protective equipment for fire-fighters Fire-fighters should wear full protective acid resistant suit and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Fire-fighting equipment should be thoroughly decontaminated after use

Special procedures for fire-fighting Remove personnel immediately from the incident area. Approach from upwind. Depending on wind direction, warn people of danger of inhalation, close doors and windows, stop air-intake of ventilation system

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Evacuate/secure area. Approach from upwind. If caught downwind, exit the area perpendicularly to the wind direction. Continue to monitor weather conditions and wind direction. Ventilate the premises with fresh air. Eliminate all sources of ignition, and do not generate flames or sparks. Keep away incompatible materials/products. Continually assess situation and respond appropriately

Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment

6.2. Environmental precautions

Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. Prevent discharge into drains; do not flush into sanitary sewer system. Dike to prevent/control entry into waterways

6.3. Methods and material for containment and cleaning up

Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Use sufficient absorbent until area appears dry. Collect as much of the spilled material as possible. NOTE, adding an absorbent material does not remove the physical, health, or environmental hazards

Place used absorbent material in a metal container approved for use in transportation by appropriate authorities. The container must be lined with polyethylene plastic or contain a plastic drum liner made of polyethylene. Cover, but do not seal for 48 hours. Dispose of collected material in accordance with all applicable regulations

7. HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling	Do not handle until all safety precautions have been read and understood. Use only in well ventilated areas. Use only equipment and materials which are compatible with hydrogen fluoride. Wear appropriate personal protective equipment (refer to Section 8). Do not breathe dust/fume/gas/mist/vapors/spray. Control exposure in accordance with appropriate occupational exposure limits. Do not get in eyes, on skin, or on clothing. Keep away from moisture, heat, ignition source, and incompatible materials (refer to Section 10). Avoid release to the environment
General hygiene considerations:	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should thoroughly wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Wash contaminated clothing before reuse

7.2. Conditions for safe storage, including any incompatibilities

Conditions for Safe Storage	<p>Use containment dike around storage containers and transfer installation. Keep in a cool, well-ventilated area. Keep containers tightly closed to prevent contamination with water or air. Containers should be vented periodically to a suitable scrubbing system to prevent a dangerous buildup of pressure. Containers should be pressure vessels designed to withstand the vapor pressure of hydrogen fluoride at 47.5° C, as well as sub-atmospheric pressure which can occur if hydrogen fluoride cools below 19.5° C</p> <p>Keep away from moisture, heat, ignition source, and incompatible materials (refer to Section 10). Store in a corrosive resistant container with a resistant inner liner.</p> <p>Unsuitable containers: glass, concrete, metal/cast iron</p>
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8. EXPOSURE CONTROL/PERSONAL PROTECTION

8.1. Control parameters

The table below is a summary. Please see the specific legislation for complete information. Consult your local authorities for acceptable exposure recommendations/limits.

USA OSHA Permissible Exposure Level (PEL)	3 ppm, TWA
USA ACGIH Threshold Limit Values (TLV)	0.5 ppm, TWA (as F) 2 ppm, Ceiling
USA NIOSH Recommended Exposure Level (REL)	30 ppm, IDLH 3 ppm, TWA 6 ppm, Ceiling

Mexico	0.5 ppm, TWA (as F) 2 ppm, Ceiling
UK Health and Safety Executive, EH40/2005 Workplace Exposure Limit, 2011	1.5 mg/m ³ TWA 2.5 mg/m ³ (15-mins)
Korea	3 ppm, Ceiling (as F)
Japan Society of Occupational Health	3 ppm, Ceiling 2.5 mg/m ³ , Ceiling (Skin absorption)
China	2 mg/m ³ Ceiling (as F, related to hydrofluoric acid)

Biological occupational exposure limits

US ACGIH - Biological Exposure Indices (BEI)	Note 1: Basis – Upper respiratory tract, lower respiratory tract, skin & eye irritation, and fluorosis Note 2: Prior to shift (16 hours after exposure ceases) 2 mg/l (in Urine)
	Note: This BEI applies to fluorides Note 2: End of shift (16 hours after exposure ceases) 3 mg/l (in Urine)

8.2. Exposure controls

Appropriate engineering controls	Use in closed systems when able. Provide appropriate local exhaust ventilation to reduce airborne exposure to below relevant occupational exposure limits and/or to control dust/fume/gas/mist/vapors/spray. Gas detectors should be used when toxic quantities may be released. Use respiratory protection equipment, if ventilation is not adequate. Ensure easy access to eyewash station, safety showers, firefighting and emergency equipment. Consider appropriate spillage containment. Inspect periodically wall thickness of storage tanks and piping
Respiratory protection	Respiratory protection complying with an approved standard should be worn if a risk assessment indicates inhalation exposure is possible. If a respirator is needed, use respirators as part of a full respiratory protection program. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced. Use a positive pressure supplied-air respirator if there is a potential for over exposure from an uncontrolled release, exposure levels are not known, or under any other circumstances where air-purifying respirators may not provide adequate protection
Skin/hand protection	Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. If gloves are needed, use chemical resistant gloves (butyl rubber) or gloves made from fluoroelastomer. Gloves must be inspected prior to use. Use proper glove removal technique to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands after gloves are removed.

If skin exposure is identified by an exposure assessment, use acid resistant clothing and boots. If appropriate, use neoprene suit with double envelop leg to cover acid resistant boot with chemical resistant gloves secured to suit

Eye/face

Wear full face shield and indirect vented safety goggles. Use of contact lenses prohibited

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state and appearance	Colorless liquid; Fumes in air
Odor	Sharp pungent odor
Odor threshold	0.5 to 3 ppm
Melting point	-71°C
Boiling point	66°C
Flash point	Not Flammable
Flammability (solid, gas)	Not applicable
Upper explosive limit	Not applicable
Lower explosive limit	Not applicable
Vapor pressure	110 mm Hg at 21°C
Vapor density	2.21 at 21°C 1.76 at 26.6°C
Solubility in water	100% Miscible
Ionization potential	15.98 eV
Specific gravity	1.25 at 4°C
Explosive properties	Not explosive
Oxidizing properties	Not oxidizing

10. STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity: Water reactive. Air reactive. Bases. Fumes in air. Fumes are highly irritating, corrosive, and poisonous. Generates much heat on dissolution

10.2. Chemical stability

Stability: Stable at ambient temperatures in closed containers, but hygroscopic on exposure to the atmosphere

10.3. Possibility of hazardous reactions

Possibility of hazardous reactions: May react with common metals (iron, steel) to generate flammable hydrogen gas if diluted below 65% with water. Reacts exothermically with chemical bases (examples: amines, amides, inorganic hydroxides). Reacts with cyanide salts and compounds to release gaseous hydrogen cyanide. May generate flammable and/or toxic gases with dithiocarbamates, isocyanates, mercaptans, nitrides, nitriles, sulfides. Additional gas-generating reactions may occur with sulfites, nitrites, thiosulfates (to give H₂S and SO₃), dithionites (SO₂), and carbonates. Reacts explosively with cyanogen fluoride, methanesulfonic acid or glycerol mixed with nitric acid. Reacts violently with arsenic trioxide, phosphorus pentachloride, acetic anhydride, alkali metals, ammonium hydroxide, chlorosulfonic acid,

ethylenediamine, fluorine, potassium permanganate, oleum, propylene oxide, vinyl acetate, mercury (II) oxide. Contact with many silicon compounds and metal silicides causes violent evolution of gaseous silicon tetrafluoride

10.4. Conditions to avoid

Conditions to avoid: Incompatible substance/materials. Excess heat.

10.5. Incompatible materials

Materials to avoid: See Section 10.3 above. Will attack glass, concrete, natural rubber, leather, certain metals, especially those containing silica, and many organic materials

10.6. Hazardous decomposition products

Hazardous decomposition products: When heated, may decompose to hydrogen, hydrogen fluoride, toxic vapor and/or gas. When heated, product emits highly corrosive fumes of fluorides

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Important Note: Absorption of excessive fluoride ion (F-) can result in acute systemic fluorosis with hypocalcemia interference with various metabolic functions and organ damage (heart, liver, kidneys)

Acute toxicity - oral	No data available; HF is a corrosive substance
Acute toxicity - dermal	No data available; HF is a corrosive substance
Acute toxicity - inhalation	No data available; HF is a corrosive substance
Acute toxicity - intravenous	LD50 - 17.4 mg/kg (rat) (Not a guideline study)
Skin corrosion/irritation	Corrosive, (rabbit) (OECD Test Guideline 404)
Serious eye damage/irritation	Moderately irritating (rabbit) (OECD Test Guideline 405)
Skin sensitization	No evidence of skin sensitization from occupational exposure reports or from animal data
Germ cell mutagenicity Genotoxicity – in vitro	Negative (with & without S9 activation) (OECD Guideline 471)
Germ cell mutagenicity Genotoxicity – in vivo *read-across substance sodium fluoride; study not conducted with hydrogen fluoride	*Negative (mouse) (Not a guideline study)
Reproductive toxicity *read-across substance sodium fluoride; study not conducted with hydrogen fluoride	*Oral NOAEL - 250 ppm (rat) (OECD Guideline 416)
Teratogenic toxicity *read-across substance sodium fluoride; study not conducted with hydrogen fluoride	*NOAEL - 150 ppm for maternal toxicity and *NOAEL - 300 ppm for developmental toxicity (rat) (OECD Guideline 414)

Specific target organ toxicity - single exposure STOT - single exposure	No data available
Specific target organ toxicity (STOT) - repeated exposure - inhalation	NOAEL - 1.0 ppm (analytical), equivalent to 0.82 mg/m ³ (rat) (OECD Test Guideline 412)
Aspiration hazard	No data available

Carcinogenicity

IARC: No component of this product, present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC

ACGIH: No component of this product, present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by ACGIH. See note below*

NTP: No component of this product, present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by NTP

OSHA: No component of this product, present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by OSHA

*Note: ACGIH Determination for Fluoride (as F) - A4, Not Classifiable as a Human Carcinogen

12. ECOLOGICAL INFORMATION

12.1. Toxicity

Acute toxicity to fish (<i>Onchoryhnchus mykiss</i>) *read-across substance sodium fluoride	*LC50 - 51 mg/L (Non-guideline study)
Acute toxicity for marine invertebrates *read-across substance sodium fluoride	*EC50 - 10.5 mg/L (Non-guideline studies)
Long term aquatic invertebrates (<i>Daphnia magna</i>) *read-across substance sodium fluoride	*NOEC - 8.9 mg/L (arithmetic mean of two studies)
Acute toxicity to aquatic algae and cyanobacteria *read-across substance sodium fluoride	*EC50 for freshwater algae - 43 mg/L *EC50 for marine water algae - 81 mg/L
Long-term toxicity to aquatic algae and cyanobacteria *read-across substance sodium fluoride	*NOEC for freshwater algae – 50 mg/L *NOEC for marine algae - 50 mg/L
Activated sludge	NOEC (3-hr) - 510 mg/L (for fluoride) (OECD 209 Study)

12.2. Persistence and degradability

Rapidly dissociate in water at environmentally relevant pH to form hydrogen and fluoride ions

12.3. Bioaccumulative potential

High bioaccumulation potential. Sequestration/accumulation of fluoride occurs in bones and teeth

12.4. Mobility in soil

Fluoride strongly adsorbs to soil and is essentially immobile

12.5. Results of PBT and vPvB assessment

Does not fulfill the criteria for vPvB or PBT substance

13. DISPOSAL CONSIDERATIONS

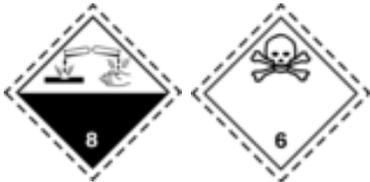
13.1. Waste treatment methods

Product	<p>Disposal Method: The generation of waste should be avoided or minimized whenever possible. Disposal practices must be in compliance with all federal, state and local laws and regulations. DO NOT dump into any sewers, on the ground or into any body of water. Contact a licensed professional waste disposal service to ensure proper disposal. Combustion products will include HF</p> <p>Waste Codes: <ul style="list-style-type: none"> - EPA Hazardous Waste Number (RCRA): U134 - EU Waste Code Number: 06 01 03 (hydrofluoric acid) </p>
Packaging	<p>Disposal Method: The generation of waste should be avoided or minimized whenever possible. Empty containers or liners may retain some product residues. Contact a licensed professional waste disposal service for disposal guidance. Combustion products may include HF</p> <p>Container Waste Code: <ul style="list-style-type: none"> - EU Waste Code No. 16 05 07: discarded inorganic chemicals consisting of or containing hazardous substances </p>

14. TRANSPORT INFORMATION

The information below is relevant for ADR, RID, IMDG, IATA, ICAO and US DOT

14.1 UN Number:	1790
14.2 Proper shipping name:	Hydrogen fluoride, aqueous (70%)
Transport document description	UN1790, Hydrogen fluoride, aqueous (70%), 8, (6.1), I
14.3 Transport hazard class(es) (UN):	8 6.1

Hazard labels (UN):	
14.4 Packing group (UN):	I
14.5 Environmental hazards:	Not applicable
14.6 Other information:	Passenger aircraft/rail: 0.5 L Cargo aircraft: 2.5 L
14.7 Special precautions for user:	Transport within user's premises: always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage
14.8 Transport in bulk according to Annex II of MARPOL and the IBC Code:	Not applicable

15. REGULATORY INFORMATION

International Inventories

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory	Complies; Listed as "Active"
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List	Complies
ENCS - Japan Existing and New Chemical Substances	Complies
ISHL – Japan Inventory of Chemical Substances	Not determined
IECSC - China Inventory of Existing Chemical Substances	Complies
KECI - Korean Existing and Evaluated Chemical Substances	Complies
PICCS - Philippines Inventory of Chemicals and Chemical Substances	Complies
AICS - Australian Inventory of Chemical Substances	Complies
NZIoC - New Zealand Inventory of Chemicals	Complies
TCSI – Taiwan Chemical Substance Inventory	Complies
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances	Complies

US Federal Regulations

SARA Section 302 (40 CFR 355) Extremely Hazardous Substances: Hydrofluoric acid (conc. 50% or greater); Threshold Planning Quantity (TPQ) 100 lbs.

EPCRA Section 304: Hydrofluoric acid (conc. 50% or greater); Reportable Quantity (RQ) 100 lbs.

SARA 311/312 Hazard Categories: Hydrofluoric acid (conc. 50% or greater)

SARA Section 313 (40 CFR 372) Toxics Release Inventory: Hydrofluoric acid (conc. 50% or greater)

CAA Section 112(r): Hydrofluoric acid (conc. 50% or greater); Threshold Quantity (TQ) 1000

CERCLA (40 CFR 302): This material, as supplied, contains one or more substances regulated as a hazardous substance - Hydrofluoric acid (conc. 50% or greater); Reportable Quantity (RQ) 100 lbs

U.S. State Regulations – Right to Know

Massachusetts: Hydrofluoric acid, CAS No. 7664-39-3

New Jersey: Hydrogen Fluoride; CAS No. 7664-39-3

Pennsylvania: Hydrogen Fluoride; CAS No. 7664-39-3

California Proposition 65: This product does not contain any Proposition 65 chemical

16. OTHER INFORMATION

Glossary:

IARC: International Agency for Research on Cancer

ACGIH: American Conference of Governmental Industrial Hygienists

NTP: National Toxicology Program of the United States

NIOSH: National Institute for Occupational Safety and Health

OSHA: US Occupational Safety and Health Administration

ADR: Accord europeen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways

RID: Reglement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations concerning the International Transport of Dangerous Goods by Rail)

IATA: International Air Transport Association

ICAO: International Civil Aviation Organization

IMDG: International Maritime Dangerous Goods

IMO: International Maritime Organization

CAS: Chemical Abstracts Service

EC₅₀: Concentration at which growth or mobilization is reduced by 50%

LC₅₀: Lethal Concentration to 50% of a test population

LD₅₀: Lethal Dose to 50% of a test population (Median Lethal Dose)

PBT: Persistent, Bioaccumulative and Toxic substance

vPvB: Very Persistent and Very Bioaccumulative

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END OF SAFETY DATA SHEET