

α,α,α -Trifluorotoluene

sc-257042

Material Safety Data Sheet



The Power is Question

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

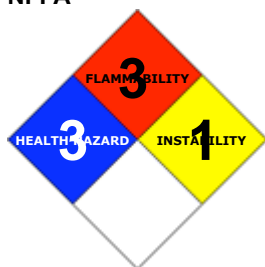
PRODUCT NAME

α,α,α -Trifluorotoluene

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave

Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: CHEMWATCH: From within the US and Canada:
877-715-9305

Emergency Tel: From outside the US and Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE

In dye chemistry; in the manufacture of substituted benzotrifluorides containing an ethylenic group; in dielectric fluids such as transformer oils.

SYNONYMS

C7-H5-F3, C6-H5-CF3, "toluene, alphah, alpha, alpha-trifluoro-", "benzenyl fluoride", "benzylidene fluoride", phenylfluoroform, (trifluoromethyl)benzene, omega-trifluorotoluene, "USAF MA-16"

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Causes severe burns.

Risk of serious damage to eyes.

Highly flammable.

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- Accidental ingestion of the material may be damaging to the health of the individual.
- Fluoride causes severe loss of calcium in the blood, with symptoms appearing several hours later including painful and rigid muscle contractions of the limbs. Cardiovascular collapse can occur and may cause death with increased heart rate and other heart rhythm irregularities. The brain and kidneys may be affected. Other toxic effects include headache, increased saliva output, jerking of the eyeball and dilated pupils, lethargy, stupor, coma and rarely, convulsions.

EYE

- The material can produce severe chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
- If applied to the eyes, this material causes severe eye damage.
- Experiments in which a 20-percent aqueous solution of hydrofluoric acid (hydrogen fluoride) was instilled into the eyes of rabbits caused immediate damage in the form of total corneal opacification and conjunctival ischemia; within an hour, corneal stroma edema occurred, followed by necrosis of anterior ocular structures.

SKIN

- The material can produce severe chemical burns following direct contact with the skin.
- Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.
- Fluorides are easily absorbed through the skin and cause death of soft tissue and erode bone. Healing is delayed and death of tissue may continue to spread beneath skin.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

- The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
 - Acute effects of fluoride inhalation include irritation of nose and throat, coughing and chest discomfort. A single acute over-exposure may even cause nose bleed. Pre-existing respiratory conditions such as emphysema, bronchitis may be aggravated by exposure. Occupational asthma may result from exposure.
 - Acute inhalation exposures to hydrogen fluoride (hydrofluoric acid) vapours produce severe eye, nose, and throat irritation; delayed fever, cyanosis, and pulmonary edema; and may cause death.
- Even fairly low airborne concentrations of hydrogen fluoride produce rapid onset of eye, nose, and throat irritation. Hydrogen fluoride has a strong irritating odor that is discernible at concentrations of about 0.04 ppm. Higher concentrations of the vapour/ mist may cause corrosion of the throat, nose and lungs, leading to severe inflammation, pulmonary oedema or possible hypocalcaemia.
- Vapour concentration of 10 ppm is regarded as intolerable but a vapour concentration of 30 ppm. is considered by NIOSH as: Immediately Dangerous to Life and Health (IDLH).
- In humans, inhalation of hydrogen fluoride gas may cause immediate or delayed-onset pulmonary oedema after a 1-hour exposure. In addition, exposure to high concentrations of the vapors of hydrofluoric acid characteristically results in ulcerative tracheobronchitis and haemorrhagic pulmonary edema; this local reaction is equivalent to that caused by gaseous hydrogen chloride. From accidental, occupational, and volunteer exposures, it is estimated that the lowest lethal concentration for a 5-minute human exposure to hydrogen fluoride is in the range of 50 to 250 ppm. Significant exposures by dermal or inhalation route may cause hypocalcaemia and hypomagnesaemia; cardiac arrhythmias may follow. Acute renal failure has also been documented after an ultimately fatal inhalation exposure.
- Fluorides are not bound to any extent to plasma proteins. In human serum the fluoride occurs equally as nonionic and ionic forms. when fluoride intake is high the ionic form predominates.
- Repeated sublethal exposures to hydrogen fluoride produce liver and kidney damage.
- Rats, rabbits, guinea pigs, and dogs subject to hydrogen fluoride inhalation experienced significant irritation of the conjunctivae, nasal tissues, and respiratory system after acute inhalation exposures at near-lethal levels. Pathological lesions were observed in the kidney and liver, and the severity of the lesions was dose related. The external nares and nasal vestibules were black, and, at dosages causing considerable mortality, those areas showed zones of mucosal and submucosal necrosis.

CHRONIC HEALTH EFFECTS

- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
- Extended exposure to inorganic fluorides causes fluorosis, which includes signs of joint pain and stiffness, tooth discoloration, nausea and vomiting, loss of appetite, diarrhea or constipation, weight loss, anemia, weakness and general unwellness. There may also be frequent urination and thirst. Redness, itchiness and allergy-like inflammation of the skin and mouth cavity can occur. The central nervous system may be involved.
- Hydrogen fluoride easily penetrates the skin and causes destruction and corrosion of the bone and underlying tissue. Ingestion causes

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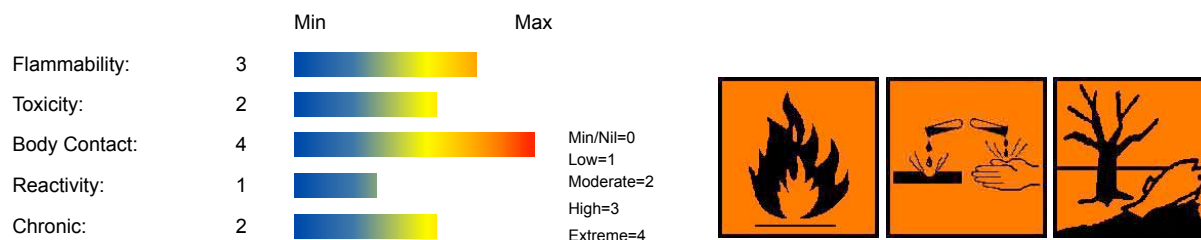
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severe pains and burns in the mouth and throat and blood calcium levels are dangerously reduced. Symptoms include spasm and twitching of the muscles, high fever, convulsions and general extreme pain. Inhalation may cause corrosion of the throat, nose and lungs, leading to severe inflammation and lung swelling.

Repeated or prolonged exposure to acids may result in the erosion of teeth, swelling and or ulceration of mouth lining. Irritation of airways to lung, with cough, and inflammation of lung tissue often occurs. Chronic exposure may inflame the skin or conjunctiva.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS



NAME	CAS RN	%
benzotrifluoride	98-08-8	>98
hydrolysis yields		
hydrogen fluoride	7664-39-3	
benzoic acid	65-85-0	

Section 4 - FIRST AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Center or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

If patient is conscious, give six calcium gluconate or calcium carbonate tablets dissolved in water, by mouth.

EYE

- If this product comes in contact with the eyes:
 - Immediately hold eyelids apart and flush the eye continuously with running water.
 - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
 - Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
 - Transport to hospital or doctor without delay.
 - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin or hair contact occurs:
 - Immediately flush body and clothes with large amounts of water, using safety shower if available.
 - Quickly remove all contaminated clothing, including footwear.
 - Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
 - Transport to hospital, or doctor.

INHALED

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- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

- For acute or short term repeated exposures to fluorides:
 - Fluoride absorption from gastro-intestinal tract may be retarded by calcium salts, milk or antacids.
 - Fluoride particulates or fume may be absorbed through the respiratory tract with 20-30% deposited at alveolar level.
 - Peak serum levels are reached 30 mins. post-exposure; 50% appears in the urine within 24 hours.
- For acute poisoning (endotracheal intubation if inadequate tidal volume), monitor breathing and evaluate/monitor blood pressure and pulse frequently since shock may supervene with little warning. Monitor ECG immediately; watch for arrhythmias and evidence of Q-T prolongation or T-wave changes. Maintain monitor. Treat shock vigorously with isotonic saline (in 5% glucose) to restore blood volume and enhance renal excretion.
- Where evidence of hypocalcemic or normocalcemic tetany exists, calcium gluconate (10 ml of a 10% solution) is injected to avoid tachycardia.

BIOLOGICAL EXPOSURE INDEX - BEI These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
Fluorides in urine	3 mg/gm creatinine	Prior to shift	B, NS
	10mg/gm creatinine	End of shift	B, NS

B: Background levels occur in specimens collected from subjects NOT exposed

NS: Non-specific determinant; also observed after exposure to other exposures.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not available
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	1.1886
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA

-
- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

-
- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- Fight fire from a safe distance, with adequate cover.
- If safe, switch off electrical equipment until vapor fire hazard removed.
- Use water delivered as a fine spray to control the fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protective location.
- If safe to do so, remove containers from path of fire.

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GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Liquid and vapor are highly flammable.
- Severe fire hazard when exposed to heat, flame and/or oxidizers.
- Vapor may travel a considerable distance to source of ignition.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).

Combustion products include: carbon dioxide (CO₂), hydrogen fluoride, other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:

Full face- shield.

Gloves:

Respirator:

Type AB-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

-
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb small quantities with vermiculite or other absorbent material.
- Wipe up.
- Collect residues in a flammable waste container.

MAJOR SPILLS

-
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place).
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapor.
- Contain spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labeled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

PROTECTIVE ACTIONS FOR SPILL

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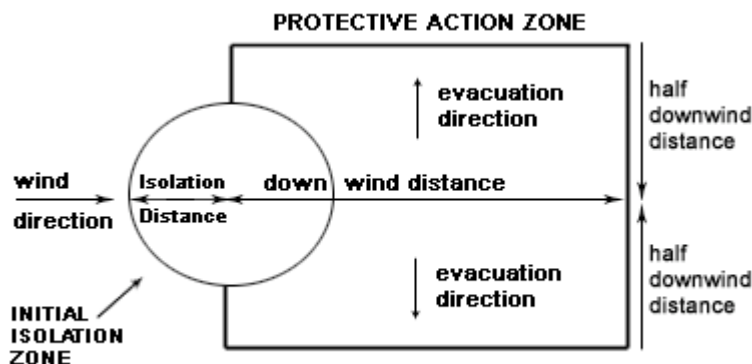
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From IERG (Canada/Australia)

Isolation Distance 50 meters

Downwind Protection Distance 300 meters

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.

3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.

4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.

5 Guide 131 is taken from the US DOT emergency response guide book.

6 IERG information is derived from CANUTEC - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

hydrogen

fluoride

AEGL Type	10 min	30 min	60 min	4 hr	8 hr
AEGL 1	1	1	1	1	GALSYN~
AEGL 2	95	34	24	12	GALSYN~
AEGL 3	170	62	44	22	GALSYN~

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Containers, even those that have been emptied, may contain explosive vapors.

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- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.
- DO NOT allow clothing wet with material to stay in contact with skin

WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights, heat or ignition sources.
- When handling, DO NOT eat, drink or smoke.
- Vapor may ignite on pumping or pouring due to static electricity.
- DO NOT use plastic buckets.
- Earth and secure metal containers when dispensing or pouring product.
- Use spark-free tools when handling.
- Avoid contact with incompatible materials.
- Keep containers securely sealed.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.

RECOMMENDED STORAGE METHODS

■ Packing as supplied by manufacturer. Plastic containers may only be used if approved for flammable liquid. Check that containers are clearly labeled and free from leaks.

- For low viscosity materials (i): Drums and jerricans must be of the non-removable head type. (ii): Where a can is to be used as an inner package, the can must have a screwed enclosure.
- For materials with a viscosity of at least 2680 cSt. (23 deg. C)
- For manufactured product having a viscosity of at least 250 cSt. (23 deg. C)
- Manufactured product that requires stirring before use and having a viscosity of at least 20 cSt (23 deg. C) - (i): Removable head packaging; (ii): Cans with friction closures and (iii): low pressure tubes and cartridges may be used.
- Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages
- In addition, where inner packagings are glass and contain liquids of packing group I there must be sufficient inert absorbent to absorb any spillage, unless the outer packaging is a close fitting molded plastic box and the substances are not incompatible with the plastic.
- Material is corrosive to most metals, glass and other siliceous materials.

STORAGE REQUIREMENTS

-
- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.
- DO NOT store in pits, depressions, basements or areas where vapors may be trapped.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry well ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X: Must not be stored together

O: May be stored together with specific preventions

+: May be stored together

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US - Hawaii Air Contaminant Limits	benzotrifluoride (Fluorides (as F))		2.5						(CAS (Varies with compound))
US - Minnesota Permissible Exposure Limits (PELs)	hydrogen fluoride (Hydrogen fluoride (as F))	3		6					
Canada - Ontario Occupational Exposure Limits	hydrogen fluoride (Hydrogen fluoride (as F))	0.5				2			
US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)	hydrogen fluoride (HYDROGEN FLUORIDE)	0.02							
US NIOSH Recommended Exposure Limits (RELs)	hydrogen fluoride (Hydrogen fluoride)	3	2.5			6	5		
US ACGIH Threshold Limit Values (TLV)	hydrogen fluoride (Hydrogen fluoride)	0.5				2			Measured as F. TLV Basis: upper and lower respiratory tract, skin & eye irritation; fluorosis
Canada - British Columbia Occupational Exposure Limits	hydrogen fluoride (Hydrogen fluoride, as F)					2			
Canada - Alberta Occupational Exposure Limits	hydrogen fluoride (Hydrogen fluoride, as F)	0.5	0.4			2	1.6		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	hydrogen fluoride (Hydrogen fluoride (as F))	3		6					
US - Idaho - Acceptable Maximum Peak Concentrations	hydrogen fluoride (Hydrogen Fluoride (Z37.26-1969))	3							
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	hydrogen fluoride (Hydrogen fluoride (as F))	3		6					
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	hydrogen fluoride (Hydrogen fluoride (as F))			See Table Z-2					
US - Idaho - Limits for Air Contaminants	hydrogen fluoride (Hydrogen fluoride (as F))		[2]						
US - California Permissible Exposure Limits for Chemical Contaminants	hydrogen fluoride (Hydrogen fluoride, as F)	3	2.5	6					
US - Michigan Exposure Limits for Air Contaminants	hydrogen fluoride (Hydrogen fluoride (as F))	3		6					

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US - Alaska Limits for Air Contaminants	hydrogen fluoride (Hydrogen fluoride (as F))	3	6			
Canada - Northwest Territories Occupational Exposure Limits (English)	hydrogen fluoride (Hydrogen fluoride (as F))	3	2.5	6	4.9	
US - Washington Permissible exposure limits of air contaminants	hydrogen fluoride (Hydrogen fluoride)			3		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	hydrogen fluoride (Hydrogen fluoride)	3	2	3	2	
US - Hawaii Air Contaminant Limits	hydrogen fluoride (Hydrogen fluoride (as F))	3	6			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	hydrogen fluoride (Hydrogen fluoride, (as F))	0.5				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	hydrogen fluoride (Hydrogen fluoride (as F))			3	2.6	
US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	hydrogen fluoride (Hydrogen fluoride (Z37.28-1969))	3				
Canada - Nova Scotia Occupational Exposure Limits	hydrogen fluoride (Hydrogen fluoride)	0.5			2	Measured as F. TLV Basis: upper and lower respiratory tract, skin & eye irritation; fluorosis
US - Oregon Permissible Exposure Limits (Z2)	hydrogen fluoride (Hydrogen fluoride (Z37.28-1969))	3				
Canada - Prince Edward Island Occupational Exposure Limits	hydrogen fluoride (Hydrogen fluoride)	0.5			2	Measured as F. TLV Basis: upper and lower respiratory tract, skin & eye irritation; fluorosis
US OSHA Permissible Exposure Levels (PELs) - Table Z3	benzoic acid (Inert or Nuisance Dust: (d) Respirable fraction)	5				
US OSHA Permissible Exposure Levels (PELs) - Table Z3	benzoic acid (Inert or Nuisance Dust: (d) Total dust)	15				
US - Oregon Permissible Exposure Limits (Z3)	benzoic acid (Inert or Nuisance Dust: (d) Respirable fraction)	5				*
US - Oregon Permissible Exposure Limits (Z3)	benzoic acid (Inert or Nuisance Dust: (d) Total dust)	10				*
EMERGENCY EXPOSURE LIMITS						
Material	Revised IDLH Value (mg/m3)			Revised IDLH Value (ppm)		
hydrogen fluoride				30 [Unch]		

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MATERIAL DATA

BENZOTRIFLUORIDE:

HYDROGEN FLUORIDE:

■ Exposed individuals are reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

Odor Safety Factor (OSF) is determined to fall into either Class A or B.

The Odor Safety Factor (OSF) is defined as:

OSF= Exposure Standard (TWA) ppm/ Odor Threshold Value (OTV) ppm

Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV-TWA for example) is being reached, even when distracted by working activities
B	26-550	Idem for 50-90% of persons being distracted
C	1-26	Idem for less than 50% of persons being distracted
D	0.18-1	0-50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	Idem for less than 10% of persons aware of being tested

Amoore and Hautala * have determined that it is only at an OSF value of 26 that 50% of distracted persons can detect the substance at the Exposure Standard value. In the case of alerted persons, an OSF of 26 means that 99% of them can detect the odor at the Exposure Standard value. It is ONLY for substances belonging to Class A and B that there is a reasonable chance of being warned in time, that the Exposure Standard is being exceeded. * Journal Applied Toxicology: Vol 3, 1983, p272

NOTE: The use of the OSF may be inappropriate for mixtures where substances mask the odor of others.

BENZOTRIFLUORIDE:

HYDROGEN FLUORIDE:

■ Odour Threshold for hydrogen fluoride: 0.042 ppm

NOTE: Detector tubes for hydrogen fluoride, measuring in excess of 1.5 ppm, are available commercially. Long-term measurements (8 hrs) may be conducted to detect concentrations exceeding 0.25 ppm.

Hydrogen fluoride is a primary irritant which as a gas causes severe respiratory irritation and as a liquid which causes severe and painful burns to the skin and eyes. The recommendation for TLV-TWA is based on the results of controlled inhalation studies in human volunteers. The limit is thought to minimise the potential for occurrence of dental and/or osteofluorosis (systemic fluorosis) and to prevent the risk of primary irritation to the eyes, nose, throat and lower respiration system.

At concentrations exceeding 3 ppm there have been reports of skin reddening and burning of the nose and eyes.

Odour Safety Factor(OSF)

OSF=71 (HYDROGEN FLUORIDE).

BENZOTRIFLUORIDE:

OEL STEL (Russia): 100 mg/m³

BENZOIC ACID:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

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- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

PERSONAL PROTECTION



Consult your EHS staff for recommendations

EYE

-
- Chemical goggles.
- Full face shield.
- Contact lenses pose a special hazard; soft contact lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET

- Elbow length PVC gloves.
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

- Neoprene gloves

OTHER

-
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.
- Ensure there is ready access to a safety shower.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

RESPIRATOR

- Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	AB-1 P	-
1000	50	-	AB-1 P
5000	50	Airline*	-

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5000	100	-		AB-2 P
10000	100	-		AB-3 P
	100+			Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

■ For flammable liquids and flammable gases, local exhaust ventilation or a process enclosure ventilation system may be required. Ventilation equipment should be explosion-resistant. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min.) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.

State	Liquid	Molecular Weight	146.11
Melting Range (°F)	-20.29	Viscosity	Not Available
Boiling Range (°F)	218.228	Solubility in water (g/L)	Reacts
Flash Point (°F)	53.996	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	1.1886
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	5.04
Volatile Component (%vol)	Not available	Evaporation Rate	Not available
Gas group	IIA		

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Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

APPEARANCE

Colourless liquid with aromatic odour; does not mix with water. Miscible with alcohol, acetone, benzene, carbon tetrachloride, ether, n-heptane.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

-
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

- Reacts with mild steel and zinc to produce hydrogen (H₂).

Hydrogen fluoride:

- reacts violently with strong oxidisers, acetic anhydride, alkalis, 2-aminoethanol, arsenic trioxide (with generation of heat), bismuthic acid, calcium oxide, chlorosulfonic acid, cyanogen fluoride, ethylenediamine, ethyleneimine, fluorine (fluorine gas reacts vigorously with a 50% hydrofluoric acid solution and may burst into flame), nitrogen trifluoride, N-phenylazopiperidine, oleum, oxygen difluoride, phosphorus pentoxide, potassium permanganate, potassium tetrafluorosilicate(2-), beta-propiolactone, propylene oxide, sodium, sodium tetrafluorosilicate, sulfuric acid, vinyl acetate
- reacts (possibly violently) with aliphatic amines, alcohols, alkanolamines, alkylene oxides, aromatic amines, amides, ammonia, ammonium hydroxide, epichlorohydrin, isocyanates, metal acetylides, metal silicides, methanesulfonic acid, nitrogen compounds, organic anhydrides, oxides, silicon compounds, vinylidene fluoride
- attacks glass and siliceous materials, concrete, ceramics, metals (flammable hydrogen gas may be produced), metal alloys, some plastics, rubber coatings, leather, and most other materials with the exception of lead, platinum, polyethylene, wax.

Segregate from alcohol, water.

Avoid reaction with oxidizing agents.

- NOTE: May develop pressure in containers; open carefully. Vent periodically.

Benzotrifluoride:

- reacts with atmospheric moisture, water and stem, forming hydrogen fluoride and benzoic acid
- reacts violently with oxidisers, lithium
- reacts explosively with bis(trifluoromethyl)sulfide

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

benzotrifluoride

TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 15000 mg/kg	Nil Reported
Inhalation (rat) LC50: 70810 mg/m ³ /4h	
Oral (mouse) LD50: 10000 mg/kg	
Inhalation (mouse) LC50: 92240 mg/m ³ /2h	

- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

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CARCINOGEN

Fluorides (inorganic, used in drinking-water)	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group	3
Fluorides (as F)	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
Benzoic acid	US EPA Carcinogens Listing	Carcinogenicity	D
Benzoic acid	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	D

SKIN

hydrogen fluoride	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
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Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

HYDROGEN FLUORIDE:

BENZOIC ACID:

BENZOTRIFLUORIDE:

■ DO NOT discharge into sewer or waterways.

HYDROGEN FLUORIDE:

BENZOTRIFLUORIDE:

■ Although small amounts of fluorides are conceded to have beneficial effects two forms of chronic toxic effect, dental fluorosis and skeletal fluorosis may be caused by excessive intake over long periods.

BENZOTRIFLUORIDE:

■ Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

HYDROGEN FLUORIDE:

■ Hazardous Air Pollutant:	Yes
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■ Prevent, by any means available, spillage from entering drains or watercourses.

BENZOIC ACID:

■ Fish LC50 (96hr.) (mg/l):	180- 200
-----------------------------	----------

■ log Kow (Prager 1995):	1.87
--------------------------	------

■ log Pow (Verschueren 1983):	1.87
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■ For benzoates:

The ultimate environmental characteristics for benzoates may be determined by the properties of counter-ions. The description below assumes these to be non-toxic.

Environmental Exposure and Fate

Distribution modelling using Mackay Level III (the EPA default: equal releases (10,000 kg/hr) and equal distribution to all compartments was used) indicates water (34.8-50%) and soil (48.4-64.2%) to be the main compartment for benzyl alcohol, benzoic acid, sodium and potassium benzoates. None are expected to volatilise to the atmosphere (< 1.51%), nor to adsorb to sediment (< 0.09 %).

However physical chemical properties and use patterns indicate water to be the main compartment for these substances.

Based on structure and organic chemistry rules (e.g. bonding in organic molecules, activation energy, reactivity, transformations, addition, substitution, elimination) no hydrolysis is expected at pH ranges of 4 - 11.

The calculated photodegradation for benzyl alcohol and the benzoates are 50% after 1.3 to 3 days , and the measured photodegradation for benzoic acid is 90% after 140 minutes .

Biodegradation and Bioaccumulation:

This family of substances is readily biodegradable (> 90% after 28 days) both aerobically and anaerobically (Benzoic acid is used as positive control in OECD Guideline for ready biodegradability testing).

From the results of numerous removal experiments the main elimination pathway for the chemicals is biotic mineralisation. The octanol/water partition coefficient of all compounds indicates a low potential for bioaccumulation. This is also supported by the rapid biotransformation and/or excretion of these compounds in urine in mammals.

Ecotoxicity:

From the data (fish, daphnia, algae, bacteria) it is obvious that neutralisation of the pH greatly reduces (up to one order of magnitude) the acute toxicity of benzoic acid. This is also supported by the lower toxicity observed with sodium benzoate. Under environmental relevant conditions therefore the acute toxicity of benzoic acid, sodium benzoate and potassium benzoate for all four trophic levels is > 100 mg/l.

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The Power is Question

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Under environmental relevant conditions the acute toxicity of benzyl alcohol for fish, daphnia and bacteria is > 100 mg/l. For algae, an EC 50 3 hrs of 95 mg/l is reported. Under environmental relevant conditions, benzoic acid and its salts have very low acute toxicity, whereas benzyl alcohol has low to moderate acute toxicity.

log Kow: 1.87

BOD 5: 1.25-1.65,47%

COD: 1.88-1.95

ThOD: 1.96

BCF: 10-2800

Fish:TLm (96 h): 180 mg/L

Toxicity invertebrate: cell mult. inhib.31-480mg/L

Effects on algae and plankton: cell mult. inhib.55-1630mg/L

Degradation Biological: soil microflora -1 day,significant processes Abiotic: dissoc,Rxn OH*

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
benzotrifluoride	HIGH		LOW	MED
hydrogen fluoride			LOW	
benzoic acid	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Ignitability characteristic: use EPA hazardous waste number D001 (waste code I)

B. Component Waste Numbers

When hydrogen fluoride is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number U134 (waste code C,T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

! Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION



DOT:

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Hazard Alert Code Key:		EXTREME	HIGH	MODERATE	LOW
Symbols:	None				
Identification Numbers:	UN2338				
Label Codes:	3				
Packaging: Exceptions:	150				
Packaging: Exceptions:	150				
Quantity Limitations: Cargo aircraft only:	60 L				
Vessel stowage: Other:	40				
Hazard class or Division:	3				
PG:	II				
Special provisions:	IB2, T4, TP1				
Packaging: Non-bulk:	202				
Quantity limitations: Passenger aircraft/rail:	5 L				
Vessel stowage: Location:	B				

Hazardous materials descriptions and proper shipping names:

Benzotrifluoride

Air Transport IATA:

ICAO/IATA Class:	3	ICAO/IATA Subrisk:	None
UN/ID Number:	2338	Packing Group:	II
Special provisions:	None		

Shipping Name: BENZOTRIFLUORIDE

Maritime Transport IMDG:

IMDG Class:	3	IMDG Subrisk:	None
UN Number:	2338	Packing Group:	II
EMS Number:	F-E,S-D	Special provisions:	None
Limited Quantities:	1 L		

Shipping Name: BENZOTRIFLUORIDE

Section 15 - REGULATORY INFORMATION

benzotrifluoride (CAS: 98-08-8) is found on the following regulatory lists;

"Canada - Saskatchewan Industrial Hazardous Substances", "Canada Non-Domestic Substances List (NDSL)", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - Massachusetts Oil & Hazardous Material List", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Master Testing List - Index I Chemicals Listed", "US Toxic Substances Control Act (TSCA) - Inventory"

Regulations for ingredients

hydrogen fluoride (CAS: 7664-39-3) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives", "Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Environmental Quality Guidelines (EQGs) Air", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "OECD Representative List of High Production Volume (HPV) Chemicals", "The Australia Group Export Control List: Chemical Weapons Precursors", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California OEHH/ARB - Acute Reference Exposure Levels and Target Organs (RELs)", "US - California OEHH/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Toxic Air Contaminant List Category II", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Acceptable Maximum Peak Concentrations", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Hazardous Materials", "US - Oregon Permissible Exposure Limits (Z1)", "US - Oregon Permissible Exposure Limits (Z2)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous Constituents", "US - Vermont Hazardous wastes which are Discarded Commercial Chemical Products or

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Off-Specification Batches of Commercial Chemical Products or Spill Residues of Either", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""U"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming List of Highly Hazardous Chemicals, Toxics and Reactives", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift", "US ACGIH Threshold Limit Values (TLV)", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CERCLA Priority List of Hazardous Substances", "US Clean Air Act - Hazardous Air Pollutants", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Acute Exposure Guideline Levels (AEGs) - Final", "US EPA Master Testing List - Index I Chemicals Listed", "US EPCRA Section 313 Chemical List", "US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives", "US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act", "US NFPA 45 Fire Protection for Laboratories Using Chemicals - Flammability Characteristics of Common Compressed and Liquefied Gases", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA List of Highly Hazardous Chemicals, Toxics and Reactives", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US OSHA Permissible Exposure Levels (PELs) - Table Z2", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US SARA Section 302 Extremely Hazardous Substances", "US Toxic Substances Control Act (TSCA) - Inventory"

benzoic acid (CAS: 65-85-0) is found on the following regulatory lists;

"Canada Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - Massachusetts Oil & Hazardous Material List", "US - New Jersey Right to Know Hazardous Substances", "US - Pennsylvania - Hazardous Substance List", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients found safe, with qualifications", "US Cosmetic Ingredient Review (CIR) Cosmetic ingredients with insufficient data to support safety", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Carcinogens Listing", "US EPA High Production Volume Program Chemical List", "US Food Additive Database", "US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act", "US NFPA 499 Combustible Dusts", "US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Ingestion may produce health damage*.
- Cumulative effects may result following exposure*.

* (limited evidence).

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- Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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The Power is Question

Hazard Alert Code Key:

EXTREME

HIGH

MODERATE

LOW

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