Material Safety Data Sheet

Version 3.2
Revision Date 01/17/2012
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1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	BF_3 - Butanol solution
Product Number	:	33126-U
Brand	:	Supelco
Supplier	:	Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
Telephone	:	+1 800-325-5832
Fax	:	+1 800-325-5052
Emergency Phone # (For both supplier and manufacturer)	:	(314) 776-6555
Preparation Information	:	Sigma-Aldrich Corporation Product Safety - Americas Region 1-800-521-8956

2. HAZARDS IDENTIFICATION

Emergency Overview

OSHA Hazards

Flammable liquid, Harmful by ingestion., Target Organ Effect, Corrosive, Highly toxic by inhalation

Flammable liquid, Harmful by ingestion., Target Organ Effect, Toxic by inhalation., Corrosive

Target Organs

Kidney, Liver, Bone, Lungs, Blood, Teeth., Central nervous system, earsCentral nervous system, ears, Liver, Kidney, Blood, Bone, Lungs, Teeth.

GHS Classification

Flammable liquids (Category 3)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 5)
Acute toxicity, Oral (Category 4)
Skin corrosion (Category 1A)
Serious eye damage (Category 1)
Specific target organ toxicity - single exposure (Category 3)

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H226	Flammable liquid and vapour.
H302	Harmful if swallowed.
H313	May be harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H331	Toxic if inhaled.
H335 + H336	May cause respiratory irritation, and drowsiness or dizziness.

Precautionary statement(s)

P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.

HMIS Classification

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	3
Physical hazards:	3

NFPA Rating

Health hazard:	4
Fire:	3
Reactivity Hazard:	2
Special hazard.:	W

Health hazard:	3
Fire:	3
Reactivity Hazard:	0

Potential Health Effects

Inhalation	Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. May be fatal if inhaled. May be fatal if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. Vapours may cause drowsiness and dizziness.
Skin	May be fatal if absorbed through skin. Causes severe skin burns. Harmful if absorbed through skin. Causes skin burns.
Eyes	Causes severe eye burns. Causes eye burns. Causes severe eye burns.
Ingestion	Harmful if swallowed. Causes severe burns. Harmful if swallowed. Causes burns.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component		Classification	Concentration
n-Butanol			
CAS-No. EC-No. Index-No.	71-36-3 200-751-6 603-004-00-6	Flam. Liq. 3; Acute Tox. 4; STOT SE 3; Skin Irrit. 2; Eye Dam. 1; STOT SE 3; H226, H302, H315, H318, H335, H336	60 - 100 %
Boron trifluoride			
CAS-No. EC-No. Index-No.	7637-07-2 231-569-5 005-001-00-X	Press. Gas ; Acute Tox. 2; Skin Corr. 1A; H280, H314, H330, EUH014	10 - 30 %

For the full text of the H-Statements and R-Phrases mentioned in this Section, see Section 16

4. FIRST AID MEASURES

General advice
Consult a physician. Show this safety data sheet to the doctor in attendance.Move out of dangerous area.

If inhaled
If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

In case of skin contact
Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

In case of eye contact
Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

If swallowed
Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

5. FIREFIGHTING MEASURES

Conditions of flammability
Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

Suitable extinguishing media
Dry powder

Special protective equipment for firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

Hazardous combustion products
Hazardous decomposition products formed under fire conditions. - Hydrogen fluoride, Fluoboric acid, Carbon oxides
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride, Borane/boron oxides

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental precautions
Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

Methods and materials for containment and cleaning up
Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Do not flush with water.

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

Conditions for safe storage
Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Never allow product to get in contact with water during storage.

Recommended storage temperature: 2 - 8 °C

Handle and store under inert gas. hygroscopic

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
n-Butanol	71-36-3	TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Eye & Upper Respiratory Tract irritation			
		C	50 ppm 150 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000

	Skin notation			
		TWA	100 ppm 300 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate.			
		C	50 ppm 150 mg/m3	USA. NIOSH Recommended Exposure Limits
	Potential for dermal absorption			
Boron trifluoride	7637-07-2	C	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Lower Respiratory Tract irritation Pneumonitis			
		C	1 ppm 3 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		C	1 ppm 3 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m3 is approximate. Ceiling limit is to be determined from breathing-zone air samples.			
		C	1 ppm 3 mg/m3	USA. NIOSH Recommended Exposure Limits
		TWA	2.5 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z2
	Z37.28-1969			

Personal protective equipment

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Hand protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) 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.

Eye protection
Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Hygiene measures
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Form	clear, liquid
Colour	colourless

Safety data

pH	no data available
Melting	-89 °C (-128 °F)

point/freezing point	
Boiling point	118 °C (244 °F) at 1,013 hPa (760 mmHg)
Flash point	37.2 °C (99.0 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	1.4 %(V)
Upper explosion limit	11.2 %(V)
Vapour pressure	5.6 hPa (4.2 mmHg)
Density	0.810 g/cm3
Water solubility	soluble
Partition coefficient: n-octanol/water	no data available
Relative vapour density	2.7
Odour	no data available
Odour Threshold	no data available
Evaporation rate	0.46

10. STABILITY AND REACTIVITY

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions

Vapours may form explosive mixture with air.
Reacts violently with water.

Conditions to avoid
Heat, flames and sparks. Exposure to moisture.

Materials to avoid
Alkali metals, Boron trifluoride reacts vigorously with alkyl nitrates after an induction period up to several hours. Reacts with alkali or alkaline earth metals. Do not use mercury manometers as boron trifluoride is soluble in mercury, Oxidizing agents, Bases, Strong acids, Halogens

Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Hydrogen fluoride, Fluoboric acid, Carbon oxides
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen fluoride, Borane/boron oxides
Other decomposition products - no data available

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral LD50
LD50 Oral - rat - 790 mg/kg

Inhalation LC50
Dermal LD50
Other information on acute toxicity
no data available

Skin corrosion/irritation
no data available

Serious eye damage/eye irritation

Eyes: no data available

Respiratory or skin sensitization
no data available

Germ cell mutagenicity

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 a carcinogen or potential carcinogen by ACGIH.
NTP:	No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
OSHA:	No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

no data available

Teratogenicity

no data available

Specific target organ toxicity - single exposure (Globally Harmonized System)
no data available

Specific target organ toxicity - repeated exposure (Globally Harmonized System)
no data available

Aspiration hazard
no data available

Potential health effects

Inhalation	Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. May be fatal if inhaled. May be fatal if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. Vapours may cause drowsiness and dizziness.
Ingestion	Harmful if swallowed. Causes severe burns. Harmful if swallowed. Causes burns.
Skin	May be fatal if absorbed through skin. Causes severe skin burns. Harmful if absorbed through skin. Causes skin burns.
Eyes	Causes severe eye burns. Causes eye burns. Causes severe eye burns.

Signs and Symptoms of Exposure
Central nervous system depression, Gastrointestinal disturbance, drying, cracking of the skin, Skin irritation

Synergistic effects
no data available

Additional Information
RTECS: Not available

12. ECOLOGICAL INFORMATION

Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 1,840 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia - 1,855 mg/l - 24 h

Persistence and degradability
no data available

Bioaccumulative potential
no data available

Mobility in soil
no data available

PBT and vPvB assessment
no data available

Other adverse effects

no data available

13. DISPOSAL CONSIDERATIONS

Product
Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated packaging
Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT (US)
UN number: 1120 Class: 3 Packing group: III
Proper shipping name: Butanols
Reportable Quantity (RQ): 5556 lbs
Marine pollutant: No
Poison Inhalation Hazard: No

IMDG
UN number: 1120 Class: 3 Packing group: III EMS-No: F-E, S-D
Proper shipping name: BUTANOLS
Marine pollutant: No

IATA
UN number: 1120 Class: 3 Packing group: III
Proper shipping name: Butanols

15. REGULATORY INFORMATION

OSHA Hazards

Flammable liquid, Harmful by ingestion., Target Organ Effect, Corrosive, Highly toxic by inhalation Flammable liquid, Harmful by ingestion., Target Organ Effect, Toxic by inhalation., Corrosive

SARA 302 Components

	CAS-No.	Revision Date
Boron trifluoride	7637-07-2	2007-07-01

SARA 313 Components

	CAS-No.	Revision Date
Boron trifluoride	7637-07-2	2007-07-01
n-Butanol	71-36-3	2007-07-01

SARA 311/312 Hazards
Fire Hazard, Acute Health Hazard, Chronic Health Hazard

Massachusetts Right To Know Components

	CAS-No.	Revision Date
Boron trifluoride	7637-07-2	2007-07-01
n-Butanol	71-36-3	2007-07-01

Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Boron trifluoride	7637-07-2	2007-07-01
n-Butanol	71-36-3	2007-07-01

New Jersey Right To Know Components

	CAS-No.	Revision Date
Boron trifluoride	7637-07-2	2007-07-01
n-Butanol	71-36-3	2007-07-01

California Prop. 65 Components
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

16. OTHER INFORMATION

Text of H-code(s) and R-phrase(s) mentioned in Section 3

Acute Tox.	Acute toxicity
EUH014	Reacts violently with water.
Eye Dam.	Serious eye damage
Flam. Liq.	Flammable liquids
H226	Flammable liquid and vapour.
H280	Contains gas under pressure; may explode if heated.
H302	Harmful if swallowed.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H330	Fatal if inhaled.
H335	May cause respiratory irritation.
H336	May cause drowsiness or dizziness.
Press. Gas	Gases under pressure
Skin Corr.	Skin corrosion
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

Further information

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See www.sigma-aldrich.com and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.