SECTION 1 .....................................................  PRODUCT IDENTIFICATION .............................................................

Name: Heptafluorobutyric Anhydride
Code: 270851, 270853

SECTION 2 ..................................  COMPOSITION, INFORMATION ON INGREDIENTS .....................................................

Synonyms
HFBA; Heptafluorobutanoic acid, anhydride; Heptafluorobutyric acid, anhydride; Heptafluorobutanoic anhydride; Heptafluorobutyric acid anhydride; Heptafluorobutyryl anhydride; Perfluorobutanoic anhydride; Perfluorobutyric anhydride
CAS #: 336-59-4

Ingredients Concentration (%/wt)
Heptafluorobutyric Anhydride (336-59-4) ................................................................................. NLT 90.0 %
Manufacturing Impurities......................................................................................................... NMT 10.0 %

SECTION 3 .....................................................  HAZARDS IDENTIFICATION.........................................................................

Precautionary Statements
Corrosive. Causes burns.

Emergency Overview 
See Sections 8 and 11 for further details.

NFFA Ratings (Scale 0-4); Health = 3; Fire = 1; Reactivity = 1; \(!\)

Liquid: clear, colorless. Odor: strong pungent stench; sharp acidic
Corrosive liquid and vapor--HFBA can decompose on contact with water or moist air.
Under fire conditions, hydrofluoric acid may be produced, that in contact with metals can generate flammable/explosive hydrogen gas.
The properties of this material have not been fully investigated. Use due caution in handling and use of this material.
Corrosive--Cause burns to all body tissues. Permanent eye damage possible. May be fatal of toxic if swallowed or inhaled.
Emits toxic fumes under fire conditions—potential chemical or thermal decomposition products: carbon oxides, hydrogen fluoride
Standard chemical handling precautions: Avoid ingestion or breathing mists. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling.
Target organs: mucous membranes, skin, eyes, respiratory system, lungs, teeth

Other Hazard Information
This compound has not fully been tested for toxicological, irritation, or similar tendencies.
Primary Route(s) of Entry: Inhalation, Ingestion, Eye, Skin
Eye: Corrosive--Can cause burns. May cause severe irritation, itching, tearing, redness, corneal inflammation, blurred vision, and lens damage. Permanent eye damage possible.
Skin: Corrosive--Can cause burns with redness and possible blistering. May cause severe irritation with itchiness and dryness, cracking and dermatitis due to the loss of natural skin oils.
Inhalation: Corrosive--Causes burns or severe irritation to mucous membranes, respiratory tract, nose, throat, and lung damage. May be harmful or fatal if inhaled in large quantities due to spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema (fluid retention/swelling). Prolonged/repeated inhalation may cause tooth decay.

Abbreviations: NA—not applicable; NE—not established; U—unknown/not available; NL—not listed; N—no; Y—yes.; NDA-No data available.

MSDS# 270851d Effective Date: 05/30/2012 Version #: 4 Page 1 of 7
Ingestion: Can cause burns. May be toxic or fatal if ingested due to mucous membrane corrosion and other tissue in the esophagus and GI tract. Symptoms include sore throat, pain, nausea, vomiting, and diarrhea.

Acute: See above route.

Chronic: See above route.

Symptoms: See specific route above.

Pre-existing conditions that may be aggravated: skin, eye, respiratory, GI tract

See Section 11 for additional toxicological data.

SECTION 4 .........................................................  FIRST AID MEASURES............................................................................

Eye contact: Immediately flush eyes with copious amounts of water or eyewash solution for at least 15 minutes; lift eyelids occasionally. If irritation persists, consult physician.

Skin contact: Immediately remove contaminated clothing and shoes, then wash skin with soap and copious amounts of water. If irritation persists, consult physician.

Inhalation: Remove to fresh air. If not breathing, give artificial respiration and keep person warm and at rest. If breathing is difficult, give oxygen; consult physician.

Ingestion: Wash out mouth with water provided person is conscious; give large amounts of water or milk. Repeat if vomiting occurs. Ingested corrosive should be diluted approximately 100 times to render it harmless to tissues (Dreisbach & Robertson; Handbook of Poisoning; 12th Ed.); consult physician; DO NOT induce vomiting without first consulting physician. If vomiting occurs, keep head lower than hips to help prevent aspiration. Maintain airway and respiration. Treat symptomatically and supportively.

Wash contaminated clothing before reuse. Discard contaminated footwear.

Physician note: Symptomatic and supportive care. No specific antidote, but treatment may be similar to that of hydrofluoric acid burns. Treatment based on physician judgment in response to reactions of the patient.

SECTION 5 .....................................................  FIRE FIGHTING MEASURES ........................................................................

Flash Point: NE

Method: NE

Autoignition: NE

OSHA Flammability Class: NA

Explosion Limits: upper: NE

NFPA: See Section 3 Hazards Identification Emergency Overview above. lower: NE

Extinguishing Media

Water spray, carbon dioxide, dry chemical powder, or appropriate foam. Do NOT use straight water streams.

Special Fire Fighting Procedures

Self-contained breathing apparatus (SCBA) and protective clothing to prevent contact with skin and eyes should be worn in fighting large fires involving chemicals.

Standard Fire and Explosion Hazards

Avoid inhalation of material or combustion by-products.

Unusual Fire and Explosion Hazards

Corrosive liquid and vapor--HFBA can decompose on contact with water. Under fire conditions, hydrofluoric acid may be produced, that in contact with metals can generate flammable/explosive hydrogen gas. Sufficient dilution of water may reduce the acidity of the solution. Containers may build pressure or rupture when heated. Water spray may be used to cool fire-exposed containers. Emits toxic fumes under fire conditions.

Hazardous Combustion or Decomposition Products

carbon oxides, hydrogen fluoride
SECTION 6 .............................................. ACCIDENTAL RELEASE MEASURES..............................................................

Eliminate all ignition sources. Use spark proof tools.
Evacuate unnecessary people from area. Isolate spilled material.
Ventilate area.
Wear protective clothing to prevent contact with skin and eyes (lab coat, gloves, and safety glasses).
Wear NIOSH/MSHA approved respirator for organic/acid gas, dust, and mists to prevent inhalation of mists.
Contain and recover material when possible.
Use chemically compatible spill pillows, or similar adsorbent material.
Sweep up, seal in appropriate hazardous waste container, and hold for proper waste disposal.
(If possible to do so safely, neutralize waste to pH 6-9 prior to disposal.)
Avoid raising contaminated dust.
Wash spill site after material pickup is complete.
Standard chemical precautions: Keep out of water supplies and sewers.

SECTION 7 ...................................................... HANDLING AND STORAGE.............................................................

General Handling Measures
See Section 8 Below.

General Storage Measures
Store in a cool, dry place with adequate ventilation, in a storage area suitable for corrosives.

Special Storage Instructions
Do not store in metal containers.
Store tightly closed under inert gas.
Empty containers retain product residue, (liquid/vapor), and can be dangerous.

Special Handling Instructions
Use appropriate precautions for handling corrosive liquids.
Wash thoroughly after handling.
Immediately remove contaminated clothing, because material is very corrosive to body tissues.

SECTION 8 ................................. EXPOSURE CONTROLS, PERSONAL PROTECTION ....................................................

Airborne Exposure Limits

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</table>

NE = Not established

Special/Other Control Measures
Odor threshold: NE

Personal Protective Equipment (PPE)
OSHA/ANSI approved chemical safety eyewear or goggles
Compatible chemical-resistant gloves: Rubber (e.g., natural rubber, neoprene, nitrile, or equivalent), Silver Shield®, Viton®, or 4®
Wear NIOSH/MSHA approved respirator for organic/acid gas, dust, and mists to prevent inhalation.
Protective Clothing (e.g., lab coat)

Abbreviations: NA—not applicable; NE—not established; U—unknown/not available; NL—not listed; N—no; Y—yes.; NDA-No data available.
Name: Heptafluorobutyric Anhydride
Code: 1-270085-500, 1-270851-200, 1-270853-200

Other Standard Safety Equipment and Engineering Preventive Measures
Safety shower and eye wash
Mechanical exhaust required. Hood recommended. Use adequate general and/or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

General Precautions and Handling Measures
Avoid ingestion, inhalation and contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure. Wash thoroughly after handling. Wash contaminated clothing before reuse. Discard contaminated footwear.

Material is very destructive to body tissues.

SECTION 9 ......................................... PHYSICAL AND CHEMICAL PROPERTIES ..............................................................................

Chemical Family: Halogenated, organic acid anhydride
Use: Analytical Derivatization Acylation Reagent for GC

Appearance, Odor, and Other Properties
Appearance: clear, colorless liquid
Odor: pungent, strong stench, sharp acidic
Freeze/MP: -43°C (-45.4°F)
Water Reactive: yes
bp (1atm): 108-109°C (226-228°F)
Water Solubility: soluble/decomposes
FW: 410.06
Specific Gravity (H₂O = 1.0): 1.653
VP (mmHg): NE
Vapor Density (air=1): 1.612
% Volatiles: 100%
Evap. Rate (BuAc = 1.0): NE
pH: NE
Refractive Index (nD²⁰): 1.2870
Soluble in Organic Solvents: NE

SECTION 10 .................................................. STABILITY AND REACTIVITY .................................................................

Stability
Stable if stored tightly sealed under inert gas.

Incompatibilities
Alkalis
Metals
Strong acids and bases
Strong oxidizers and reducing agents
Water or moist air—HFBA can decompose on contact with water or moist air to produce heptafluorobutyric acid. Under fire conditions, hydrofluoric acid may be produced, that in contact with metals can generate flammable/explosive hydrogen gas.

Precautions
Avoid incompatibilities.
Protect from heat, flames, sparks, and ignition sources.
Keep out of water supplies and sewers.

Hazardous Combustion or Decomposition Products
carbon oxides, hydrogen fluoride

Hazardous Polymerization
None
SECTION 11 ............................................... TOXICOLOGICAL INFORMATION..............................................................

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**RTECS #**

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Only selected Registry of Toxic Effects of Chemical Substances data (RTECS) is presented here. See actual entry in RTECS for complete information.

### Irritation Data

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NDA = No data available

### Toxicity Data

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### Carcinogenicity

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NL = Not Listed as a carcinogen;

**Teratogenicity and Reproductive Effects**

No data available.

**Neurotoxicity**

No data available.

**Mutagenicity**

No data available.

**Miscellaneous**

No data available.

**Acute and Chronic Effects**

Section 3 Hazards Identification above.

SECTION 12 .......................................................... ECOLOGICAL INFORMATION.................................................................

**Environmental Fate and Ecotoxicity Data**

Heptafluorobutyric Anhydride: No data available.

**Standard Chemical Precautions**

Keep out of air, water, and soil

SECTION 13 ................................................. DISPOSAL CONSIDERATIONS ......................................................................

That which cannot be recovered or recycled, should be disposed of in accordance with all applicable Federal, State, and local environmental regulations.

RCRA waste code(s): D002

RCRA Hazard Class (40CFR 261): Corrosive
SECTION 14 .................................................. TRANSPORT INFORMATION........................................................................

Ship in accordance with all applicable local, State, Federal, and International transportation regulations.
The following is a summary only. Check regulations for complete information:

U. S. Department of Transportation (49CFR171.101)
Shipping Name: Corrosive liquid, n.o.s. (heptafluorobutyric acid anhydride)
Hazard Class or Division: 8, Subsidiary Class: none
ID Number: UN1760
Packing Group: II
Labeling: Corrosive Liquid

SECTION 15 ................................................. REGULATORY INFORMATION ......................................................................

Reviews, Standards, and Regulations
.................................................................................. ....Heptafluorobutyric Anhydride
CAS number ............................................................. ..........................336-59-4
TSCA:.............................................................................. ..........................Y
This compound is sold strictly for FDA or research and development use.
EINECS:.............................................................................. ..........................Y
Number ................................................................. 206-410-8
CERCLA [Section 103 (40 CFR 302.4)]:........................ .........................NL
RQ (lbs) ............................................................................ ........................... NA
RCRA Waste Code ..................................................................................NA
TQ (lbs)... ........................................................................ ........................... NA
Clean Air Act
[Section 112r (40 CFR 68)]: ......... NA
Contains Ozone Depleters (Class I or Class II) ................ ............................ N
SARA Title III Notification [40 CFR 302.4]:
Section 302/304 (EHS) Ingredient
[40 CFR 355.3] ........................................................................ .......................... NL
TPQ (lbs) ............................................................................ ........................... NA
RQ (lbs) ............................................................................ ........................... NA
Section 313 Ingredient [40 CFR 372.65] ...................... .......................... NL
State Lists:
States............................................................................... .......................... NL
On CA 65 Significant Risk Level............................................. .......................... NL

Hazard Classes

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</table>

European Classification and Danger/Hazard Symbol:
C............................ Corrosive

Abbreviations: NA—not applicable; NE—not established; U—unknown/not available; NL—not listed; N—no; Y—yes.; NDA-No data available.
Risk Phrases:
R20/21/22 .......... Harmful by inhalation, in contact with skin and if swallowed
R34 ............... Causes burns.
R36/37/38 .......... Irritating to eyes (severely), respiratory system, and skin.
R40 ............... Possible risk of irreversible effects.
R41 ............... Risk of serious damage to eyes.

Safety Phrases:
S23/24/25 ........... Do not breath vapors. Avoid contact with skin and eyes
S26/28 .............. In case of contact with eyes or skin, rinse immediately with plenty of water and seek medical advice.
S27 .................. Take off immediately all contaminated clothing.
S36/37/39 .......... Wear suitable protective clothing, gloves, and eye/face protection.
S44 .................. If you feel unwell, seek medical advice immediately (show the label where possible.)

SECTION 16 ........................................................ OTHER INFORMATION ..............................................................

Miscellaneous
The health and toxicological hazards of this compound have not been fully investigated; therefore, this substance must be handled only by, or under close supervision of those qualified in the handling and use of potentially hazardous substances.

Disclaimer
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