

# HBTU

sc-203074

## Material Safety Data Sheet



The Power to Question

Hazard Alert Code  
Key:

EXTREME

HIGH

MODERATE

LOW

## Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

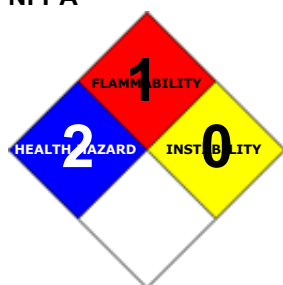
### PRODUCT NAME

HBTU

### 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

Coupling reagent for peptide synthesis. Intermediate

### SYNONYMS

C11-H16-F6-N5-O-P, C11-H16-F6-N5-O-P, "O-benzotriazol-1-yl-N, N, N' N' -tetramethyluronium hexafluorophosphate", "O-benzotriazol-1-yl-N, N, N' N' -tetramethyluronium hexafluorophosphate", "N, N, N' N' -tetramethyl-O-(benzotriazol-1-yl)uronium hexafluorophosphate", "N, N, N' N' -tetramethyl-O-(benzotriazol-1-yl)uronium hexafluorophosphate", HBTU

## Section 2 - HAZARDS IDENTIFICATION

### CANADIAN WHMIS SYMBOLS



### EMERGENCY OVERVIEW

#### RISK

Heating may cause an explosion.

Harmful by inhalation, in contact with skin and if swallowed.

Irritating to eyes, respiratory system and skin.

Toxic to soil organisms.

May cause long-term adverse effects in the environment.

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

### POTENTIAL HEALTH EFFECTS

### ACUTE HEALTH EFFECTS

## SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

## EYE

■ This material can cause eye irritation and damage in some persons.

## SKIN

■ Skin contact with the material may be harmful; systemic effects may result following absorption.

■ This material can cause inflammation of the skin on contact in some persons.

■ The material may accentuate any pre-existing dermatitis condition.

■ 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

■ Inhalation of dusts, generated by the material, during the course of normal handling, may be harmful.

■ The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

■ 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.

## 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.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

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.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

### HAZARD RATINGS

|               |   | Min                                                                                 | Max |  |
|---------------|---|-------------------------------------------------------------------------------------|-----|--|
| Flammability: | 1 |  |     |  |
| Toxicity:     | 2 |  |     |  |
| Body Contact: | 2 |  |     |  |
| Reactivity:   | 2 |  |     |  |
| Chronic:      | 2 |  |     |  |

Min/Nil=0  
Low=1  
Moderate=2  
High=3  
Extreme=4



| NAME                                              | CAS RN     | %   |
|---------------------------------------------------|------------|-----|
| benzotriazolyl tetramethyluronium fluorophosphate | 94790-37-1 | >98 |

## Section 4 - FIRST AID MEASURES

### SWALLOWED

■

• IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.

• Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

• For advice, contact a Poisons Information Center or a doctor.

• Urgent hospital treatment is likely to be needed.

• If conscious, give water to drink.

• INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

• In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.

• If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.

• If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

### EYE

■ If this product comes in contact with the eyes:

• Wash out immediately with fresh 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.

• If pain persists or recurs seek medical attention.

- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

## SKIN

- If skin contact occurs:
  - Immediately remove all contaminated clothing, including footwear
  - Flush skin and hair with running water (and soap if available).
  - Seek medical attention in event of irritation.

## INHALED

- - 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 poisons (where specific treatment regime is absent):

### BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary edema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

### ADVANCED TREATMENT

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary edema.
- Hypotension with signs of hypovolemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

Treat symptomatically.

## Section 5 - FIRE FIGHTING MEASURES

|                             |                |
|-----------------------------|----------------|
| Vapour Pressure (mmHG):     | Negligible     |
| Upper Explosive Limit (%):  | Not available. |
| Specific Gravity (water=1): | Not available  |
| 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.
  - Wear breathing apparatus plus protective gloves.
  - Prevent, by any means available, spillage from entering drains or water course.
  - Use water delivered as a fine spray to control fire and cool adjacent area.
  - DO NOT approach containers suspected to be hot.
  - Cool fire exposed containers with water spray from a protected location.
  - If safe to do so, remove containers from path of fire.
  - Equipment should be thoroughly decontaminated after use.

## GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- WARNING: May EXPLODE on heating!!!
  - Combustible solid which burns but propagates flame with difficulty.
  - Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.

- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), hydrogen fluoride, nitrogen oxides (NO<sub>x</sub>), phosphorus oxides (PO<sub>x</sub>), other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

May emit corrosive fumes.

#### **FIRE INCOMPATIBILITY**

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

#### **PERSONAL PROTECTION**

Glasses:

Chemical goggles.

Gloves:

Respirator:

Particulate

## **Section 6 - ACCIDENTAL RELEASE MEASURES**

#### **MINOR SPILLS**

■ Environmental hazard - contain spillage.

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.

#### **MAJOR SPILLS**

■ Environmental hazard - contain spillage.

Moderate hazard.

- CAUTION: Advise personnel in area.
- Alert Emergency Responders and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.
- Recover product wherever possible.
- IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
- ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise emergency services.

#### **ACUTE EXPOSURE GUIDELINE LEVELS (AEGl) (in ppm)**

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**

■

- 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.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- 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 are maintained.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

## RECOMMENDED STORAGE METHODS

- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

## STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- 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

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

| Source                                                                    | Material                                                                                                        | TWA<br>ppm | TWA<br>mg/m <sup>3</sup> | STEL<br>ppm | STEL<br>mg/m <sup>3</sup> | Peak<br>ppm | Peak<br>mg/m <sup>3</sup> | TWA<br>F/CC | Notes                                  |
|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------|--------------------------|-------------|---------------------------|-------------|---------------------------|-------------|----------------------------------------|
| US - Oregon Permissible Exposure Limits (Z3)                              | benzotriazolyl tetramethyluronium fluorophosphate (Inert or Nuisance Dust: (d) Respirable fraction)             |            | 5                        |             |                           |             |                           |             | *                                      |
| US - Hawaii Air Contaminant Limits                                        | benzotriazolyl tetramethyluronium fluorophosphate (Particulates not other wise regulated - Respirable fraction) |            | 5                        |             |                           |             |                           |             |                                        |
| US - Hawaii Air Contaminant Limits                                        | benzotriazolyl tetramethyluronium fluorophosphate (Particulates not other wise regulated - Total dust)          |            | 10                       |             |                           |             |                           |             |                                        |
| US OSHA Permissible Exposure Levels (PELs) - Table Z3                     | benzotriazolyl tetramethyluronium fluorophosphate (Inert or Nuisance Dust: (d) Total dust)                      |            | 15                       |             |                           |             |                           |             |                                        |
| US OSHA Permissible Exposure Levels (PELs) - Table Z3                     | benzotriazolyl tetramethyluronium fluorophosphate (Inert or Nuisance Dust: (d) Respirable fraction)             |            | 5                        |             |                           |             |                           |             |                                        |
| US - Oregon Permissible Exposure Limits (Z3)                              | benzotriazolyl tetramethyluronium fluorophosphate (Inert or Nuisance Dust: (d) Total dust)                      |            | 10                       |             |                           |             |                           |             | *                                      |
| Canada - Ontario Occupational Exposure Limits                             | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as fluoride))                                     |            | 2.5                      |             |                           |             |                           |             |                                        |
| US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as F))                                            |            | 2.5                      |             |                           |             |                           |             |                                        |
| US ACGIH Threshold Limit Values (TLV)                                     | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as F))                                            |            | 2.5                      |             |                           |             |                           |             | TLV Basis: bone damage; fluorosis. BEI |
| US - Michigan Exposure Limits for Air Contaminants                        | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as F))                                            |            | 2.5                      |             |                           |             |                           |             |                                        |
| US - Oregon Permissible                                                   | benzotriazolyl tetramethyluronium                                                                               |            | 2.5                      |             |                           |             |                           |             | (TWA (See Oregon                       |

|                                                                                         |                                                                                                                        |     |   |                                        |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|-----|---|----------------------------------------|
| Exposure Limits (Z1)                                                                    | fluorophosphate (Fluorides (As F))                                                                                     | 2.5 |   | Oregon Table Z-2))                     |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | benzotriazolyl tetramethyluronium fluorophosphate (Fluoride, (as F))                                                   | 2.5 | 5 |                                        |
| US - Alaska Limits for Air Contaminants                                                 | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as F))                                                   | 2.5 |   |                                        |
| Canada - Nova Scotia Occupational Exposure Limits                                       | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as F))                                                   | 2.5 |   | TLV Basis: bone damage; fluorosis. BEI |
| Canada - Prince Edward Island Occupational Exposure Limits                              | benzotriazolyl tetramethyluronium fluorophosphate (Fluorides (as F))                                                   | 2.5 |   | TLV Basis: bone damage; fluorosis. BEI |
| Canada - Northwest Territories Occupational Exposure Limits (English)                   | benzotriazolyl tetramethyluronium fluorophosphate (Fluoride (as F))                                                    | 2.5 | 5 |                                        |
| US - Oregon Permissible Exposure Limits (Z2)                                            | benzotriazolyl tetramethyluronium fluorophosphate (Fluoride as dust (Z37.28-1969))                                     | 2.5 |   |                                        |
| US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants               | benzotriazolyl tetramethyluronium fluorophosphate (Particulates not otherwise regulated Respirable fraction)           | 5   |   |                                        |
| US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants        | benzotriazolyl tetramethyluronium fluorophosphate (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction) | 5   |   |                                        |
| US - Michigan Exposure Limits for Air Contaminants                                      | benzotriazolyl tetramethyluronium fluorophosphate (Particulates not otherwise regulated, Respirable dust)              | 5   |   |                                        |

## MATERIAL DATA

### BENZOTRIAZOLYL TETRAMETHYLURONIUM FLUOROPHOSPHATE:

■ 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:

- 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.

Based on a study in which the threshold for minimum increase in bone density due to fluoride exposure was 3.38 mg/m<sup>3</sup> (as fluoride), the present TLV-TWA has been adopted to prevent irritant effects and disabling bone changes. There is also support for the proposition that occupational exposure below the TLV will have no adverse effect on pregnant women or off-spring. IARC has classified fluorides in drinking water as Group 3 carcinogens; i.e. Not classifiable as to its carcinogenicity to humans. Equivocal evidence of carcinogenic activity (osteosarcoma) has been found in male rats administered sodium fluoride in drinking water. (0-175 ppm) Evidence was not found in female rats or in male or female mice.

## PERSONAL PROTECTION



Consult your EHS staff for recommendations

## EYE



- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

## HANDS/FEET

■ 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.

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

## OTHER



- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.



- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

## RESPIRATOR



| Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator |
|-------------------|----------------------|----------------------|------------------------|
| 10 x PEL          | P1                   | -                    | PAPR-P1                |
|                   | Air-line*            | -                    | -                      |
| 50 x PEL          | Air-line**           | P2                   | PAPR-P2                |
| 100 x PEL         | -                    | P3                   | -                      |
|                   |                      | Air-line*            | -                      |
| 100+ x PEL        | -                    | Air-line**           | PAPR-P3                |

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

Type B for use against certain inorganic gases and other acid gases and vapors.

Type E for use against sulfur dioxide and other acid gases and vapors.

Type K for use against ammonia and organic ammonia derivatives

Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.

Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.

Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.

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

■

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;

(b): filter respirators with absorption cartridge or canister of the right type;

(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

| Type of Contaminant:                                                                                                                                           | Air Speed:                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 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.)   |
| grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).           | 2.5-10 m/s (500-2000 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 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 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

Solid.

Mixes with water.

|                           |                |                                |                |
|---------------------------|----------------|--------------------------------|----------------|
| State                     | Divided solid  | Molecular Weight               | 379.25         |
| Melting Range (°F)        | Not applicable | Viscosity                      | Not Applicable |
| Boiling Range (°F)        | Not applicable | Solubility in water (g/L)      | Miscible       |
| Flash Point (°F)          | Not available  | pH (1% solution)               | Not available  |
| Decomposition Temp (°F)   | 428- 464       | pH (as supplied)               | Not applicable |
| Autoignition Temp (°F)    | Not available  | Vapour Pressure (mmHG)         | Negligible     |
| Upper Explosive Limit (%) | Not available. | Specific Gravity (water=1)     | Not available  |
| Lower Explosive Limit (%) | Not available  | Relative Vapor Density (air=1) | Not Applicable |
| Volatile Component (%vol) | Negligible     | Evaporation Rate               | Not applicable |

### APPEARANCE

White powder; mixes with water. Soluble in acetonitrile.

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

■

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

## STORAGE INCOMPATIBILITY

- Avoid reaction with oxidizing agents.

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

## Section 11 - TOXICOLOGICAL INFORMATION

benzotriazolyl tetramethyluronium fluorophosphate

### TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
  - 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.
- No significant acute toxicological data identified in literature search.

### CARCINOGEN

|                  |                                                     |                     |    |
|------------------|-----------------------------------------------------|---------------------|----|
| Fluorides (as F) | US ACGIH Threshold Limit Values (TLV) - Carcinogens | Carcinogen Category | A4 |
|------------------|-----------------------------------------------------|---------------------|----|

## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

### BENZOTRIAZOLYL TETRAMETHYLURONIUM FLUOROPHOSPHATE:

- On the basis of available evidence concerning either toxicity, persistence, potential to accumulate and or observed environmental fate and behaviour, the material may present a danger, immediate or long-term and /or delayed, to the structure and/ or functioning of natural ecosystems.
  - Harmful 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.
- Toxic to soil organisms.
  - Benzotriazole derivatives have been implicated as possible carcinogens, endocrine disruptors, and plant hormone regulators, but the literature on their biological activity is dated and tenuous. Benzotriazoles as a class may interact with the P-450s. The P450s are important both for detoxifying a broad range of xenobiotics and for activating many compounds to carcinogens in mammalian systems. Benzotriazoles are recalcitrant molecules used as corrosion inhibitors in antifreeze and deicing formulations. Existing data for members of this category indicate that they are of low concern for mammalian toxicity, will partition to soil and water. Benzotriazoles have high stabilities both at high temperatures and in presence of UV light. These compounds present an environmental problem due to their toxicity to microorganisms and plants. Until now, there have not been reports revealing ways for treating waste streams containing benzotriazoles by conventional methods, due to the lack of microorganisms that can degrade most benzotriazoles. No evidence for anaerobic degradation of benzotriazole and its derivatives was observed for both batch and continuously fed anaerobic systems. Benzotriazoles show toxicity to anaerobic microbes at fairly low concentrations. Acute toxic responses to benzotriazoles have been observed in MICROTOX<sup>TM</sup> assays at concentrations less than 10 mg/L. Aquatic organisms are known to be sensitive to low levels of benzotriazoles, for instance for fish, LC50 is around 30 mg/L.
  - Benzotriazoles are nitrification inhibitors. Much fertilizer N applied to soils is in the form of ammonium or ammonium-producing compounds such as urea, and is usually oxidised quite rapidly to nitrate by nitrifying microorganisms in soil.
  - Benzotriazole has a toxic effect on plants. Several reports cited in an EPA (1977) document indicated that benzotriazole can produce distinct morphological changes in a variety of plants. Tomato plants were shown to be sensitive to both benzotriazole and benzothiadiazole. Benzotriazole has a structure that resembles auxin, which may account for its toxicity to plants. It may also be an analog of purines and indoles. Plant roots interact with organic pollutants and some of these contaminants can be phytotransformed. Root uptake of 1-H-benzotriazole and its derivatives, tolyltriazole, 5-methyl benzotriazole, and 1-hydroxy benzotriazole was studied. At levels below the toxic threshold of about 100 mg/L, triazoles appear to be incorporated into plant tissue. Plants actively take up the triazoles at a rate greater than predicted by transpiration stream-concentration factor and plant-water uptake.
  - Benzotriazoles have been observed to be readily degraded by a Fenton reaction in the presence of peroxide and iron. Certain fungi produce lignin peroxidase (Phanerochaete chrysosporium for example) and have been shown to degrade benzotriazoles.
  - 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.
  - The principal problems of phosphate contamination of the environment relates to eutrophication processes in lakes and ponds. Phosphorus is an essential plant nutrient and is usually the limiting nutrient for blue-green algae. A lake undergoing eutrophication shows a rapid growth of algae in surface waters. Planktonic algae cause turbidity and flotation films. Shore algae cause ugly muddying, films and damage to reeds. Decay of these algae causes oxygen depletion in the deep water and shallow water near the shore. The process is self-perpetuating because anoxic conditions at the sediment/ water interface causes the release of more adsorbed phosphates from the sediment. The growth of algae produces undesirable effects on the treatment of water for drinking purposes, on fisheries, and on the use of lakes for recreational purposes.
  - DO NOT discharge into sewer or waterways.

## Section 13 - DISPOSAL CONSIDERATIONS

### Disposal Instructions

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

‡ Puncture containers to prevent re-use and bury at an authorized landfill.

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. 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

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

## Section 15 - REGULATORY INFORMATION

**benzotriazolyl tetramethyluronium fluorophosphate (CAS: 94790-37-1,67654-71-1) is found on the following regulatory lists;**

"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 - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","US - Alaska Limits for Air Contaminants","US - California Environmental Health Standards for the Management of Hazardous Waste - List of Inorganic Persistent and Bioaccumulative Toxic Substances and Their STLC & TTLC Values","US - Michigan Exposure Limits for Air Contaminants","US - Oregon Permissible Exposure Limits (Z1)","US - Oregon Permissible Exposure Limits (Z2)","US - Pennsylvania - Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

■ Cumulative effects may result following exposure\*.

\* (limited evidence).

### Ingredients with multiple CAS Nos

| Ingredient Name                                   | CAS                    |
|---------------------------------------------------|------------------------|
| benzotriazolyl tetramethyluronium fluorophosphate | 94790-37-1, 67654-71-1 |

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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](http://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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