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

1.1 Product Identifier

Chemical Name: Di-t-butyl N,N-Diethylphosphoramidite (~90%)

Catalogue #: D429300

1.2 Relevant Identified Uses of the Substance or Mixture and Uses Advised Against

Product Uses: To be used only for scientific research and development. Not for use in humans or animals.

1.3 Details of the Supplier of the Safety Data Sheet

Company: Toronto Research Chemicals
2 Brisbane Road
Toronto, ON M3J 2J8
CANADA

Telephone: +14166659696
FAX: +14166654439
Email: orders@trc-canada.com

1.4 Emergency Telephone Number

Emergency#: +1(416) 665-9696 between 0800-1700 (GMT-5)

2. HAZARDS IDENTIFICATION

WHMIS Classification (Canada)

B3 Combustible Liquid

Moderate Skin/Eye/Respiratory Tract Irritant

D2B Toxic Material Causing Other Toxic Effects

Moderate Skin/Eye/Respiratory Tract Irritant

WHMIS Symbols (Canada)

2.1/2.2 Classification of the Substance or Mixture and Label Elements

GHS Hazards Classification (According to EU Regulation 1272/2008 and US OSHA 1910.1200)

Flammable Liquids (Category 4)
Skin Irritation (Category 2)
Serious Eye Irritation (Category 2A)
Specific Target Organ Toxicity, Single Exposure; Respiratory Tract Irritation (Category 3)

GHS Hazards Identification (According to EU Regulation 1272/2008 and US OSHA 1910.1200)

Signal Word: Warning

GHS Hazard Statements

H227 Combustible liquid and vapour.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.
3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Molecular Formula: C_{12}H_{28}NO_2P  Molecular Weight: 249.33
CAS Registry #: 117924-33-1  EC#:
Synonyms
N,N-Diethyl-phosphoramidous Acid Bis(1,1-dimethylethyl) Ester; Di-tert-butyl N,N-Diethylphosphoramidite;

3.2 Mixtures
Not a mixture.

4. FIRST AID MEASURES

4.1 Description of First Aid Measures
General Advice
If medical attention is required, show this safety data sheet to the doctor.

If Inhaled
If inhaled, move person to fresh air. If not breathing, give artificial respiration and consult a physician.

In Case of Skin Contact
Wash affected area with soap and water. Consult a physician if any exposure symptoms are observed.

In Case of Eye Contact
Immediately rinse eyes with plenty of water for at least 15 minutes. Consult a physician.

If Swallowed
Never give anything by mouth to an unconscious person. Rinse mouth with water. Do NOT induce vomiting unless advised to do so by a physician or Poison Control Center. Seek medical attention.

4.2 Most Important Symptoms and Effects, Both Acute and Delayed
The most important known symptoms and effects are described in the labeling (see section 2.2) and/or section 11.

4.3 Indication of any Immediate Medical Attention and Special Treatment Needed
No data available.

5. FIREFIGHTING MEASURES

5.1 Extinguishing Media
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special Hazards Arising from the Substance or Mixture
Carbon oxides, Nitrogen oxides, Phosphorous oxides

5.3 Advice for Firefighters
Wear self contained breathing apparatus for fire fighting if necessary.

5.4 Further Information
No data available.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment and Emergency Procedures
Use recommended personal protective equipment (see Section 8). Adequate ventilation must be provided to ensure
vapours or mists are not inhaled. Vapours are heavier than air and may accumulate in low areas. All sources of ignition, including sources of static discharge, must be removed from area.

6.2 Environmental Precautions
Material should not be allowed to enter the environment. Prevent further spillage or discharge into drains, if safe to do so.

6.3 Methods and Materials for Containment and Cleaning Up
Contain the spill and then collect using non-combustible absorbent material (such as clay, diatomaceous earth, vermiculite or other appropriate material). Place material in a suitable, sealable container and then dispose according to local/national regulations and guidance (see Section 13).

6.4 Reference to Other Sections
For protective equipment, refer to Section 8. For disposal, see Section 13.

7. HANDLING AND STORAGE

7.1 Precautions for Safe Handling
Avoid contact with skin and eyes. Ventilation and proper handling are to be used to prevent the formation of vapours and mists. Remove all sources of ignition and take precautionary measures to prevent the buildup of electrostatic discharge (ground and bond containers as appropriate). No smoking, eating or drinking around this material. Wash hands after use.

7.2 Conditions for Safe Storage, Including any Incompatibilities
Ensure container is kept securely closed before and after use. Keep in a well ventilated area and do not store with strong oxidizers or other incompatible materials (see Section 10).

Storage conditions:-20°C Freezer, Under Inert Atmosphere

7.3 Specific End Uses
For scientific research and development only. Not for use in humans or animals.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters
Contains no components with established occupational exposure limits.

8.2 Exposure Controls

Appropriate Engineering Controls
A laboratory fumehood or other appropriate form of local exhaust ventilation should be used to avoid exposure.

Personal Protective Equipment
All recommendations below are advisory in nature and a risk assessment should be performed by the employer/end user prior to use of this product. The type of protective equipment must be selected based on the amount and concentration of the dangerous material being used in the workplace.

Eye/Face Protection
Safety goggles or face shield. All equipment should have been tested and approved under appropriate standards, such as NIOSH (US), CSA (Canada), or EN 166 (EU).

Skin Protection
Gloves should be used when handling this material. Gloves are to be inspected prior to use. Contaminated gloves are to be removed using proper glove removal technique so that the outer surface of the glove does not contact bare skin. Dispose of contaminated gloves after use in compliance with good laboratory practices and local requirements.

Suggested gloves: AnsellPro Sol-Vex nitrile gloves style 37-175, 15 mil thickness.
Penetration time has not been determined.

Gloves used for incidental exposures (splash protection) should be designated as “chemical resistant” by EU standard EN 374 with the resistance codes corresponding to the anticipated use of the material. Unrated gloves are not recommended.
Penetration time has not been determined.

Gloves used for prolonged direct exposure (immersion) should be designated “chemical resistant” as per EN 734 with the resistance codes corresponding to the anticipated use of the material.
Penetration time has not been determined.

These recommendations may not apply if the material is mixed with any other chemical, or dissolved into a solution.
risk assessment must be performed to ensure the gloves will still offer acceptable protection.

**Body Protection**
Fire resistant (Nomex) lab coat or coveralls.

**Respiratory Protection**
Recommended respirators are NIOSH-approved N100 or CEN-approved FFP3 particulate respirators. These are to be only used as a backup to local exhaust ventilation or other engineering controls. If the respirator is the only means of protection, a full-face supplied air respirator must be used.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on Basic Physical and Chemical Properties

<table>
<thead>
<tr>
<th>A) Appearance</th>
<th>B) Odour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Colourless Oil</td>
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</tr>
<tr>
<td>C) Odour Threshold</td>
<td>D) pH</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>E) Melting Point/Freezing Point</td>
<td>F) Initial Boiling Point/Boiling Range</td>
</tr>
<tr>
<td>N/A</td>
<td>No data available</td>
</tr>
<tr>
<td>G) Flash point</td>
<td>H) Evaporation Rate</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>I) Flammability (Solid/Gas)</td>
<td>J) Upper/Lower Flammability/Explosive Limits</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>K) Vapour Pressure</td>
<td>L) Vapour Density</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>M) Relative Density</td>
<td>N) Solubility</td>
</tr>
<tr>
<td>No data available</td>
<td>Chloroform (Slightly), Ethyl Acetate (Slightly)</td>
</tr>
<tr>
<td>O) Partition Coefficient: n-octanol/water</td>
<td>P) Auto-Ignition Temperature</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>Q) Decomposition Temperature</td>
<td>R) Viscosity</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
<tr>
<td>S) Explosive Properties</td>
<td>T) Oxidizing Properties</td>
</tr>
<tr>
<td>No data available</td>
<td>No data available</td>
</tr>
</tbody>
</table>

#### 9.2 Other Information

No data available

### 10. STABILITY AND REACTIVITY

#### 10.1 Reactivity

No data available.

#### 10.2 Chemical Stability

Stable under recommended storage conditions.

#### 10.3 Possibility of Hazardous Reactions

No data available.

#### 10.4 Conditions to Avoid

Avoid moisture. Heat, flames and sparks.

#### 10.5 Incompatible Materials

Strong oxidizing agents.

#### 10.6 Hazardous Decomposition Products

In the event of fire: See section 5. Other decomposition products: No data available.

### 11. TOXICOLOGICAL INFORMATION

#### 11.1 Information on Toxicological Effects

**A) Acute Toxicity**

<table>
<thead>
<tr>
<th>Oral LD50: No data available.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inhalation LC50: No data available.</td>
</tr>
<tr>
<td>Dermal LD50: No data available.</td>
</tr>
</tbody>
</table>

**B) Skin Corrosion/Irritation**

Moderate skin irritant.
C) Serious Eye Damage/Irritation
Moderate eye irritant.

D) Respiratory or Skin Sensitization
No data available

E) Germ Cell Mutagenicity
No data available

F) Carcinogenicity
No data available

G) Reproductive Toxicity/Teratogenicity
No data available

H) Single Target Organ Toxicity - Single Exposure
Moderate respiratory tract irritation.

I) Single Target Organ Toxicity - Repeated Exposure
No data available

J) Aspiration Hazard
No data available

K) Potential Health Effects and Routes of Exposure

Inhalation
May be harmful if inhaled. Causes respiratory tract irritation.

Ingestion
May be harmful if swallowed.

Skin
May be harmful if absorbed through skin. Causes skin irritation.

Eyes
Causes eye irritation.

L) Signs and Symptoms of Exposure
The most important known symptoms and effects are described in the labeling (see section 2.2) and/or section 11.

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

M) Additional Information
RTECS: Not available.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available.

12.2 Persistence and Degradability
No data available.

12.3 Bioaccumulative Potential
No data available.

12.4 Mobility in Soil
No data available.

12.5 Results of PBT and vPvB Assessment
No data available.

12.6 Other Adverse Effects
No data available.

13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

A) Product
Product may be burned in an incinerator equipped with afterburner and scrubber. Excess and expired materials are to be offered to a licensed hazardous material disposal company. Ensure that all Federal and Local regulations regarding the disposal and destruction of this material are followed.

B) Contaminated Packaging
Dispose of as above.

C) Other Considerations
Product is not to be disposed of in sanitary sewers, storm sewers, or landfills.
14. TRANSPORT INFORMATION

14.1 UN Number
DOT (US): N/A  IATA: N/A  IMDG: N/A  ADR/RID: N/A

14.2 UN Proper Shipping Name
DOT (US)/IATA: Not dangerous goods
IMDG/ARD/RID: Not dangerous goods

14.3 Transport Hazard Class(es)
DOT (US): N/A  IATA: N/A  IMDG: N/A  ADR/RID: N/A

14.4 Packing Group
DOT (US): N/A  IATA: N/A  IMDG: N/A  ADR/RID: N/A

14.5 Environmental Hazards
DOT (US): None  IATA: None  IMDG: None  ADR/RID: None

14.6 Special Precautions for User
None

15. REGULATORY INFORMATION
This safety data sheet complies with the requirements of WHMIS (Canada), OSHA 1910.1200 (US), and EU Regulation EC No. 1907/2006 (European Union).

15.1 Safety, Health and Environmental Regulations/Legislation Specific for the Substance or Mixture
A) Canada
   DSL/NDSL Status: This product is not listed on the Canadian DSL/NDSL.
B) United States
   TSCA Status: This product is not listed on the US EPA TSCA.
C) European Union
   ECHA Status: This product is not registered with the EU ECHA.

15.2 Chemical Safety Assessment
No data available

16. OTHER INFORMATION

16.1 Revision History
Original Publication Date: 3/30/2011

16.2 List of Abbreviations
LD50  Median lethal dose of a substance required to kill 50% of a test population.
LC50  Medial lethal concentration of a substance required to kill 50% of a test population.
LDLo  Lowest known lethal dose
TDLo  Lowest known toxic dose
IARC  International Agency for Research on Cancer
NTP   National Toxicology Program
RTECS Registry of Toxic Effects of Chemical Substances

16.3 Further Information
Copyright 2015. Toronto Research Chemicals Inc. Copies may be made for internal use only. The above information is believed to be correct to the best of our knowledge, but is to be only used as a guide. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated. Please take all due care when handling this product.