1. IDENTIFICATION OF SUBSTANCE/PREPARATION AND THE COMPANY UNDERTAKING

Chemical Name: 2,5-Dideoxy-2,5-imino-D-mannitol
Product Code: MD04702
Synonyms: 2R,5R-Bis(hydroxymethyl)-3R,4R-dihydroxypyrrolidine
          DMDP
          2,5-Anhydro-2,5-imino-D-mannitol
Recommended uses: For R&D purposes
Supplier: Carbosynth Ltd, 8&9 Old Station Business Park, Compton, Berkshire, RG20 6NE, UK.
Emergency contact numbers: Telephone: +44 (0)1635 578 444
                      Fax: +44 (0)1635 579 444
                      Mobile: +44 (0)7887 998 634

2. HAZARDS IDENTIFICATION

Irritating to eyes, respiratory system and skin.

Classification:

Skin irritation (Category 2)
Eye irritation (Category 2A)
Specific target organ toxicity - single exposure (Category 3)

Labelling and precautionary statements:
Pictogram:

Signal word: Warning.

Hazard statement(s):
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H335 May cause respiratory irritation.

Precautionary statement(s):
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P305 + P351 + P338 IF IN EYES:
Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Hazard symbol(s): Xi Irritant.

R-phrase(s): R36/37/38 Irritating to eyes, respiratory system and skin.
S-phrase(s): S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S36 Wear suitable protective clothing.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Molecular Formula: \(C_6H_{13}NO_4\)
Molecular weight: 163.17
CAS Number: 59920-31-9
EINECS Number: -

Synonyms:
- 2R,5R-Bis(hydroxymethyl)-3R,4R-dihydroxypyrrolidine
- DMDP
- 2,5-Anhydro-2,5-imino-D-mannitol

4. FIRST AID MEASURES

Eye contact: Immediately flush eye with copious amounts of water for at least 15 minutes. Get medical aid immediately.

Skin contact: In case of contact remove contaminated clothing and immediately wash affected areas with copious quantities of water and soap for at least 15 minutes. Get medical aid immediately. Wash contaminated clothing before reuse.

Inhalation: Remove to fresh air. If not breathing give artificial respiration. If breathing is difficult give oxygen. Get medical aid.

Ingestion: Never give anything by mouth to an unconscious person. Wash out mouth with water provided person is conscious. Call a physician.

Notes to Physician: Treat symptomatically and supportively.

5. FIRE-FIGHTING MEASURES

Personal precautions: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Extinguishing media: In case of fire use water spray, dry chemical powder, carbon dioxide, or alcohol-resistant foam.

Special hazards arising from the substance or mixture: Carbon monoxide, carbon dioxide, nitrogen oxides. Emits toxic fumes under fire conditions.

6. ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment as indicated in Section 8.
MATERIAL SAFETY DATA SHEET

2,5-DIDEOXY-2,5-IMINO-D-MANNITOL

Personal precautions: Wear self-contained breathing apparatus, eye protection and gloves. Avoid contact with skin and eyes. Avoid dust formation. Avoid breathing dust, vapours, mist or gas. Ensure adequate ventilation.

Environmental precautions: Do not let product enter the drains.

Spills/Leaks: Vacuum or sweep up and place the material in appropriate container for disposal and dispose of as hazardous waste. Avoid raising dust. Ventilate area, clean up spills and wash spill site after material pickup is complete, observing precautions in the Protective Equipment section.

7. HANDLING AND STORAGE

Handling: Wear appropriate protective clothing - see Section 8. Wash thoroughly after handling. Use only under a chemical fume hood. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with skin and eyes. Avoid ingestion and inhalation. Provide appropriate exhaust ventilation at places where dust if formed.

Storage: Store in a cool, dry, well-ventilated area. Keep container tightly closed. Refrigerate. Keep cold. Store at 2-8°C.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protection equipment:**

Eye protection: Wear appropriate protective safety glasses with side-shields conforming to EN166, chemical safety goggles or face-shield (min. 8-inch) as described by OSHA’s eye and face protection regulations. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin protection: Wear appropriate protective gloves to prevent skin exposure, as defined in EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body protection: Appropriate protective clothing, overalls.

Respiratory protection: Where risk assessment indicates air-purifying respirators are required use a dust mask type P95 (US) or type P1 (EN 143) particle respirator. For higher level protection use type OV/AG/P99 (US) or type ABEK-P2 (EU EN 143) respirator cartridges. Respirators and components must tested and approved under appropriate government standards - NIOSH (US) or CEN (EU).

Hygiene measures: Use good working practices. Wash hands and face thoroughly after handling.

9. PHYSICAL AND CHEMICAL PROPERTIES

Date of issue: 26 February 2015

Revision Number: 1
10. STABILITY AND REACTIVITY

   Chemical stability: Stable under recommended storage conditions.
   Conditions to avoid: Data not available.
   Incompatibilities with other materials: Strong oxidizing agents.
   Hazardous decomposition products: Carbon monoxide, carbon dioxide, nitrogen oxides.
   Hazardous polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

   RTCS #: Data not available.
   Acute toxicity: Data not available.
   Skin corrosion/irritation: Causes skin irritation.
   Serious eye damage/eye irritation: Causes serious eye irritation.
   Respiratory or skin sensitization: Data not available.
   Germ cell mutagenicity: Data not 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.
   Reproductive toxicity: Data not available.
Specific target organ toxicity - single exposure: Inhalation - May cause respiratory irritation.

Specific target organ toxicity - repeated exposure: Data not available.

Aspiration hazard: Data not available.

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

Target organs: Data not available.

Potential health effects:
Eye: Causes serious eye irritation.
Skin: May be harmful by skin absorption. Causes skin irritation.
Ingestion: May be harmful if swallowed.
Inhalation: Material may be irritating to mucous membranes and upper respiratory tract.
Chronic: No information found.

12. ECOLOGICAL INFORMATION

Data not available.

13. DISPOSAL CONSIDERATIONS

Observe all federal, state and local environmental regulations. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Contact a licensed professional waste disposal service to dispose of this material.

14. TRANSPORT INFORMATION

ADR/RID
Not classified as hazardous for transport.

IMDG
Not classified as hazardous for transport.

IATA
Not classified as hazardous for transport.

15. REGULATORY INFORMATION
16. ADDITIONAL INFORMATION

Further information on PPE:

European Standard & performance category markings:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EN143</td>
<td>Particulates filter.</td>
</tr>
<tr>
<td>EN166</td>
<td>Standard applicable to all types of personal eye protectors.</td>
</tr>
<tr>
<td>EN374</td>
<td>Protects hands against chemicals and/or microorganisms.</td>
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</table>

Gas & vapour protection:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Organic vapours</td>
</tr>
<tr>
<td>B</td>
<td>Inorganic vapours</td>
</tr>
<tr>
<td>E</td>
<td>Acid gases</td>
</tr>
<tr>
<td>K</td>
<td>Ammonia and its derivatives</td>
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</tbody>
</table>

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.