SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identification

Product Description: Spermine
Cat No. : 132750000; 132750010; 132752500; 132750050
Synonyms N,N'-Bis(3-aminopropyl)-1,4-butanediamine
CAS-No 71-44-3
EC-No. 200-754-2
Molecular Formula C10 H26 N4

1.2. Relevant identified uses of the substance or mixture and uses advised against

Recommended Use Laboratory chemicals.
Uses advised against No Information available

1.3. Details of the supplier of the safety data sheet

Company Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
E-mail address begel.sdsdesk@thermofisher.com

1.4. Emergency telephone number

For information US call: 001-800-ACROS-01 / Europe call: +32 14 57 52 11
Emergency Number US: 001-201-796-7100 / Europe: +32 14 57 52 99
CHEMTREC Tel. No.US: 001-800-424-9300 / Europe: 001-703-527-3887

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP Classification - Regulation (EC) No 1272/2008

Physical hazards
Based on available data, the classification criteria are not met

Health hazards
Skin Corrosion/irritation Category 1 B
Serious Eye Damage/Eye Irritation Category 1

Environmental hazards
Based on available data, the classification criteria are not met

2.2. Label elements
SAFETY DATA SHEET

Signal Word: Danger

Hazard Statements
H314 - Causes severe skin burns and eye damage

Precautionary Statements
P280 - Wear protective gloves/ protective clothing/ eye protection/ face protection
P264 - Wash face, hands and any exposed skin thoroughly after handling
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P310 - Immediately call a POISON CENTER or doctor/ physician

2.3. Other hazards
No information available

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>EC-No.</th>
<th>Weight %</th>
<th>CLP Classification - Regulation (EC) No 1272/2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,4-Butanediamine, N,N’-bis(3-aminopropyl)-</td>
<td>71-44-3</td>
<td>EEC No. 200-754-2</td>
<td>&gt;95</td>
<td>Skin Corr. 1B (H314) Eye Dam. 1 (H318)</td>
</tr>
</tbody>
</table>

Full text of Hazard Statements: see section 16

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Eye Contact
Immediate medical attention is required. Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.

Skin Contact
Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Obtain medical attention. Take off contaminated clothing and shoes immediately.

Ingestion
Do not induce vomiting.

Inhalation
Move to fresh air.

Protection of First-aiders
Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and prevent spread of contamination.

4.2. Most important symptoms and effects, both acute and delayed

Causes burns by all exposure routes. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue.
and danger of perforation

4.3. Indication of any immediate medical attention and special treatment needed

Notes to Physician
Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable Extinguishing Media
Water spray, dry chemical, carbon dioxide (CO₂), or foam.

Extinguishing media which must not be used for safety reasons
No information available.

5.2. Special hazards arising from the substance or mixture

Thermal decomposition can lead to release of irritating gases and vapors.

Hazardous Combustion Products
Nitrogen oxides (NOₓ), Carbon monoxide (CO), Carbon dioxide (CO₂).

5.3. Advice for firefighters

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

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation.

6.2. Environmental precautions

See Section 12 for additional ecological information.

6.3. Methods and material for containment and cleaning up

6.4. Reference to other sections

Refer to protective measures listed in Sections 8 and 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Do not breathe dust. Do not get in eyes, on skin, or on clothing. Use only under a chemical fume hood.

7.2. Conditions for safe storage, including any incompatibilities

Keep refrigerated. Keep container tightly closed in a dry and well-ventilated place. Store under an inert atmosphere.

7.3. Specific end use(s)

Use in laboratories

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ACR13275
8.1. Control parameters

Exposure limits
This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Biological limit values
This product, as supplied, does not contain any hazardous materials with biological limits established by the region specific regulatory bodies.

Monitoring methods
BS EN 14042:2003 Title Identifier: Workplace atmospheres. Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents.
MDHS14/3 General methods for sampling and gravimetric analysis of respirable and inhalable dust

<table>
<thead>
<tr>
<th>Derived No Effect Level (DNEL)</th>
<th>No information available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Route of exposure</td>
<td>Acute effects (local)</td>
</tr>
<tr>
<td></td>
<td>Acute effects (systemic)</td>
</tr>
<tr>
<td>Oral</td>
<td>Chronic effects (local)</td>
</tr>
<tr>
<td>Dermal</td>
<td>Chronic effects (systemic)</td>
</tr>
</tbody>
</table>

| Predicted No Effect Concentration (PNEC) | No information available. |

8.2. Exposure controls

Engineering Measures
Ensure that eyewash stations and safety showers are close to the workstation location.
Wherever possible, engineering control measures such as the isolation or enclosure of the process, the introduction of process or equipment changes to minimise release or contact, and the use of properly designed ventilation systems, should be adopted to control hazardous materials at source.

Personal protective equipment
Eye Protection Goggles (European standard - EN 166)
Hand Protection Protective gloves

<table>
<thead>
<tr>
<th>Glove material</th>
<th>Breakthrough time</th>
<th>Glove thickness</th>
<th>EU standard</th>
<th>Glove comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrile rubber</td>
<td>See manufacturers</td>
<td>-</td>
<td>EN 374</td>
<td></td>
</tr>
<tr>
<td>Neoprene</td>
<td></td>
<td>recommendations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural rubber</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Skin and body protection Long sleeved clothing

Inspect gloves before use.
Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves.
(Refer to manufacturer/supplier for information)
Ensure gloves are suitable for the task: Chemical compatibility, Dexterity, Operational conditions, User susceptibility, e.g. sensitisation effects, also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion.
Remove gloves with care avoiding skin contamination.

Respiratory Protection When workers are facing concentrations above the exposure limit they must use
To protect the wearer, respiratory protective equipment must be the correct fit and be used and maintained properly. Use a NIOSH/MSHA or European Standard EN 136 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

**Recommended Filter type:** Particulates filter conforming to EN 143

**Large scale/emergency use**

Use a NIOSH/MSHA or European Standard EN 149:2001 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

**Recommended half mask:** Particle filtering: EN149:2001

When RPE is used a face piece Fit Test should be conducted.

### Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

### Environmental exposure controls

No information available.

## SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Off-white</td>
</tr>
<tr>
<td><strong>Physical State</strong></td>
<td>Solid</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Odor Threshold</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Melting Point/Range</strong></td>
<td>26 - 30 °C / 78.8 - 86 °F</td>
</tr>
<tr>
<td><strong>Softening Point</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Boiling Point/Range</strong></td>
<td>130 - 150 °C / 266 - 302 °F</td>
</tr>
<tr>
<td><strong>Flash Point</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Evaporation Rate</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Flammability (solid,gas)</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Explosion Limits</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapor Pressure</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Vapor Density</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Specific Gravity / Density</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Bulk Density</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Water Solubility</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Solubility in other solvents</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Partition Coefficient (n-octanol/water)</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Autoignition Temperature</strong></td>
<td>No data available</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Explosive Properties</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>Oxidizing Properties</strong></td>
<td>No information available</td>
</tr>
</tbody>
</table>

### 9.2. Other information

- **Molecular Formula:** C10 H26 N4
- **Molecular Weight:** 202.34

## SECTION 10: STABILITY AND REACTIVITY

### 10.1. Reactivity

None known, based on information available.

### 10.2. Chemical stability

Hygroscopic, Air sensitive

### 10.3. Possibility of hazardous reactions

No data available.
SAFETY DATA SHEET

Spermine

Hazardous Polymerization
Hazardous polymerization does not occur.

Hazardous Reactions
No information available.

10.4. Conditions to avoid
Exposure to moist air or water. Exposure to air.

10.5. Incompatible materials

10.6. Hazardous decomposition products
Nitrogen oxides (NOx). Carbon monoxide (CO). Carbon dioxide (CO₂).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information
No acute toxicity information is available for this product

(a) acute toxicity;
   Oral
   No data available
   Dermal
   No data available
   Inhalation
   No data available

(b) skin corrosion/irritation;
   Category 1 B

(c) serious eye damage/irritation;
   Category 1

(d) respiratory or skin sensitization;
   Respiratory
   No data available
   Skin
   No data available

(e) germ cell mutagenicity;
   No data available

(f) carcinogenicity;
   No data available
   There are no known carcinogenic chemicals in this product

(g) reproductive toxicity;
   No data available

(h) STOT-single exposure;
   No data available

(i) STOT-repeated exposure;
   No data available

   Target Organs
   No information available.

(j) aspiration hazard;
   Not applicable
   Solid

Other Adverse Effects
See actual entry in RTECS for complete information The toxicological properties have not been fully investigated.

Symptoms / effects, both acute and delayed
Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity
Ecotoxicity effects
Contains no substances known to be hazardous to the environment or that are not
12.2. Persistence and degradability  No information available

12.3. Bioaccumulative potential  No information available

12.4. Mobility in soil  No information available

12.5. Results of PBT and vPvB assessment  No data available for assessment.

12.6. Other adverse effects

Endocrine Disruptor Information  This product does not contain any known or suspected endocrine disruptors

Persistent Organic Pollutant  This product does not contain any known or suspected substance

Ozone Depletion Potential  This product does not contain any known or suspected substance

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from Residues / Unused Products  Waste is classified as hazardous. Dispose of in accordance with the European Directives on waste and hazardous waste. Dispose of in accordance with local regulations.

Contaminated Packaging  Dispose of this container to hazardous or special waste collection point.

European Waste Catalogue (EWC)  According to the European Waste Catalogue, Waste Codes are not product specific, but application specific.

Other Information  Waste codes should be assigned by the user based on the application for which the product was used. Do not empty into drains. Do not dispose of waste into sewer. Large amounts will affect pH and harm aquatic organisms.

SECTION 14: TRANSPORT INFORMATION

IMDG/IMO

14.1. UN number  UN3259
14.2. UN proper shipping name  Amines or polyamines, solid, corrosive, n.o.s
14.3. Transport hazard class(es)  8
14.4. Packing group  II

ADR

14.1. UN number  UN3259
14.2. UN proper shipping name  Amines or polyamines, solid, corrosive, n.o.s
14.3. Transport hazard class(es)  8
14.4. Packing group  II

IATA

14.1. UN number  UN3259
14.2. UN proper shipping name  Amines or polyamines, solid, corrosive, n.o.s
14.3. Transport hazard class(es)  8
14.4. Packing group  II

14.5. Environmental hazards  No hazards identified

14.6. Special precautions for user  No special precautions required

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code  Not applicable, packaged goods
SECTION 15: REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

<table>
<thead>
<tr>
<th>Component</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>PICCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>AICS</th>
<th>KECL</th>
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</thead>
<tbody>
<tr>
<td>1,4-Butanediamine, N,N'-bis(3-aminopropyl)</td>
<td>200-754-2</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

National Regulations

Take note of Control of Substances Hazardous to Health Regulations (COSHH) 2002 and 2005 Amendment.
Take note of Dir 94/33/EC on the protection of young people at work.
Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

15.2. Chemical safety assessment

A Chemical Safety Assessment/Report (CSA/CSR) has not been conducted.

SECTION 16: OTHER INFORMATION

Full Text of H-/EUH-Statements Referred to Under Section 3

H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage

Legend

<table>
<thead>
<tr>
<th>CAS</th>
<th>EINECS/ELINCS</th>
<th>DSL/NDSL</th>
<th>PICCS</th>
<th>KECL</th>
<th>WEL</th>
<th>ACGIH</th>
<th>DNEL</th>
<th>RPE</th>
<th>LC50</th>
<th>NOEC</th>
<th>PBT</th>
<th>ADR</th>
<th>IMO/IMDG</th>
<th>OECD</th>
<th>BCF</th>
<th>Key literature references and sources for data</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS</td>
<td>Chemical Abstracts Service</td>
<td>European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances</td>
<td>Canadian Domestic Substances List/Non-Domestic Substances List</td>
<td>Philippines Inventory of Chemicals and Chemical Substances</td>
<td>Japanese Existing and New Chemical Substances</td>
<td>Korean Existing and Evaluated Chemical Substances</td>
<td>American Conference of Governmental Industrial Hygienists</td>
<td>Derived No Effect Level</td>
<td>Respiratory Protective Equipment</td>
<td>Lethal Concentration 50%</td>
<td>No Observed Effect Concentration</td>
<td>Persistent, Bioaccumulative, Toxic</td>
<td>European Agreement Concerning the International Carriage of Dangerous Goods by Road</td>
<td>International Maritime Organization/International Maritime Dangerous Goods Code</td>
<td>Organisation for Economic Co-operation and Development</td>
<td>Bioconcentration factor</td>
</tr>
<tr>
<td>TSCA</td>
<td>United States Toxic Substances Control Act Section 8(b) Inventory</td>
<td>ENCS</td>
<td>AICS</td>
<td>KECL</td>
<td>WEL</td>
<td>TWA</td>
<td>IARC</td>
<td>PNEC</td>
<td>LD50</td>
<td>ECS0</td>
<td>POW</td>
<td>vPvB</td>
<td>ICAO/IATA</td>
<td>MARPOL</td>
<td>ATE</td>
<td>VOC</td>
</tr>
<tr>
<td>Inventory</td>
<td>Japanese Existing and New Chemical Substances</td>
<td>Australian Inventory of Chemical Substances</td>
<td>New Zealand Inventory of Chemicals</td>
<td>Time Weighted Average</td>
<td>International Agency for Research on Cancer</td>
<td>Predicted No Effect Concentration</td>
<td>Lethal Dose 50%</td>
<td>Effective Concentration 50%</td>
<td>Partition coefficient Octanol:Water</td>
<td>very Persistent, very Bioaccumulative</td>
<td>Persistent, Toxic, Very Persistent, Very Bioaccumulative</td>
<td>International Civil Aviation Organization/International Air Transport Association</td>
<td>International Convention for the Prevention of Pollution from Ships</td>
<td>Acute Toxicity Estimate</td>
<td>Volatile Organic Compounds</td>
<td></td>
</tr>
</tbody>
</table>

Suppliers safety data sheet, Chemadvisor - LOLI, Merck index, RTECS

Training Advice

Chemical hazard awareness training, incorporating labelling, Safety Data Sheets (SDS), Personal Protective Equipment (PPE) and hygiene.
Use of personal protective equipment, covering appropriate selection, compatibility, breakthrough thresholds, care, maintenance, fit and standards.
First aid for chemical exposure, including the use of eye wash and safety showers.

Creation Date 05-Nov-2010
SAFETY DATA SHEET

Revision Date 25-Aug-2015

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Disclaimer

The information provided on 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 guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as 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 material or in any process, unless specified in the text.

End of Safety Data Sheet