1. Identification of the substance/preparation and the company/undertaking

Product Name
Isobutyric anhydride

Manufacturer or supplier's details

Celanese (Shanghai) International Trading Co., Ltd.
Room 239, Xinmao Building
South Taizhong Road
Waigaoqiao Free Trade Zone
Shanghai, China

Celanese Pte Ltd
60 Anson Road
Maple Tree Anson #13-02
Singapore 079914

Emergency telephone number
+(65) 62656917 (Operations Room direct dial)
or fax request to +(65) 62664696 (Facsimile to Operations Room)
or email to posh.er@paccoffshore.com.sg

In China Emergency Number: 86-532-83889090 (NRCC)

Identified uses
Chemical intermediate

2. Hazards identification

GHS Classification

Hazards                                      Category
Flammable liquid                             Category 4
Acute dermal toxicity                       Category 3
Acute inhalation toxicity                   Category 3
Skin corrosion/irritation                   Category 1B
Serious eye damage/eye irritation           Category 1
Acute aquatic toxicity                      Category 3

Labeling
SAFETY DATA SHEET

Product Name: Isobutyric anhydride
MSDS number: 80186
Revision Number: 4.02

Signal Word: Danger

Hazard Statements:
- H227 - Combustible liquid
- H311 - Toxic in contact with skin
- H331 - Toxic if inhaled
- H314 - Causes severe skin burns and eye damage
- H318 - Causes serious eye damage
- H402 - Harmful to aquatic life

Precautionary Statements:
- P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
- P260 - Do not breathe dust/fume/gas/mist/spray/spray.
- P264 - Wash hands thoroughly after handling
- P271 - Use only outdoors or in a well-ventilated area
- P273 - Avoid release to the environment
- P280 - Wear protective gloves/protective clothing/eye protection/face protection
- P301 + P330 + P331 - IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
- P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
- P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
- P310 - Immediately call a POISON CENTER or doctor/physician.
- P370 + P378 - In case of fire, use water/water spray/water jet/carbon dioxide/sand/foam/alcohol resistant foam/chemical powder for extinction
- P361 - Remove/Take off immediately all contaminated clothing
- P363 - Wash contaminated clothing before reuse
- P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
- P405 - Store locked up
- P501 - Dispose of contents/container in accordance with local regulations.

Statements of Hazard:
Reacts with the following substances: water

3. Composition/Information on ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isobutyric anhydride</td>
<td>97-72-3</td>
<td>min 98</td>
</tr>
<tr>
<td>Isobutyric acid</td>
<td>79-31-2</td>
<td>max 2</td>
</tr>
</tbody>
</table>

2 of 11
4. First aid measures

General Information
Remove contaminated, soaked clothing immediately and dispose of safely. Pay attention to own protection. In any case show the physician the Safety Data Sheet.

Skin
Wash off immediately with plenty of water for at least 15 minutes. Obtain medical attention.

Eyes
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician immediately.

Inhalation
Keep at rest. Move to fresh air. Call a physician immediately.

Ingestion
If conscious, drink plenty of water. If swallowed, do not induce vomiting - seek medical advice.

Notes to physician
Observe for latent pulmonary edema.

5. Fire-fighting measures

NFPA: Health: 3 Flammability: 2 Instability: 0

Suitable extinguishing media
Foam, Dry chemical, Carbon dioxide (CO2), Water spray

Extinguishing media which must not be used for safety reasons
Do not use a solid water stream as it may scatter and spread fire.

Special exposure hazards arising from the substance or preparation itself, its combustion products, or released gases
Under conditions giving incomplete combustion, hazardous gases produced may consist of Carbon monoxide Carbon dioxide (CO2) Combustion gases of organic materials must in principle be graded as inhalation poisons

Special protective equipment for fire-fighters
self-contained breathing apparatus (EN 133).

Environmental precautions
Water used to fight fire runoff can cause environmental damage. Dike and collect water used to fight fire.

Other Information
Cool containers / tanks with water spray.

6. Accidental release measures
6. Accidental release measures

**Personal precautions**
Avoid contact with the skin and the eyes. Keep away from heat and sources of ignition. Provide adequate ventilation.

**Environmental precautions**
Prevent further leakage or spillage. Do not discharge into the drains/surface waters/groundwater. Dike and collect water used to fight fire.

**Methods for cleaning up**
Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Keep in suitable, closed containers for disposal. Dispose of in accordance with local regulations.

7. Handling and storage

**Advice on safe handling**
Provide sufficient air exchange and/or exhaust in work rooms.

**Incompatible products**
Keep away from: Bases, Amines, Alcohols

**Protection - fire and explosion:**
Keep away from sources of ignition - No smoking. Take necessary action to avoid static electricity discharge. Ground and bond containers when transferring material. In case of fire, emergency cooling with water spray should be available.

**Material storage**
Store locked up. Keep in a dry, cool and well-ventilated place.

**Incompatible products**
Keep away from: Bases, Amines, Alcohols

**Technical measures/Storage conditions**
Keep tightly closed in a dry, cool and well-ventilated place. Never allow product to get in contact with water during storage. Keep container tightly closed.

8. Exposure controls / personal protection

**ACGIH Exposure Limits**
No exposure limits established.

**OSHA Exposure Limits**
No exposure limits established.

**Exposure controls**

**Engineering measures**
General or dilution ventilation is frequently insufficient as the sole means of controlling employee exposure. Local ventilation is usually preferred. Explosion-proof equipment (for example fans, switches, and grounded ducts) should be used in mechanical ventilation systems.
### Personal protective equipment

**General advice**
Avoid contact with skin and eyes. Do not breathe vapors or spray mist. Use only in an area equipped with a safety shower. Hold eye wash fountain available.

**Hygiene measures**
When using, do not eat, drink or smoke. Take off all contaminated clothing immediately. Wash hands before breaks and immediately after handling the product.

**Respiratory protection**
If aerosols or vapors are present, respiratory protection is required (gas filter A). Full mask with above mentioned filter according to producers using requirements or self-contained breathing apparatus. Equipment should conform to EN 136 or EN 140 and EN 143.

**Eye protection**
Tightly fitting safety goggles. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face. Equipment should conform to EN 166.

**Skin protection**
Impervious clothing

**Hand protection**
Chemicals resistant gloves

- **Suitable material**: Butyl-rubber
- **Type**: Butoject (Company KCL) or comparable article; or refer to glove manufacturer's recommendation

**Evaluation**
- **Material thickness**: Approx. 0.3 mm
- **Break through time**: 480 min

### 9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td></td>
</tr>
<tr>
<td>Form</td>
<td>liquid</td>
</tr>
<tr>
<td>Color</td>
<td>colourless</td>
</tr>
<tr>
<td>Odor</td>
<td>pungent</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>68°C</td>
</tr>
<tr>
<td>Method</td>
<td>closed cup</td>
</tr>
<tr>
<td><strong>Ignition temperature</strong></td>
<td>329°C</td>
</tr>
<tr>
<td><strong>Lower explosion limit</strong></td>
<td>1 Vol. %</td>
</tr>
<tr>
<td><strong>Upper explosion limit</strong></td>
<td>6.2 Vol. %</td>
</tr>
<tr>
<td><strong>Melting point/range</strong></td>
<td>-55°C</td>
</tr>
<tr>
<td>Method</td>
<td>EU A.1</td>
</tr>
<tr>
<td><strong>Boiling point/range</strong></td>
<td>182.9°C @ 1013 hPa</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td>0.952 g/ml @ 20°C</td>
</tr>
<tr>
<td><strong>Viscosity</strong></td>
<td>1.23 mPa*s @ 25°C, dynamic</td>
</tr>
<tr>
<td>Method</td>
<td>OECD 114</td>
</tr>
<tr>
<td><strong>Vapor pressure</strong></td>
<td>86 Pa @ 20°C</td>
</tr>
<tr>
<td>Method</td>
<td>EU A.4</td>
</tr>
<tr>
<td><strong>Water solubility</strong></td>
<td>618 g/l @ 20°C</td>
</tr>
<tr>
<td>Method</td>
<td>OECD 105</td>
</tr>
<tr>
<td><strong>Partition coefficient (n-octanol/water)</strong></td>
<td>1.1 @ 25°C (data based on isobutyric acid)</td>
</tr>
</tbody>
</table>
9. Physical and chemical properties

<table>
<thead>
<tr>
<th>Method</th>
<th>Explosive Properties</th>
<th>Oxidizing Properties</th>
<th>Surface Tension</th>
</tr>
</thead>
<tbody>
<tr>
<td>OECD 117</td>
<td>not applicable based on consideration of the structure</td>
<td>not applicable based on consideration of the structure</td>
<td>26.32 mN/m @ 21.4°C</td>
</tr>
<tr>
<td>EU A.5</td>
<td></td>
<td></td>
<td>Method</td>
</tr>
</tbody>
</table>

10. Stability and reactivity

Reactivity
Stable under normal conditions of handling, use and transportation.

Conditions to avoid
Avoid any source of ignition. Avoid contact with heat, sparks, open flame, and static discharge.

Incompatible Materials
Keep away from: Amines, Bases, Alcohols

Hazardous Combustion or Decomposition Products:
Thermal decomposition products may include oxides of carbon.
11. Toxicological information

Potential health effects

Routes of exposure
Skin, eyes, inhalation, ingestion.

Immediate effects

**Skin**
Causes skin burns. Harmful if absorbed through skin. Symptoms of overexposure include: Redness or discoloration, swelling, itching, burning or blistering of skin.

**Eyes**
Exposure to vapors Causes severe eye burns, damage irreversible. Symptoms of exposure may include: Eye irritation, burning sensation, pain, watering, and/or change of vision. Transient visual disturbances characterized by mildly blurred vision and a blue-gray discoloration of sight. This effect is commonly referred to as blue haze, or halo vision, with halo vision getting its name form the appearance of a halo when looking at light sources. These effects are due to mild corneal irritation and edema and normally disappear several hours after exposure.

**Inhalation**
Causes respiratory tract irritation. Symptoms of exposure may include: Nasal discharge, hoarseness, coughing, chest pain and breathing difficulty. Accumulation of fluid in the lungs (pulmonary edema); symptoms can be delayed for several hours.

**Ingestion**
Causes digestive tract burns. Harmful if swallowed. Symptoms of exposure may include: Nausea, vomiting, loss of appetite, gastrointestinal irritation and/or diarrhea. Severe damage to the mouth, throat esophagus and/or stomach.

Target organ effects
Overexposure (prolonged or repeated exposure) may cause:
- Injury to the eyes
- Irritation of the respiratory tract
- Digestive tract damage
- Respiratory tract damage
- Skin damage.

Medical conditions which may be aggravated by exposure:
Significant exposure to this chemical may adversely affect people with acute or chronic disease of the:
- Respiratory Tract
- Skin
- Eyes
- Digestive tract

Isobutyric anhydride

<table>
<thead>
<tr>
<th>Acute oral toxicity</th>
<th>LD50: 7700 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data based on isobutyric acid</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute dermal toxicity</th>
<th>LD50: 474 mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data based on isobutyric acid</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Acute inhalation toxicity</th>
<th>LC50 (7h): 4210 mg/m³</th>
</tr>
</thead>
</table>
### Skin corrosion/irritation
- **Species:** rabbit
- **Method:** (Reference substance: 2-Methylpropanol)

### Serious eye damage/eye irritation
- **Species:** rabbit eye
- **Method:** similar to OECD 405

#### in vitro Mutagenicity

#### in vivo Mutagenicity
- Mammalian Erythrocyte Micronucleus Test in mice: negative - Method: OECD 474 (Reference substance: 2-Methylpropan-1-ol)

### Reproductive toxicity
- No adverse reproductive effects at the highest dose tested (Reference substance: 2-Methylpropanol)
- **Routes of exposure:** inhalation
- **Species:** rat
- **NOAEL:** 2500 ppm

### Developmental effects
- No evidence of maternal or developmental toxicity
- **Routes of exposure:** Inhalation
- **Species:** rat
- **NOAEL:** 10 mg/L

#### Repeated exposure
- No adverse effects (Reference substance: 2-Methylpropanol)
- **Routes of exposure:** oral gavage
- **Species:** rat
- **Method:** OECD 408
- **NOEL:** 316 mg/kg bw/day

### Repeated Exposure
- No adverse effects (Reference substance: 2-Methylpropanol)
- **Routes of exposure:** Inhalation
- **Species:** rat
- **Method:** OECD 413
- **NOAEC:** ~ 7700 mg/m³

## 12. Ecological Information

### Isobutyric anhydride

#### Acute fish toxicity
- **Species:** Leuciscus idus (Golden orfe)
- **Method:** DIN 38412 T.15
- **LC50:** 26 mg/l (96h)

#### Acute daphnia toxicity
- **Species:** Daphnia magna
- **Method:** DIN 38412, Part 11
- **EC50:** 51.25 mg/l (48h)
- **(Reference substance: Isobutyric acid)**

#### Toxicity to aquatic plants
- **Species:** Daphnia magna
- **Method:** DIN 38412, Part 11
- **EC50:** 45.1 mg/l (72h)
- **(Reference substance: Isobutyric acid)**

---

**Revision Date:** Apr.29.2014

**Issuing date:** Feb.12.2019
12. Ecological Information

Species: Desmodesmus subspicatus
DIN 38412 T.9

Toxicity to bacteria
IC50: 2.15 mg/l (40h)
(Reference substance: Isobutyric acid)

Species: Tetrahymena pyriformis

Biodegradation
Readily biodegradable
(Reference substance: Isobutyric acid)

Method
OECD 301

Other potential hazards
The substance does not meet the criteria for PBT / vPvB according to REACH, Annex XIII

13. Disposal considerations

Product information
Disposal required in compliance with all waste management related state and local regulations. The choice of the appropriate method of disposal depends on the product composition by the time of disposal as well as the local statutes and possibilities for disposal.

Uncleaned empty packaging
Contaminated packaging should be emptied as far as possible and after appropriate cleansing may be taken for reuse

14. Transport information

US Department of Transportation

UN/NA Number: UN 2739
Proper Shipping Name: Butyric anhydride
Hazard class: 8
Packing Group: III
Emergency Resp. Guide: 156

ADR/RID

UN/ID No.: UN 2739
Proper Shipping Name: Butyric anhydride
Hazard Class: 8
Classification Code: C3
Packing group: III
Environmentally hazardous: no
Tunnel Restriction Code: (E)
Hazard Label(s): 8
Hazard Number: 80

ADN

UN/ID No.: UN 2739
Proper Shipping Name: Butyric anhydride
Hazard Class: 8
Classification Code: C3
Packing group: III
14. Transport information

- Environmentally hazardous: no
- Hazard Labels: 8

ADN Tanker: FORBIDDEN

ICAO/IATA
- UN-No.: UN 2739
- Proper Shipping Name: Butyric anhydride
- Hazard Class: 8
- Packing group: III
- Environmentally hazardous: no
- Hazard Labels: 8

IMDG
- UN/ID No.: UN 2739
- Proper Shipping Name: Butyric anhydride
- Hazard Class: 8
- Packing group: III
- Marine pollutant: no
- Hazard Labels: 8
- EmS Code: F-A, S-B

15. Regulatory information

International Inventories
Listed on the chemical inventories of the following countries or qualifies for an exemption:
- Australia (AICS)
- Canada (DSL)
- China (IECSC)
- Europe (EINECS)
- Korea (KECI)
- New Zealand (NZIoC)
- Philippines (PICCS)
- United States (TSCA)

16. Other information

HMIS:
- Health: 3
- Flammability: 2
- Physical Hazard: 0

Prepared By
Product Stewardship Department
Celanese

For further information, see:
For more information, other material safety data sheets or technical data sheets please consult the Celanese homepage (www.celanese.com).
SAFETY DATA SHEET

Observe national and local legal requirements.

Changes against the previous version are marked by ***

**Sources of key data used to compile the datasheet**
Information contained in this safety data sheet is based on Celanese owned data and public sources deemed valid or acceptable. The absence of data elements required by ANSI or 1907/2006/EC indicates that no data meeting these requirements is available.

**Further information**
This information is based on our present state of knowledge. It shall describe our products regarding safety requirements and shall not be construed as a guarantee or statement of condition and/or quality. For more information, other material safety data sheets or technical data sheets please consult the Celanese homepage (www.celanese.com)