SAFETY DATA SHEET

Product Name: n-Butyric anhydride

Manufacturer or supplier’s details
Celanese Sales Germany GmbH
Am Unisys-Park 1
65843 Sulzbach (Taunus)
Germany

Product Information
PS.Chemicals.EU@celanese.com

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

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

Identified uses
Chemical intermediate

2. Hazards identification

GHS Classification

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquid</td>
<td>Category 4</td>
</tr>
<tr>
<td>Skin corrosion/irritation</td>
<td>Category 1B</td>
</tr>
<tr>
<td>Acute oral toxicity</td>
<td>Category 4</td>
</tr>
<tr>
<td>Acute aquatic toxicity</td>
<td>Category 3</td>
</tr>
</tbody>
</table>

Symbol(s)

[Symbol images: Flammable, Corrosive]

Signal Word

Warning

Hazard Statements

- H227 - Combustible liquid
- H302 - Harmful if swallowed
- H314 - Causes severe skin burns and eye damage
- H402 - Harmful to aquatic life
Precautionary Statements

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P234 - Keep only in original container
P260 - Do not breathe dust/fume/gas/mist/spray/spray.
P264 - Wash hands thoroughly after handling
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.
P363 - Wash contaminated clothing before reuse
P403 + P235 - Store in a well-ventilated place. Keep cool
P501 - Dispose of contents/container in accordance with local regulations.

3. Composition/Information on ingredients

Chemical characterization
Butanoic acid, anhydride

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butyric anhydride</td>
<td>106-31-0</td>
<td>min 98</td>
</tr>
<tr>
<td>n-Butyric acid</td>
<td>107-92-6</td>
<td>max 2</td>
</tr>
</tbody>
</table>

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.

5. Fire-fighting measures
5. Fire-fighting measures

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

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
Dike and collect water used to fight fire.

Other Information
Cool containers / tanks with water spray.

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, water

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, water

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

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
Reference substance: Isobutyric anhydride
Type: Butject (Company KCL) or comparable article; or refer to glove manufacturer's recommendation
Evaluation: according to EN 374: level 6
Material thickness: Approx. 0.3 mm
Break through time: approx. 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>Flash point</td>
<td>88°C</td>
</tr>
<tr>
<td>Method</td>
<td>closed cup</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>279°C</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>0.9 Vol. %</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>5.8 Vol. %</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>-75°C</td>
</tr>
<tr>
<td>Boiling point/range</td>
<td>198°C @ 1013 hPa</td>
</tr>
<tr>
<td>Density</td>
<td>0.966 - 0.967 g/ml @ 20°C</td>
</tr>
<tr>
<td>pH</td>
<td>5.4</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>0.4 hPa @ 20°C</td>
</tr>
<tr>
<td>Vapor density</td>
<td>5.4 (Air=1)</td>
</tr>
<tr>
<td>Water solubility</td>
<td>hydrolyses</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>1.39 (calculated)</td>
</tr>
<tr>
<td>(n-octanol/water)</td>
<td></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
11. Toxicological information

Potential health effects

Routes of exposure
Skin, eyes, inhalation, ingestion.

Immediate effects

- **Skin**: Causes skin burns. Symptoms of overexposure include: Redness or discoloration, swelling, itching, burning or blistering of skin.
- **Eyes**: Causes eye burns. Symptoms of exposure may include: Eye irritation, burning sensation, pain, watering, and/or change of vision. Loss of vision.
- **Inhalation**: Causes respiratory tract burns. Symptoms of exposure may include: Nasal discharge, hoarseness, coughing, chest pain and breathing difficulty.
- **Ingestion**: Causes digestive tract burns. Symptoms of exposure may include: Severe damage to the mouth, throat, esophagus and/or stomach.

**Butyric anhydride**

- **Acute oral toxicity**: LD50: > 5000 mg/kg, rat
- **Acute dermal toxicity**: LD50: > 5000 mg/kg, rabbit
- **Acute inhalation toxicity**: LC50: > 2200 (calculated) ppm, rat, 8h
- **Skin corrosion/irritation**: Irritating
- **Serious eye damage/eye irritation**: Severe eye irritation

The toxicological data given are determined by analogy.

12. Ecological Information

**Butyric anhydride**

- **Acute fish toxicity**: LC50: 90 mg/l (48h) (Reference substance: Butyric acid)
  - Species: Oryzias latipes (Medaka)
  - Method: QSAR
- **Chronic fish toxicity**: LC50: 245-480 mg/l (48h) (Reference substance: Butyric acid)
  - Species: Leuciscus idus (Golden orfe)
  - Method: DIN 38412 T.15
- **Acute daphnia toxicity**: EC50: 800-1000 mg/l (48h)
  - Species: Daphnia magna
  - Method: DIN 38412, Part 11
- **Toxicity to aquatic plants**: EC50: 46.7 mg/l (72h) (Reference substance: Butyric acid)
12. Ecological Information

Species: Scenedesmus subspicatus
Toxicity to bacteria
- Toxicological threshold concentration (72h): 26 mg/l
  (Reference substance: Butyric acid)
Biodegradation
- Inherently biodegradable
  Method: OECD 302 B (Zahn-Wellens Test)
  Bioconcentration factor (BCF): 2.33 (calculated)
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
- Reportable Quantity (RQ): Butyric acid - 5000 lb/ 2268 kg
- 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 REGULATIONS
This substance is classified as dangerous according to Chinese legislation

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

16. Other information

HMIS: Health: 3 Flammability: 2 Physical Hazard: 1

Prepared By
Product Stewardship Department
Celanese
SAFETY DATA SHEET

Other Information:
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)