1. Product and company identification

Trade Name

Isobutyric anhydride

Manufacturer, importer, supplier
Celanese Ltd.
222 W. Las Colinas Blvd., Suite 900N
Irving, TX  75039
United States
Phone:  972 443 4000
Internet:  www.celanese.com

Transportation emergency phone numbers:
In USA, call  800 424 9300
Outside USA, call  +001 703 527 3887, collect calls accepted.
In Mexico, call  01-800-681-9531

Identified uses
Chemical intermediate

2. Hazard Identification

GHS Classification

Hazard	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

Label elements

Signal Word	Danger

Hazard Statements
Combustible liquid
Toxic in contact with skin
Toxic if inhaled
Causes severe skin burns and eye damage
Causes serious eye damage
Precautionary statements
Keep away from flames and hot surfaces - No smoking
Keep container tightly closed.
In case of fire:
Use foam, dry chemical, carbon dioxide (CO2), or water spray to extinguish.
Wear protective gloves/ protective clothing/ eye protection/ face protection.
Do not breathe dusts or mists
Use only outdoors or in a well-ventilated area.
Wash face, hands and any exposed skin thoroughly after handling.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
Wash contaminated clothing before reuse.
Call a POISON CENTER or doctor if you feel unwell.
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
Immediately call a POISON CENTER or doctor.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Immediately call a POISON CENTER or doctor.
Store locked up.
Store in a well-ventilated place. Keep cool.
Dispose of contents/ container to an approved waste disposal plant.

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>98</td>
</tr>
<tr>
<td>Isobutyric acid</td>
<td>79-31-2</td>
<td>0 - 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.

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

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

Isolation
Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Isolate for 800 meters or 0.5 miles in all directions if tank, rail car, or tank truck is involved in fire. Evacuate downwind areas as conditions warrant to prevent exposure and to allow vapors or fumes to dissipate. Spills may expose downwind areas to toxic or flammable concentrations over considerable distances in some cases.

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.
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.

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.

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

Incompatible products
Keep away from: Bases, Amines, Alcohols

8. Exposure controls / personal protection

OSHA Exposure Limits
No exposure limits established.

ACGIH Exposure Limits
No exposure limits established.

Mexico National 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.

Protective equipment
A safety shower and eyewash should be readily available.

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.
Respiratory protection
Based on workplace contaminant level and working limits of the respirator, use a respirator approved by NIOSH. The following is the minimum recommended equipment for an occupational exposure level. To estimate an occupational exposure level see Section 8 and Section 11.

For concentrations > 1 and < 10 times the occupational exposure level: Use air-purifying respirator with full facepiece and organic vapor cartridge(s) or air-purifying full facepiece respirator with an organic vapor canister or a full facepiece powered air-purifying respirator fitted with organic vapor cartridge(s). The air purifying element must have an end of service life indicator, or a documented change out schedule must be established. Otherwise, use supplied air.

For concentrations more than 10 times the occupational exposure level and less than the lower of either 100 times the occupational exposure level or the IDLH: Use Type C full facepiece supplied-air respirator operated in positive-pressure or continuous-flow mode.

For concentrations > 100 times the occupational exposure level or greater than the IDLH level or unknown concentrations (such as in emergencies): Use self-contained breathing apparatus with full facepiece in positive-pressure mode or Type C positive-pressure full facepiece supplied-air respirator with an auxiliary positive-pressure self-contained breathing apparatus escape system.

For escape: Use self-contained breathing apparatus with full facepiece or any respirator specifically approved for escape.

Skin protection:
Wear impervious clothing and gloves to prevent contact. Butyl rubber is recommended. Other protective material may be used, depending on the situation, if adequate degradation and permeation data is available. If other chemicals are used in conjunction with this chemical, material selection should be based on protection for all chemicals present.

Eye/face protection:
Wear chemical goggles when there is a reasonable chance of eye contact. In addition to goggles, wear a face shield if there is a reasonable chance for splash to the face.

9. Physical and chemical properties

Appearance
Form liquid
Color colourless
Odor pungent
Molecular Weight 158.22
Flash point 68°C (152.6°F)
Method closed cup
Ignition temperature 329°C (624°F)
Lower explosion limit 1 Vol. %
Upper explosion limit 6.2 Vol. %
Boiling point/range 182.9°C @ 1013 hPa
Density 0.952 g/ml @ 20°C
Viscosity 1.23 mPa*s @ 25°C, dynamic
Method OECD 114
Vapor pressure 86 Pa @ 20°C
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.

Possibility of hazardous reactions
Hazardous polymerization does not occur.
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**

**Acute oral toxicity**
LD50: 7700 mg/kg
Data based on isobutyric acid

**Acute dermal toxicity**
LD50: 474 mg/kg
Data based on isobutyric acid
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)
12. Ecological Information

Toxicity to aquatic plants
Species: Desmodesmus subspicatus
Method: DIN 38412 T.9
EC50: 45.1 mg/l (72h)
(Reference substance: Isobutyric acid)

Toxicity to bacteria
Species: Tetrahymena pyriformis
Method: OECD 301
IC50: 2.15 mg/l (40h)
(Reference substance: Isobutyric acid)

Biodegradation
Readily biodegradable
(Reference substance: Isobutyric acid)

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

13. Disposal considerations

Disposal considerations
Dispose of spilled material in accordance with state and local regulations for hazardous waste. Recommended methods are incineration or biological treatment at a federally or state-permitted disposal facility. Note that this information applies to the material as manufactured; processing, use, or contamination may make this information inappropriate, inaccurate, or incomplete.

Note that this handling and disposal information may also apply to empty containers, liners and rinsate. State or local regulations or restrictions are complex and may differ from federal regulations. This information is intended as an aid to proper handling and disposal; the final responsibility for handling and disposal is with the owner of the waste.

EPA Hazardous Waste Code(s): D001, D002

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

TDG
UN/NA Number: UN 2739
Proper Shipping Name: BUTYRIC ANHYDRIDE
Class: 8
Packing Group: III

Mexico Transport Information
UN-No.: UN 2739
Proper Shipping Name: Butyric anhydride
Safety Data Sheet

Product Name: Isobutyric anhydride
MSDS number: 80186
Revision Number: 4

Hazard Class: 8
Packing Group: III
Emergency Response Guide: 156

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

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

15. Regulatory Information

US State Regulations
Chemicals associated with the product which are subject to the state right-to-know regulations are listed along with the applicable state(s):

Isobutyric anhydride 97-72-3
- New Jersey: Listed
- Massachusetts: Listed

Isobutyric acid 79-31-2
- Pennsylvania: Listed
- New York: Listed
- New Jersey: Listed
- Massachusetts: Listed

U.S. FEDERAL REGULATIONS

TSCA Inventory:
We certify that all components are either on the TSCA inventory or qualify for an exemption.

Environmental Regulations:

Isobutyric acid 79-31-2
- CERCLA Hazardous Substance: Listed

SARA 311:
- Acute health: Yes
- Chronic health: No
Isobutyric acid 79-31-2

<table>
<thead>
<tr>
<th>Fire:</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sudden release of pressure:</td>
<td>No</td>
</tr>
<tr>
<td>Reactive:</td>
<td>Yes</td>
</tr>
</tbody>
</table>

INTERNATIONAL REGULATIONS

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

NFPA:
- Health: 3
- Flammability: 2
- Instability: 0

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

Prepared By
Product Stewardship Department
Celanese

For more information, other material safety data sheets or technical data sheets please consult the Celanese homepage (www.celanese.com)

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.

Other Information:
Observe national and local legal requirements
Changes against the previous version are marked by ***

For industrial use only. The information contained herein is accurate to the best of our knowledge. We do not suggest or guarantee that any hazards listed herein are the only ones which exist. Celanese makes no warranty of any kind, express or implied, concerning the safe use of this material in your process or in combination with other substances. Effects can be aggravated by other materials and/or this material may aggravate or add to the effects of other materials. This material may be released from gas, liquid, or solid materials made directly or indirectly from it. User has the sole responsibility to determine the suitability of the materials for any use and the manner of use contemplated. User must meet all applicable safety and health standards. Material safety data sheets are provided on the Internet by Celanese as a service to its customers. Possession of an Internet MSDS does not indicate that the possessor of the MSDS was a purchaser or user of the subject product.
Abbreviation and Acronym:
ADR = Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
CAS = Chemical Abstracts Service (division of the American Chemical Society)
CLP = Classification, Labelling and Packaging
DNEL = Derived No Effect Level
EINECS = European Inventory of Existing Commercial Chemical Substances
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
ICAO = International Civil Aviation Organization
IMDG = International Maritime Code for Dangerous Goods
LC50 = Lethal Concentration
LD50 = Lethal Dose
LOAEL = Low Observed Adverse Effect Level
NOAEL = No Observed Adverse Effect Level
NOEC = No Observed Effect Concentration
PBT = Persistent, Bioaccumulative and Toxic
PNEC = Predicted No Effect Concentration
RCR = Risk Characterization Ratio
RID = Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
R-Phrases = Risk Phrases
S-Phrases = Safety Phrases
vPvB = very Persistent and very Bioaccumulative