SAFETY DATA SHEET

2-Methylbutyric acid
10070

SECTION 1: Identification of the substance / mixture and of the company / undertaking

1.1. Product identifier

Identification of the substance/preparation

2-Methylbutyric acid

CAS-No 116-53-0
EC No. 204-145-2
Registration number (REACH) 01-2119959862-23

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

Identified uses
Transported isolated intermediate (1907/2006)

Uses advised against
None

1.3. Details of the supplier of the safety data sheet

Company/Undertaking
OXEA GmbH
Rheinpromenade 4A
D-40789 Monheim
Germany

Product Information
Product Stewardship
FAX: +49 (0)208 693 2053
email: psq@oxea-chemicals.com

1.4. Emergency telephone number

Emergency telephone number
+44 (0) 1235 239 670 (UK)
available 24/7

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

This substance is classified based on Directive 1272/2008/EC and its amendments (CLP Regulation)

Acute oral toxicity Category 4, H302
Acute dermal toxicity Category 4, H312
Skin corrosion/irritation Category 1B, H314
Serious eye damage/eye irritation Category 1, H318

Additional information
For full text of Hazard- and EU Hazard-statements see SECTION 16.

2.2. Label elements

Labelling according to Regulation 1272/2008/EC and its amendments (CLP Regulation).
Hazard pictograms

Signal word

Danger

Hazard statements

H302: Harmful if swallowed.
H312: Harmful in contact with skin.
H314: Causes severe skin burns and eye damage.

Precautionary statements

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 or shower.
P304 + P340: IF INHALED: Remove person to fresh air and keep 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/doctor.***

2.3. Other hazards

Vapour/air-mixtures are explosive at intense warming

PBT and vPvB assessment

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)

SECTION 3: Composition / information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>REACH-No</th>
<th>1272/2008/EC</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Methylbutyric acid</td>
<td>116-53-0</td>
<td>01-2119959862-23</td>
<td>Acute Tox. 4; H302 Acute Tox. 4; H312 Skin Corr. 1B; H314 Eye Dam. 1; H318</td>
<td>&gt; 99,0</td>
</tr>
</tbody>
</table>

For full text of Hazard- and EU Hazard-statements see SECTION 16.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation
Keep at rest. Aerate with fresh air. When symptoms persist or in all cases of doubt seek medical advice.

Skin
Wash off immediately with soap and plenty of water. When symptoms persist or in all cases of doubt seek medical advice.

**Eyes**
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses. Immediate medical attention is required.

**Ingestion**
Call a physician immediately. Do not induce vomiting without medical advice.

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

**Main symptoms**
cough, dizziness, nausea, shortness of breath, unconsciousness, gastrointestinal discomfort.

**Special hazard**
Lung irritation, Lung oedema, Dermatitis.

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

**General advice**
Remove contaminated, soaked clothing immediately and dispose of safely. First aider needs to protect himself.

Treat symptomatically. If ingested, flush stomach and compensate acidosis. In case of lung irritation, first treatment with cortisone spray.

### SECTION 5: Firefighting measures

#### 5.1. Extinguishing media

**Suitable extinguishing media**
foam, dry chemical, carbon dioxide (CO2), water spray

**Unsuitable Extinguishing Media**
Do not use a solid water stream as it may scatter and spread fire.

#### 5.2. Special hazards arising from the substance or mixture

Under conditions giving incomplete combustion, hazardous gases produced may consist of:
carbon monoxide (CO)
carbon dioxide (CO2)
Combustion gases of organic materials must in principle be graded as inhalation poisons
Vapours are heavier than air and may spread along floors
Vapour/air-mixtures are explosive at intense warming

#### 5.3. Advice for firefighters

**Special protective equipment for firefighters**
Fire fighter protection should include a self-contained breathing apparatus (NIOSH-approved or EN 133) and full fire-fighting turn out gear.

**Precautions for firefighting**
Cool containers / tanks with water spray. Water run-off and vapor cloud may be corrosive. Dike and collect water used to fight fire. Keep people away from and upwind of fire.
SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

For non-emergency personnel: For personal protective equipment see section 8. Avoid contact with skin and eyes. Avoid breathing vapors or mists. Keep people away from and upwind of spill/leak. Ensure adequate ventilation, especially in confined areas. Keep away from heat and sources of ignition.

For emergency responders: Personal protection see section 8.

6.2. Environmental precautions

Prevent further leakage or spillage. Do not discharge product into the aquatic environment without pretreatment (biological treatment plant).

6.3. Methods and material for containment and cleaning up

Methods for containment
Stop the flow of material, if possible without risk. Dike spilled material, where this is possible.

Methods for cleaning up
Soak up with inert absorbent material. Keep in suitable, closed containers for disposal. If liquid has been spilt in large quantities clean up promptly by scoop or vacuum. Dispose of in accordance with local regulations. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours).

6.4. Reference to other sections

For personal protective equipment see section 8.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Advice on safe handling
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Provide sufficient air exchange and/or exhaust in work rooms.

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.

Advice on the protection of the environment
See Section 8: Environmental exposure controls.

Incompatible products
bases
amines
oxidizing agents

7.2. Conditions for safe storage, including any incompatibilities

Advice on protection against fire and explosion
Keep away from sources of ignition - No smoking. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). In case of fire, emergency cooling with water spray should be available. Ground and bond containers when transferring material. Vapour/air-mixtures are explosive at intense
technical measures / Storage conditions
Keep containers tightly closed in a cool, well-ventilated place. Handle and open container with care. Keep at temperatures between -18 and 38 °C (0 and 100 °F).

Suitable material
stainless steel, aluminium

Unsuitable material
nickel, copper

Temperature class
T2

7.3. Specific end use(s)
Transported isolated intermediate (1907/2006)

SECTION 8: Exposure controls / personal protection

8.1. Control parameters
Exposure limits European Union
No exposure limits established

Exposure limits UK
No exposure limits established.

DNEL & PNEC
This substance is registered as intermediate under strictly controlled conditions.

2-Methylbutyric acid, CAS: 116-53-0
Workers
No data available***

General population
No data available***

Environment
No data available***

8.2. Exposure controls
Special adaptations (REACH)
Not applicable.

Appropriate Engineering controls
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.
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Personal protective equipment

General industrial hygiene practice
Avoid contact with skin, eyes and clothing. Do not breathe vapours or spray mist. Ensure that eyewash stations and safety showers are close to the workstation location.

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.

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

Hand protection
Wear protective gloves. Recommendations are listed below. 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.

Suitable material: nitrile rubber
Evaluation: according to EN 374: level 6
Glove thickness: approx 0.55 mm
Break through time: > 480 min

Suitable material: polyvinylchloride
Evaluation: Information derived from practical experience
Glove thickness: approx 0.8 mm

Skin and body protection
Impervious clothing. Wear face-shield and protective suit for abnormal processing problems.

Respiratory protection
Respirator with A filter. 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.

Environmental exposure controls
If possible use in closed systems. If leakage can not be prevented, the substance needs to be suck off at the emersion point, if possible without danger. Observe the exposure limits, clean exhaust air if needed. If recycling is not practicable, dispose of in compliance with local regulations. Inform the responsible authorities in case of leakage into the atmosphere, or of entry into waterways, soil or drains.

Additional advice
Further details on substance data can be found in the registration dossier under the following link:

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Appearance: liquid
Colour: colourless
Odour: unpleasant
Odour threshold: No data available
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pH 3,1 (1 % in water @ 20 °C (68 °F))
Melting point/range - 90 °C (Pour point)
Boiling point/range 177 °C @ 1013 hPa
Flash point 77 °C
  Method EN 22719
Evaporation rate No data available
Flammability (solid, gas) Does not apply, the substance is a liquid
Lower explosion limit 1,6 Vol %
Upper explosion limit 7,3 Vol %

Vapour pressure

<table>
<thead>
<tr>
<th>@ °C</th>
<th>@ °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>68</td>
</tr>
<tr>
<td>50</td>
<td>122</td>
</tr>
</tbody>
</table>

Vapour density ~ 3,5 (Air = 1) @ 20 °C (68 °F)

Relative density

<table>
<thead>
<tr>
<th>@ °C</th>
<th>@ °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.9360</td>
<td>68</td>
</tr>
</tbody>
</table>

Solubility 45 g/l @ 20 °C, in water, OECD 105

Autoignition temperature 435 °C
  Method DIN 51794

Decomposition temperature No data available

Viscosity 2,1 mPa*s @ 20 °C
  Method dynamic, ASTM D445

Explosive properties Does not apply, substance is not explosive. There are no chemical groups associated with explosive properties

Oxidizing properties Does not apply, substance is not oxidising. There are no chemical groups associated with oxidizing properties

9.2. Other information

Molecular weight 102.13
Molecular formula C5 H10 O2
Refractive index 1,405 @ 20 °C
Surface tension 64.2  mN/m (1 g/l @ 20°C (68°F)), OECD 115

SECTION 10: Stability and Reactivity

10.1. Reactivity

The reactivity of the product corresponds to the typical reactivity shown by the substance group as described in any text book on organic chemistry.

10.2. Chemical stability

Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

Hazardous polymerisation does not occur.

10.4. Conditions to avoid
2-Methylbutyric acid

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

10.5. Incompatible materials

bases, amines, oxidizing agents.

10.6. Hazardous decomposition products

No decomposition if stored and applied as directed.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Likely routes of exposure: Ingestion, Inhalation, Eye contact, Skin contact

Acute toxicity

2-Methylbutyric acid (116-53-0)

<table>
<thead>
<tr>
<th>Routes of Exposure</th>
<th>Endpoint</th>
<th>Values</th>
<th>Species</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>LD50</td>
<td>1750 mg/kg</td>
<td>rat, male/female</td>
<td>OECD 401</td>
</tr>
<tr>
<td>Dermal</td>
<td>LD50</td>
<td>2228 mg/kg</td>
<td>rabbit male</td>
<td>OECD 402</td>
</tr>
<tr>
<td>Dermal</td>
<td>LD50</td>
<td>1367 mg/kg</td>
<td>rabbit female</td>
<td>OECD 402</td>
</tr>
<tr>
<td>Inhalative</td>
<td>LC0</td>
<td>8375 mg/m³ (6 h)</td>
<td>rat, male/female</td>
<td>OECD 403</td>
</tr>
</tbody>
</table>

2-Methylbutyric acid, CAS: 116-53-0

Assessment

The available data lead to the classification given in section 2

Acute toxicity: The LC50/inhalation/4h/rat could not be determined because no mortality of rats was observed at the maximum achievable concentration.

Irritation and corrosion

2-Methylbutyric acid (116-53-0)

<table>
<thead>
<tr>
<th>Target Organ Effects</th>
<th>Species</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td>rabbit</td>
<td>corrosive</td>
<td>OECD 404</td>
</tr>
</tbody>
</table>

2-Methylbutyric acid, CAS: 116-53-0

Assessment

The available data lead to the classification given in section 2

Available skin corrosion data suffice for classification of eye corrosion without further testing

For respiratory irritation, no data are available

Subacute, subchronic and prolonged toxicity

2-Methylbutyric acid (116-53-0)

<table>
<thead>
<tr>
<th>Type</th>
<th>Dose</th>
<th>Species</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subchronic toxicity</td>
<td>NOAEL: 5000 mg/kg/d (90d)</td>
<td>rat, male</td>
<td>Oral</td>
</tr>
</tbody>
</table>

2-Methylbutyric acid, CAS: 116-53-0
Assessment
Based on available data, the classification criteria are not met for:
STOT RE

<table>
<thead>
<tr>
<th>Carcinogenicity, Mutagenicity, Reproductive toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Methylbutyric acid (116-53-0)</td>
</tr>
<tr>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>Mutagenicity</td>
</tr>
<tr>
<td>Developmental Toxicity</td>
</tr>
</tbody>
</table>

2-Methylbutyric acid, CAS: 116-53-0
CMR Classification
The available data on CMR properties are summarized in the table above. They do not indicate a classification into categories 1A or 1B
Evaluation
In vitro tests did not show mutagenic effects

2-Methylbutyric acid, CAS: 116-53-0
Main symptoms
cough, dizziness, nausea, shortness of breath, unconsciousness, gastrointestinal discomfort.
Target Organ Systemic Toxicant - Single exposure
Based on available data, the classification criteria are not met for:
STOT SE
Target Organ Systemic Toxicant - Repeated exposure
Based on available data, the classification criteria are not met for:
STOT RE
Aspiration toxicity
no data available
Note
Handle in accordance with good industrial hygiene and safety practice. Further details on substance data can be found in the registration dossier under the following link:

SECTION 12: Ecological information

12.1. Toxicity

<table>
<thead>
<tr>
<th>Acute aquatic toxicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Methylbutyric acid (116-53-0)</td>
</tr>
<tr>
<td><strong>Species</strong></td>
</tr>
<tr>
<td>Danio rerio (Zebra fish)</td>
</tr>
<tr>
<td>Bacteria / Sewage</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

2-Methylbutyric acid, CAS: 116-53-0
Biodegradation
67,9 % (10 d), Sewage, domestic, non-adapted, Readily biodegradable, OECD 301 D.
12.3. Bioaccumulative potential

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>log Pow</td>
<td>1.8</td>
<td>measured, OECD 117</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface tension</td>
<td>64.2 mN/m (1 g/l @ 20°C (68°F))</td>
<td>OECD 115</td>
</tr>
</tbody>
</table>

12.5. Results of PBT and vPvB assessment

2-Methylbutyric acid, CAS: 116-53-0
PBT and vPvB assessment
This substance is not considered to be persistent, bioaccumulating nor toxic (PBT), nor very persistent nor very bioaccumulating (vPvB)

12.6. Other adverse effects

2-Methylbutyric acid, CAS: 116-53-0
No data available

SECTION 13: Disposal considerations

13.1. Waste treatment methods

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.
Hazardous waste according to European Waste Catalogue (EWC)

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

SECTION 14: Transport information

ADR/RID

<table>
<thead>
<tr>
<th>14.1. UN number</th>
<th>UN 3265</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.2. UN proper shipping name</td>
<td>Corrosive liquid, acidic, organic, n.o.s. (2-Methylbutyric acid)</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>8</td>
</tr>
<tr>
<td>14.4. Packing group</td>
<td>II</td>
</tr>
<tr>
<td>14.5. Environmental hazards</td>
<td>no</td>
</tr>
</tbody>
</table>
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14.6. Special precautions for user
ADR Tunnel restriction code (E)
Classification Code C3
Hazard Number 80

ADN

14.1. UN number
UN 3265
14.2. UN proper shipping name
Corrosive liquid, acidic, organic, n.o.s. (2-Methylbutyric acid)
14.3. Transport hazard class(es)
8
14.4. Packing group
II
14.5. Environmental hazards
no

ICAO-TI / IATA-DGR

14.1. UN number
UN 3265
14.2. UN proper shipping name
Corrosive liquid, acidic, organic, n.o.s. (2-Methylbutyric acid)
14.3. Transport hazard class(es)
8
14.4. Packing group
II
14.5. Environmental hazards
no
14.6. Special precautions for user
no data available

IMDG

14.1. UN number
UN 3265
14.2. UN proper shipping name
Corrosive liquid, acidic, organic, n.o.s. (2-Methylbutyric acid)
14.3. Transport hazard class(es)
8
14.4. Packing group
II
14.5. Environmental hazards
no
14.6. Special precautions for user
EmS
F-A, S-B
14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code
not applicable

SECTION 15: Regulatory information

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

Regulation 1272/2008, Annex VI
not listed

DI 2012/18/EU (Seveso III)
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Category
not subject

DI 1999/13/EC (VOC Guideline)

<table>
<thead>
<tr>
<th>Component</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Methylbutyric acid</td>
<td>regulated</td>
</tr>
<tr>
<td>CAS: 116-53-0</td>
<td></td>
</tr>
</tbody>
</table>

International Inventories

2-Methylbutyric acid, CAS: 116-53-0
- AICS (AU)***
- DSL (CA)***
- IECSC (CN)***
- EC-No. 2041452 (EU)***
- ENCS (2)-608 (JP)***
- ISHL (2)-608 (JP)***
- KECSI KE-23544 (KR)***
- INSQ (MX)***
- PICCS (PH)***
- TSCA (US)***
- NZIoC (NZ)***
- TCSI (TW)***

National regulatory information Great Britain

Releases to air (Pollution Inventory Substances)
not subject

Releases to water (Pollution Inventory Substances)
not subject

Releases to sewer (Pollution Inventory Substances)
not subject
For details and further information please refer to the original regulation

15.2. Chemical safety assessment

The Chemical Safety Report (CSR) is not required.

SECTION 16: Other information

Full text of H-Statements referred to under sections 2 and 3
H302: Harmful if swallowed.
H312: Harmful in contact with skin.
H314: Causes severe skin burns and eye damage.
H318: Causes serious eye damage.

Abbreviations
A table of terms and abbreviations can be found under the following link:
SAFETY DATA SHEET

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Training advice
For effective first-aid, special training / education is needed.

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

Further information for the safety data sheet
Changes against the previous version are marked by ***. Observe national and local legal requirements. For more information, other material safety data sheets or technical data sheets please consult the Oxea homepage (www.oxea-chemicals.com).
The annex is not required because the substance is registered as an intermediate under REACh

Disclaimer
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. Oxea 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. 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.

End of Safety Data Sheet