SECTION 1: Identification

1.1. Product identifier

Identification of the substance/preparation: Isopentanoic acid

CAS-No: ***

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

Use of the Substance / Preparation: Intermediate

Uses advised against: None

1.3. Details of the supplier of the safety data sheet

Supplier: OXEA Corporation
15375 Memorial Drive
West Memorial Place I
Suite 300
Houston, TX 77079
USA
Phone +1 346 378 7300

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

1.4. Emergency telephone number

Emergency telephone number in USA, call 800 424 9300
outside USA, call +1.703.527.3887, collect calls accepted
available 24/7

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

This mixture is classified in accordance with paragraph (d) of §1910.1200 (GHS-US classification).

- Skin corrosion/irritation Category 1B, H314
- Serious eye damage/eye irritation Category 1, H318
- Flammable liquid Category 4, H227***
- Environmental hazard Aquatic Chronic 3; H412
OSHA Specified Hazards

Not applicable.

2.2. Label elements

Labeling according to §1910.1200 (GHS-US labeling).

Signal word

Danger

Hazard symbol(s)

Hazard statements

H227: Combustible liquid
H314: Causes severe skin burns and eye damage.
H412: Harmful to aquatic life with long lasting effects.

Precautionary statements

Prevention

P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P260: Do not breathe gas/mist/vapours.
P264: Wash hands thoroughly after handling.
P264: Avoid release to the environment.

Response

P301 + P330 + P331: IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P303 + P361 + P353: IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
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.
P363: Wash contaminated clothing before reuse.

Storage

P403 + P235: Store in a well ventilated place. Keep cool.
P405: Store locked up.

Disposal

P501: Dispose of contents/container in accordance with local regulation.

contains

n-Valeric acid (CAS 109-52-4), 2-Methylbutyric acid (CAS 116-53-0)

2.3. Other hazards
Components of the product may be absorbed into the body by inhalation and ingestion. Vapour/air-mixtures are explosive at intense warming.

**SECTION 3: Composition / information on ingredients**

### 3.2. Mixtures

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valeric acid</td>
<td>109-52-4</td>
<td>&lt; 70</td>
</tr>
<tr>
<td>2-Methylbutyric acid</td>
<td>116-53-0</td>
<td>20 - 40</td>
</tr>
<tr>
<td>Isovaleric acid</td>
<td>503-74-2</td>
<td>&lt; 1</td>
</tr>
</tbody>
</table>

**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**
central nervous system depression, unconsciousness, shortness of breath, vomiting, cough, dizziness, nausea, 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.

**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
Firefighter 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. Keep people away from and upwind of fire. Dike and collect water used to fight fire. Water run-off and vapor cloud may be corrosive. Water run-off can cause environmental damage.

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). Water runoff can cause environmental damage.

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
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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.

SECTION 8: Exposure controls / personal protection

8.1. Control parameters

Exposure limits United States of America

Emergency telephone number
in USA, call 800 424 9300; outside USA, call USA 703 527 3887, collect calls accepted

USA (A-US)
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No exposure limits established regarding ACGIH, OSHA Z-1 and OSHA Z-2.

8.2. Exposure controls

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.

Individual protection measures, such as 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.

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.

<table>
<thead>
<tr>
<th>Suitable material</th>
<th>nitrile rubber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>according to EN 374: level 6</td>
</tr>
<tr>
<td>Glove thickness</td>
<td>approx 0,55 mm</td>
</tr>
<tr>
<td>Break through time</td>
<td>&gt; 480 min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Suitable material</th>
<th>polyvinylchloride</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>Information derived from practical experience</td>
</tr>
<tr>
<td>Glove thickness</td>
<td>approx 0,8 mm</td>
</tr>
</tbody>
</table>

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

Respiratory protection
Respirator with filter for organic vapour. Use the indicated respiratory protection if the occupational exposure limit is exceeded and/or in case of product release (vapor or mist). Equipment should conform to NIOSH.***

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. 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.

Emergency telephone number
in USA, call 800 424 9300; outside USA, call USA 703 527 3887, collect calls accepted
6 / 18 USA (A-US)
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>Appearance</td>
<td>liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>unpleasant</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>2.7 (37.5 g/l in water @ 20 °C (68 °F))</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>&lt; -29 °F (&lt; -34 °C) (Pour point)</td>
</tr>
<tr>
<td>Boiling point/range</td>
<td>350 - 367 °F (177 - 186 °C) @ 1 atm (101,3 kPa)</td>
</tr>
<tr>
<td>Flash point</td>
<td>171 - 183 °F (77 - 84 °C)</td>
</tr>
<tr>
<td>Method</td>
<td>ASTM D-7094</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Does not apply, the substance is a liquid</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>1,6 Vol %</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>7,3 Vol %</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td></td>
</tr>
<tr>
<td>Values [hPa]</td>
<td>Values [kPa]</td>
</tr>
<tr>
<td>~ 2</td>
<td>~ 0,2</td>
</tr>
<tr>
<td>~ 9</td>
<td>~ 0,9</td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>Values [atm]</td>
<td>@ °C</td>
</tr>
<tr>
<td>~ 0,002</td>
<td>20</td>
</tr>
<tr>
<td>~ 0,009</td>
<td>50</td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>@ °F</td>
<td></td>
</tr>
<tr>
<td>~ 68</td>
<td></td>
</tr>
<tr>
<td>~ 122</td>
<td></td>
</tr>
<tr>
<td>Vapour density</td>
<td>~ 3,5 (Air = 1) @ 20 °C (68 °F)</td>
</tr>
<tr>
<td>Relative density</td>
<td></td>
</tr>
<tr>
<td>Values</td>
<td></td>
</tr>
<tr>
<td>0,94</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>@ °C</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>@ °F</td>
<td></td>
</tr>
<tr>
<td>68</td>
<td></td>
</tr>
<tr>
<td>122</td>
<td></td>
</tr>
<tr>
<td>Solubility</td>
<td>37 - 45 g/l @ 20 °C (68 °F), in water, OECD 105***</td>
</tr>
<tr>
<td>log Pow</td>
<td>1,8 (calculated)***</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>770 - 815 °F (410 - 435 °C)</td>
</tr>
<tr>
<td>Method</td>
<td>DIN 51794</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
</tr>
<tr>
<td>Viscosity</td>
<td>2,1 - 2,2 mPa*s @ 68 °F (20 °C)</td>
</tr>
<tr>
<td>Method</td>
<td>DIN 51562, dynamic</td>
</tr>
</tbody>
</table>

9.2. Other information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular weight</td>
<td>102,13</td>
</tr>
<tr>
<td>Molecular formula</td>
<td>C5 H10 O2</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>Does not apply, substance is not oxidising. There are no chemical groups associated with oxidizing properties</td>
</tr>
<tr>
<td>Refractive Index</td>
<td>1,405 - 1,408 @ 68 °F (20 °C)</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Does not apply, substance is not explosive. There are no chemical groups associated with explosive properties</td>
</tr>
</tbody>
</table>

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

10.5. Incompatible materials
bases, amines, strong 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

**Valeric acid, CAS: 109-52-4**
Main symptoms  central nervous system depression, unconsciousness, shortness of breath, vomiting.
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  Due to lack of data, a classification is not possible for:
STOT RE***

**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***

**Isovaleric acid, CAS: 503-74-2**
Main symptoms
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Based on available data, the classification criteria are not met for:

**Target Organ Systemic Toxicant - Single exposure**

Based on available data, the classification criteria are not met for:

**Target Organ Systemic Toxicant - Repeated exposure**

### Acute toxicity

**Valeric acid (109-52-4)**

<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>4600 mg/kg</td>
<td>rat, male/female</td>
<td>OECD 401</td>
</tr>
<tr>
<td>Dermal</td>
<td>LD50</td>
<td>&gt; 2000 mg/kg (24 h)</td>
<td>rat, male/female</td>
<td>OECD 402</td>
</tr>
</tbody>
</table>

**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>

**Isovaleric acid (503-74-2)**

<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>~ 2500 mg/kg</td>
<td>rat male female</td>
<td>OECD 401</td>
</tr>
<tr>
<td>Dermal</td>
<td>LD50</td>
<td>&gt; 2000 mg/kg</td>
<td>rabbit male female</td>
<td>OECD 402</td>
</tr>
<tr>
<td>Inhalative</td>
<td>LC0</td>
<td>2060 mg/m³ (7 h)</td>
<td>rat</td>
<td>OECD 403</td>
</tr>
</tbody>
</table>

**Valeric acid, CAS: 109-52-4**

**Assessment**

Based on available data, the classification criteria are not met for:

- Acute oral toxicity
- Acute dermal toxicity
- STOT SE

An LC50/inhalation/4h/rat could not be determined because no mortality of rats was observed at the maximum achievable concentration

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

**Assessment**

The available data lead to the classification given in section 2

An LC50/inhalation/4h/rat could not be determined because no mortality of rats was observed at the maximum achievable concentration

**Isovaleric acid, CAS: 503-74-2**

**Assessment**

Based on available data, the classification criteria are not met for:

- Acute oral toxicity
- Acute dermal toxicity
- Acute inhalation toxicity

**Irritation and corrosion**

**Emergency telephone number**
in USA, call 800 424 9300; outside USA, call USA 703 527 3887, collect calls accepted

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<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>3 min</td>
</tr>
<tr>
<td>Eyes</td>
<td>rabbit</td>
<td>corrosive</td>
<td></td>
</tr>
</tbody>
</table>

Valeric acid (109-52-4)

<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></td>
</tr>
<tr>
<td>Eyes</td>
<td>rabbit</td>
<td>corrosive</td>
<td></td>
</tr>
</tbody>
</table>

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>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 min</td>
</tr>
</tbody>
</table>

Isovaleric acid (503-74-2)

<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>
<tr>
<td></td>
<td></td>
<td></td>
<td>1h</td>
</tr>
</tbody>
</table>

Valeric acid, CAS: 109-52-4

Assessment

The available data lead to the classification given in section 2
For respiratory irritation, no data are available

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

Isovaleric acid, CAS: 503-74-2

Assessment

The available data lead to the classification given in section 2

Sensitization

<table>
<thead>
<tr>
<th>Target Organ Effects</th>
<th>Species</th>
<th>Evaluation</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin</td>
<td></td>
<td>not sensitizing</td>
<td>OECD 406, in Petrolatum</td>
</tr>
</tbody>
</table>

Valeric acid, CAS: 109-52-4

Assessment

Skin sensitization was not tested due to the corrosive properties of the substance
For skin sensitization, no data are available
For respiratory sensitization, no data are available***

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

Assessment

Skin sensitization was not tested due to the corrosive properties of the substance
For respiratory sensitization, no data are available

Isovaleric acid, CAS: 503-74-2

Assessment

Based on available data, the classification criteria are not met for:
Skin sensitization
For respiratory sensitization, no data are available

Subacute, subchronic and prolonged toxicity

Valeric acid (109-52-4)
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<table>
<thead>
<tr>
<th>Type</th>
<th>Dose</th>
<th>Species</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>no data available***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 read across</td>
</tr>
</tbody>
</table>

Isovaleric acid (503-74-2)

<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 read across</td>
</tr>
<tr>
<td>Subchronic toxicity</td>
<td>NOAEL: 1068 mg/kg/d (90d)</td>
<td>rat, male</td>
<td>OECD 408 Oral read across</td>
</tr>
<tr>
<td>Subchronic toxicity</td>
<td>NOAEL: 1431 mg/kg/d (90d)</td>
<td>rat, female</td>
<td>OECD 408 Oral read across</td>
</tr>
</tbody>
</table>

Valeric acid, CAS: 109-52-4

Assessment
Due to lack of data, a classification is not possible for:
STOT RE

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

Assessment
Based on available data, the classification criteria are not met for:
STOT RE

Isovaleric acid, CAS: 503-74-2

Assessment
Based on available data, the classification criteria are not met for:
STOT RE

Carcinogenicity, Mutagenicity, Reproductive toxicity

Valeric acid (109-52-4)

<table>
<thead>
<tr>
<th>Type</th>
<th>Dose</th>
<th>Species</th>
<th>Evaluation</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developmental Toxicity</td>
<td>NOAEL 50 mg/kg/d***</td>
<td>rat</td>
<td></td>
<td>OECD 414, Oral toxicity***</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>Salmonella typhimurium</td>
<td>negative</td>
<td>OECD 471 (Ames)</td>
<td>In vitro study</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>CHO (Chinese Hamster Ovary) cells</td>
<td>positive</td>
<td>OECD 473 (Chromosomal Aberration)</td>
<td>In vitro study</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>CHO (Chinese Hamster Ovary) cells</td>
<td>positive</td>
<td>OECD 479 (SCE)</td>
<td>In vitro study</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>CHO (Chinese Hamster Ovary) cells</td>
<td>negative</td>
<td>OECD 476 (Mammalian Gene Mutation)</td>
<td>In vitro study</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>mouse</td>
<td>negative</td>
<td>OECD 474</td>
<td>In vivo</td>
</tr>
</tbody>
</table>

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USA (A-US)
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2-Methylbutyric acid (116-53-0)

<table>
<thead>
<tr>
<th>Type</th>
<th>Dose</th>
<th>Species</th>
<th>Evaluation</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutagenicity</td>
<td>Salamella typhimurium</td>
<td>negative</td>
<td>Ames test</td>
<td>read across</td>
</tr>
<tr>
<td>Developmental Toxicity</td>
<td>NOAEL 600 mg/kg/d</td>
<td>rat</td>
<td>OECD 414, Oral</td>
<td>read across</td>
</tr>
</tbody>
</table>

Isovaleric acid (503-74-2)

<table>
<thead>
<tr>
<th>Type</th>
<th>Dose</th>
<th>Species</th>
<th>Evaluation</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutagenicity</td>
<td>Salamella typhimurium</td>
<td>negative</td>
<td>OECD 471 (Ames)</td>
<td>read across</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>mouse</td>
<td>negative</td>
<td>OECD 474</td>
<td>read across</td>
</tr>
<tr>
<td>Developmental Toxicity</td>
<td>NOAEL 600 mg/kg/d</td>
<td>rat</td>
<td>OECD 414, Oral</td>
<td>Maternal toxicity, Developmental toxicity, Teratogenicity</td>
</tr>
</tbody>
</table>

Valeric acid, CAS: 109-52-4

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

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

Isovaleric acid, CAS: 503-74-2

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

Did not show reprotoxic effects in animal experiments

Valeric acid, CAS: 109-52-4

Aspiration toxicity
no data available***

Other adverse effects
Components of the product may be absorbed into the body by inhalation and ingestion.

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

Aspiration toxicity
no data available

Isovaleric acid, CAS: 503-74-2

Aspiration toxicity
Due to the viscosity, this product does not present an aspiration hazard

Note
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Handle in accordance with good industrial hygiene and safety practice.

SECTION 12: Ecological information

12.1. Toxicity

Acute aquatic toxicity
Valeric acid (109-52-4)

<table>
<thead>
<tr>
<th>Species</th>
<th>Exposure time</th>
<th>Dose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daphnia magna (Water flea)</td>
<td>48h</td>
<td>LC50: 88,1 mg/l</td>
<td>OECD 202 read across***</td>
</tr>
<tr>
<td>Pseudokirchneriella subcapitata</td>
<td>72h</td>
<td>EC50: 29,3 mg/l</td>
<td>OECD 201</td>
</tr>
<tr>
<td>Pimephales promelas (fathead minnow)</td>
<td>96h</td>
<td>LC50: 39 mg/l</td>
<td>OECD 203</td>
</tr>
</tbody>
</table>

2-Methylbutyric acid (116-53-0)

<table>
<thead>
<tr>
<th>Species</th>
<th>Exposure time</th>
<th>Dose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danio rerio (Zebra fish)</td>
<td>96h</td>
<td>LC50: &gt; 1000 mg/l</td>
<td>OECD 203</td>
</tr>
<tr>
<td>Bacteria / Sewage</td>
<td>24h</td>
<td>TTC: 1250 mg/l</td>
<td>ETAD Fermentation tube method</td>
</tr>
</tbody>
</table>

Isovaleric acid (503-74-2)

<table>
<thead>
<tr>
<th>Species</th>
<th>Exposure time</th>
<th>Dose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pimephales promelas (fathead minnow)</td>
<td>96h</td>
<td>LC50: 77 mg/l</td>
<td>OECD 203 read across</td>
</tr>
<tr>
<td>Daphnia magna (Water flea)</td>
<td>48h</td>
<td>EC50: 51,25 mg/l</td>
<td>DIN 38412, part 11 read across</td>
</tr>
<tr>
<td>Pseudokirchneriella subcapitata</td>
<td>72h</td>
<td>EC50: 29,3 mg/l</td>
<td>OECD 201 read across</td>
</tr>
<tr>
<td>Tetrahymena pyriformis</td>
<td>40 h</td>
<td>IC50: 224 mg/l (Growth inhibition)</td>
<td></td>
</tr>
</tbody>
</table>

Long term toxicity
Valeric acid (109-52-4)

<table>
<thead>
<tr>
<th>Type</th>
<th>Species</th>
<th>Dose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic toxicity***</td>
<td>Pseudokirchneriella subcapitata***</td>
<td>NOAEC: 12,6 mg/l (3d)***</td>
<td>OECD 201***</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

Valeric acid, CAS: 109-52-4
Biodegradation
72. % (10 d), activated sludge, non-adapted, aerobic.

2-Methylbutyric acid, CAS: 116-53-0
Biodegradation
67.9 % (10 d), Sewage, domestic, non-adapted, Readily biodegradable, OECD 301 D.

Isovaleric acid, CAS: 503-74-2
Biodegradation
58 - 66 % (8 d), activated sludge, aerobic, non-adapted, OECD 301 C.
Abiotic Degradation

Valeric acid (109-52-4)

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrolysis***</td>
<td>not expected***</td>
<td></td>
</tr>
<tr>
<td>Photolysis***</td>
<td>No data available***</td>
<td></td>
</tr>
</tbody>
</table>

12.3. Bioaccumulative potential

Valeric acid (109-52-4)

<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>

2-Methylbutyric acid (116-53-0)

<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>

Isovaleric acid (503-74-2)

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>log Pow***</td>
<td>1,7***</td>
<td>measured, OECD 117***</td>
</tr>
<tr>
<td>BCF***</td>
<td>3,162***</td>
<td>calculated***</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil

Valeric acid (109-52-4)

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface tension</td>
<td>51.6 mN/m (1 g/l @ 20°C (68°F))</td>
<td>OECD 115</td>
</tr>
<tr>
<td>Adsorption/Desorption***</td>
<td>no data available***</td>
<td></td>
</tr>
<tr>
<td>Distribution to environmental compartments***</td>
<td>no data available***</td>
<td></td>
</tr>
</tbody>
</table>

2-Methylbutyric acid (116-53-0)

<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>

Isovaleric acid (503-74-2)

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface tension***</td>
<td>63.3 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

Valeric acid, CAS: 109-52-4

PBT and vPvB assessment
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Version / Revision 3

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

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)

Isovaleric acid, CAS: 503-74-2
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

Valeric acid, CAS: 109-52-4
No data available

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

Isovaleric acid, CAS: 503-74-2
No data available

Note
Avoid release to the environment.

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.

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

D.O.T. (49CFR)

14.1. UN number
UN 3265

14.2. UN proper shipping name
Corrosive liquid, acidic, organic, n.o.s. (2-Methylbutyric acid / n-Valeric acid)

14.3. Transport hazard class(es)
8

14.4. Packing group
II

14.5. Environmental hazards
no

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14.6. Special precautions for user
Emergency Response Guide 153

ICAO-TI / IATA-DGR

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

Federal and State Regulations
Components of the product are listed in the quoted regulations. For details please refer to the regulations directly. This list is not exhaustive, please check for other applicable regulations.

Federal Regulations
This product is listed on the TSCA inventory

State Regulations
Valeric acid, CAS: 109-52-4
MA RTK List***
NY RTK List***

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PA RTK List***
Isovaleric acid, CAS: 503-74-2
MA RTK List***
NJ RTK List
NY RTK List***

International Inventories

Valeric acid, CAS: 109-52-4
AICS (AU)***
DSL (CA)***
IECSC (CN)***
EC-No. 2036772 (EU)***
ENCS (2)-608 (JP)***
ISHL (2)-608 (JP)***
KECI KE-35263 (KR)***
INSQ (MX)***
PICCS (PH)***
TSCA (US)***
NZIoC (NZ)***
TCSI (TW)***

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)***
KECI KE-23544 (KR)***
INSQ (MX)***
PICCS (PH)***
TSCA (US)***
NZIoC (NZ)***
TCSI (TW)***

Isovaleric acid, CAS: 503-74-2
AICS (AU)***
DSL (CA)***
IECSC (CN)***
EC-No. 2079753 (EU)***
ENCS (2)-608 (JP)***
ISHL (2)-608 (JP)***
KECI KE-23545 (KR)***
INSQ (MX)***
PICCS (PH)***
TSCA (US)***
NZIoC (NZ)***
TCSI (TW)***

SECTION 16: Other information

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Isopentanoic acid
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Revision Date 13-Dec-2019
Issuing date 13-Dec-2019

Hazard Rating Systems

NFPA (National Fire Protection Association)
- Health Hazard 3
- Fire Hazard 2
- Reactivity 0

HMIS (Hazardous Material Information System)
- Health Hazard 3
- Flammability 2
- Physical Hazard 0

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 use of a comma in section 3 and section 7 to 12 is the same as a period.

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End of Safety Data Sheet