SAFETY DATA SHEET

n-Undecanal
11270
Version / Revision 4
Supersedes Version 3.01
Revision Date 07-May-2020
Issuing date 15-May-2020

SECTION 1: Identification

1.1. Product identifier

Identification of the substance/preparation n-Undecanal

CAS-No 112-44-7

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 OQ Chemicals 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
e-mail: sc.psq@oq.com

1.4. Emergency telephone number

Emergency telephone number NCEC +1 202 464 2554
available 24/7

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

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

Skin corrosion/irritation Category 2, H315
Environmental hazard Aquatic Acute 2; H401

OSHA Specified Hazards Not applicable.
SAFETY DATA SHEET

n-Undecanal
11270

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

Hazard symbol(s)

Signal word Warning

Hazard statements H315: Causes skin irritation.
H401: Toxic to aquatic life

Precautionary statements
Prevention P264: Wash hands thoroughly after handling.
P273: Avoid release to the environment.
P280: Wear protective gloves.

Response P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
P332 + P313: If skin irritation occurs: Get medical advice/ attention.
P362 + P364: Take off contaminated clothing and wash it before reuse.

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

2.3. Other hazards
None known

SECTION 3: Composition / information on ingredients

3.1. Substances

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Concentration (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undecanal</td>
<td>112-44-7</td>
<td>&gt; 90.0</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. Obtain medical attention.

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

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

Main symptoms
shortness of breath.

Special hazard
Lung oedema.

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. In case of lung irritation, first treatment with cortisone spray.

SECTION 5: Firefighting measures

5.1. Extinguishing media

Suitable extinguishing media
alcohol-resistant 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

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. 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). 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. DO NOT use combustible materials such as sawdust. Keep in suitable, closed containers for disposal. If liquid has been spilt in large quantities clean up promptly by scoop or vacuum. 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. Refill and handle product only in closed system.

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
acids and 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.

Technical measures/Storage conditions
Keep containers tightly closed in a cool, well-ventilated place. Handle and open container with care. Handle under nitrogen, protect from moisture.

SECTION 8: Exposure controls / personal protection

8.1. Control parameters

Exposure limits United States of America
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.
SAFETY DATA SHEET

n-Undecanal
11270

Suitable material: nitrile rubber
Reference substance: n/i-Undecanal
Evaluation: according to EN 374: level 6
Glove thickness: approx 0,55 mm
Break through time: > 480 min

Suitable material: Viton
Reference substance: n/i-Undecanal
Evaluation: according to EN 374: level 6
Glove thickness: approx 0,5 mm
Break through time: > 480 min

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. 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.

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>floral</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>6.7 (0.012 g/l in water @ 20 °C (68 °F))</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>14 °F (-10 °C) (Pour point)</td>
</tr>
<tr>
<td>Method</td>
<td>DIN ISO 3016</td>
</tr>
<tr>
<td>Boiling point/range</td>
<td>437 °F (225 °C) @ 1 atm (101,3 kPa)</td>
</tr>
<tr>
<td>Method</td>
<td>OECD 103</td>
</tr>
<tr>
<td>Flash point</td>
<td>221 °F (105 °C) @ 1 atm (101,3 kPa)</td>
</tr>
<tr>
<td>Method</td>
<td>ISO 2719</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>No data available</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>No data available</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td></td>
</tr>
<tr>
<td>Values [hPa]</td>
<td>0.38</td>
</tr>
<tr>
<td>Values [kPa]</td>
<td>0.038</td>
</tr>
<tr>
<td>Values [atm]</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>@ °C</td>
<td>20</td>
</tr>
<tr>
<td>@ °F</td>
<td>68</td>
</tr>
<tr>
<td>Method</td>
<td>OECD 104</td>
</tr>
</tbody>
</table>

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### SAFETY DATA SHEET

**n-Undecanal**  
11270  

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Method/Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour density</td>
<td>5.94 (Air = 1) @ 20 °C (68 °F)</td>
<td>OECD 104</td>
</tr>
<tr>
<td>Relative density Values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>@ °C</td>
<td>0.828</td>
<td>DIN 51757</td>
</tr>
<tr>
<td>@ °F</td>
<td>20</td>
<td>68</td>
</tr>
<tr>
<td>Solubility</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Water solubility</td>
<td>0.012 g/l @ 68 °F (20 °C)</td>
<td>OECD 105</td>
</tr>
<tr>
<td>log Pow</td>
<td>3.84 (measured)</td>
<td>OECD 117</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>392 °F (200 °C)</td>
<td>DIN 51794</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>2.295 mPa*s @ 68 °F (20 °C)</td>
<td>ASTM D445, dynamic</td>
</tr>
</tbody>
</table>

### 9.2. Other information

- **Molecular weight**: 170.29  
- **Molecular formula**: C11 H22 O  
- **Oxidizing properties**: Does not apply, substance is not oxidising. There are no chemical groups associated with oxidizing properties  
- **Refractive Index**: 1.413 - 1.435 @ 68 °F (20 °C)  
- **Explosive properties**: Does not apply, substance is not explosive. There are no chemical groups associated with explosive properties  
- **Surface tension**: 44.8 mN/m (0.0115 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 may occur. Polymerization is a highly exothermic reaction and may generate sufficient heat to cause thermal decomposition and/or rupture containers. When finely distributed, self-ignition is possible. May form explosive peroxides.

#### 10.4. Conditions to avoid

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

#### 10.5. Incompatible materials

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bases, amines, acids, 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

Undecanal, CAS: 112-44-7

Main symptoms

shortness of breath.

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

Acute toxicity

Undecanal (112-44-7)

<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>&gt; 5000 mg/kg</td>
<td>rat, male/female</td>
<td>OECD 401 read across</td>
</tr>
<tr>
<td>Dermal</td>
<td>LD50</td>
<td>&gt; 5000 mg/kg</td>
<td>rabbit</td>
<td></td>
</tr>
</tbody>
</table>

Undecanal, CAS: 112-44-7

Assessment

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

Acute oral toxicity

Acute dermal toxicity

For acute inhalation toxicity, no data are available

Irritation and corrosion

Undecanal (112-44-7)

<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>irritating</td>
<td>OECD 404 read across</td>
</tr>
<tr>
<td>Eyes</td>
<td>rabbit</td>
<td>No eye irritation</td>
<td>OECD 405 read across</td>
</tr>
</tbody>
</table>

Undecanal, CAS: 112-44-7

Assessment

The available data lead to the classification given in section 2

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

eye irritation/corrosion

For respiratory irritation, no data are available
SAFETY DATA SHEET

n-Undecanal
11270

Sensitization

**Undecanal (112-44-7)**

<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>Human experience</td>
<td>not sensitizing</td>
<td>Maximisation Test</td>
</tr>
</tbody>
</table>

**Undecanal, CAS: 112-44-7**

**Assessment**
Based on available data, the classification criteria are not met for:
Skin sensitization

**Subacute, subchronic and prolonged toxicity**

<table>
<thead>
<tr>
<th>Type</th>
<th>Dose</th>
<th>Species</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subacute toxicity</td>
<td>NOAEL: 1000 mg/kg/d</td>
<td>rat</td>
<td>OECD 422 Oral</td>
</tr>
</tbody>
</table>

**Undecanal, CAS: 112-44-7**

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

**Carcinogenicity, Mutagenicity, Reproductive toxicity**

<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></td>
<td>Salmonella typhimurium</td>
<td>negative</td>
<td>OECD 471 (Ames) In vitro study</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td></td>
<td>human lymphocytes</td>
<td>negative</td>
<td>OECD 487 In vitro study</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td></td>
<td>V79 cells, Chinese hamster</td>
<td>negative</td>
<td>OECD 476 (Mammalian Gene Mutation)</td>
</tr>
<tr>
<td>Reproductive toxicity</td>
<td>NOAEL &gt; 1000 mg/kg/d</td>
<td>rat, parental</td>
<td></td>
<td>OECD 422, Oral</td>
</tr>
<tr>
<td>Reproductive toxicity</td>
<td>NOAEL &gt; 1000 mg/kg/d</td>
<td>rat, 1. Generation, male/female</td>
<td></td>
<td>OECD 422, Oral</td>
</tr>
</tbody>
</table>

**Undecanal, CAS: 112-44-7**

**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
In the absence of specific alerts no cancer testing is required

**Undecanal, CAS: 112-44-7**

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

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SAFETY DATA SHEET

n-Undecanal
11270

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>
<th>Exposure time</th>
<th>Dose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undecanal (112-44-7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Danio rerio (Zebra fish)</td>
<td>96h</td>
<td>LC50: 5 - 7,1 mg/l</td>
<td>OECD 203 read across</td>
</tr>
<tr>
<td>Daphnia magna (Water flea)</td>
<td>48h</td>
<td>EC50: 3,85 mg/l</td>
<td>read across</td>
</tr>
<tr>
<td>Desmodesmus subspicatus</td>
<td>72h</td>
<td>EC50: 4,37 mg/l (Growth rate)</td>
<td>DIN 38412, part 9</td>
</tr>
<tr>
<td>Desmodesmus subspicatus</td>
<td>72h</td>
<td>EC50: 2,07 mg/l (Biomass)</td>
<td>DIN 38412, part 9</td>
</tr>
<tr>
<td>Activated sludge (domestic)</td>
<td>3 h</td>
<td>EC50: ~ 195 mg/l</td>
<td>OECD 209</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

| Undecanal, CAS: 112-44-7                     |               |               |                             |
| Biodegradation                               |               |               |                             |
| 65  % (28 d), activated sludge (domestic), non-adapted, aerobic, OECD 301 B. |               |               |                             |

| Abiotic Degradation                          |               |               |                             |
| Undecanal (112-44-7)                         |               |               |                             |
| Type                                        | Result        | Method        |
| Hydrolysis                                  | not expected  |               |
| Photolysis                                  | No data available |           |

12.3. Bioaccumulative potential

| Undecanal (112-44-7)                         |               |               |                             |
| Type                                        | Result        | Method        |
| log Pow                                    | 3,84          | OECD 117      |
| BCF                                         | 158,7         | calculated    |

12.4. Mobility in soil

| Undecanal (112-44-7)                         |               |               |                             |
| Type                                        | Result        | Method        |
| Surface tension                             | 44,8 mN/m (0,0115 g/l @ 20°C (68°F)) | OECD 115 |
| Adsorption/Desorption                       | log Koc: 2,84 | calculated    |

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USA (A-US)
12.5. Results of PBT and vPvB assessment

Undecanal, CAS: 112-44-7
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

Undecanal, CAS: 112-44-7
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.

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

Section 14.1 - 14.6

D.O.T. (49CFR) Not restricted

ICAO-TI / IATA-DGR Not restricted

IMDG Not restricted

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code not applicable

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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

Undecanal, CAS: 112-44-7
  NJ Right to Know
  NY Right to Know

International Inventories

Undecanal, CAS: 112-44-7
  AICS (AU)
  DSL (CA)
  IECSC (CN)
  EC-No. 2039726 (EU)
  ENCS (2)-217 (JP)
  ENCS (2)-494 (JP)
  ISHL (2)-217 (JP)
  ISHL (2)-494 (JP)
  KECE KE-35050 (KR)
  PICCS (PH)
  TSCA (US)
  NZIoC-NZ May be used as single component chemical
  TCSI (TW)

SECTION 16: Other information

Revision Date 07-May-2020
Issuing date 15-May-2020

Hazard Rating Systems

NFPA (National Fire Protection Association)
  Health Hazard 2
  Fire Hazard 1
  Reactivity 0

HMIS (Hazardous Material Information System)
  Health Hazard 1
  Flammability 1
SAFETY DATA SHEET

n-Undecanal
11270

Physical Hazard 0

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

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 OQ 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 OQ homepage (www.chemicals.oq.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