SAFETY DATA SHEET

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

1.1. Product identifier
Identification of the substance/preparation
Isononanal
Chemical Name
3,5,5-Trimethylhexanal
CAS-No
5435-64-3
EC No.
226-603-0
Registration number (REACH)
01-2119404656-40

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
OQ Chemicals GmbH
Rheinpromenade 4A
D-40789 Monheim
Germany

Product Information
Product Stewardship
FAX: +49 (0)208 693 2053
email: sc.ps@oq.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)

- Flammable liquid Category 3, H226
- Skin corrosion/irritation Category 2, H315
- Skin sensitization Category 1, H317
- Environmental hazard Aquatic Chronic 3; H412

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

2.2. Label elements
SAFETY DATA SHEET

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Version / Revision 4

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

Hazard pictograms

Signal word Warning

Hazard statements
H226: Flammable liquid and vapour.
H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H412: Harmful to aquatic life with long lasting effects.

Precautionary statements
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P233: Keep container tightly closed.
P262: Do not get in eyes, on skin, or on clothing.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
P305 + P351 + P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3. Other hazards

Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback

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>3,5,5-Trimethylhexanal</td>
<td>5435-64-3</td>
<td>01-2119404656-40</td>
<td>Flam. Liq. 3; H226 Skin Irrit. 2; H315 Skin Sens. 1; H317 Aquatic Chronic 3; H412</td>
<td>&gt; 90</td>
</tr>
</tbody>
</table>

Remarks
Mixture of isomeric Nonanals with > 90% 3,5,5-Trimethylhexanal.
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. 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
Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback

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. Water run-off can cause environmental damage. Water run-off and vapor cloud may be corrosive.
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. 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. Vapour is heavier than air and can travel considerable distance to a source of ignition and flashback.

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. Keep at temperatures between 15 and 30 °C (59 and 86 °F).

Temperature class
T3

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.

8.2. Exposure controls

Special adaptations (REACh)
The substance has been registered as an transported isolated intermediate and must be handled throughout its life cycle under strictly controlled conditions in accordance with Article 18.4, REACH.

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.

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.

<table>
<thead>
<tr>
<th>Suitable material</th>
<th>nitrile rubber</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>according to EN 374: level 4</td>
</tr>
<tr>
<td>Glove thickness</td>
<td>approx 0.55 mm</td>
</tr>
<tr>
<td>Break through time</td>
<td>approx 90 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 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. 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: http://echa.europa.eu/information-on-chemicals/registered-substances.

### 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>slight</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>3.8 - 4.3 (0.3 % in water @ 20 °C (68 °F))</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>&lt; -100 °C</td>
</tr>
<tr>
<td>Boiling point/range</td>
<td>169 °C @ 1013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>34 °C</td>
</tr>
<tr>
<td>Method</td>
<td>EU A.9</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>0.7 Vol %</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>No data available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vapour pressure</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Values [hPa]</td>
<td>9</td>
</tr>
<tr>
<td>Values [kPa]</td>
<td>0.9</td>
</tr>
<tr>
<td>Values [atm]</td>
<td>0.009</td>
</tr>
<tr>
<td>@ °C</td>
<td>20</td>
</tr>
<tr>
<td>@ °F</td>
<td>68</td>
</tr>
<tr>
<td>Method</td>
<td></td>
</tr>
</tbody>
</table>
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Vapour density
No data available

Relative density

<table>
<thead>
<tr>
<th>Values</th>
<th>@ °C</th>
<th>@ °F</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.82</td>
<td>20</td>
<td>68</td>
<td>OECD 109</td>
</tr>
</tbody>
</table>

Solubility
~ 0.3 g/l @ 20 °C, in water, OECD 105

log Pow
~ 3.3 (measured), OECD 117

Autoignition temperature
205 °C

Method
EU A.15

Decomposition temperature
No data available

Viscosity
1.72 mm²/s @ 20°C

Method
OECD 114, kinematic

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
142.23

Molecular formula
C9 H18 O

Refractive index
1.419 - 1.423 @ 20 °C

Surface tension
45.6 mN/m (0.265 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. May form explosive peroxides. When finely distributed, self-ignition is possible.

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, 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: Inhalation, Eye contact, Skin contact, Ingestion

### Acute toxicity

| 3,5,5-Trimethylhexanal (5435-64-3) |
|------------------------|-------------------------------|
| Routes of Exposure    | Endpoint | Values   | Species         | Method     |
| Oral                  | LD50     | > 2000 mg/kg | rat, male/female | OECD 401   |
| Dermal                | LD50     | > 2000 mg/kg | rat, male/female | OECD 402   |

**3,5,5-Trimethylhexanal, CAS: 5435-64-3**

**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

| 3,5,5-Trimethylhexanal (5435-64-3) |
|------------------------|-------------------------------|
| Target Organ Effects  | Species | Result            | Method     |
| Skin                  | rabbit | irritating        | OECD 404   |
|                       |        |                   | 4h         |
| Eyes                  | rabbit | Mild eye irritation | OECD 405   |
|                       |        |                   | 24h        |

**3,5,5-Trimethylhexanal, CAS: 5435-64-3**

**Assessment**

The available data lead to the classification given in section 2.

### Sensitization

| 3,5,5-Trimethylhexanal (5435-64-3) |
|------------------------|-------------------------------|
| Target Organ Effects  | Species | Evaluation | Method     |
| Skin                  | guinea pig | sensitizing | OECD 406   |

**3,5,5-Trimethylhexanal, CAS: 5435-64-3**

**Assessment**

The available data lead to a classification as skin sensitizer (see section 2)

For respiratory sensitization, no data are available.

### Subacute, subchronic and prolonged toxicity

| 3,5,5-Trimethylhexanal (5435-64-3) |
|------------------------|-------------------------------|
| Type                  | Dose | Species | Method     |
| Subacute toxicity     | NOAEL: ~ 250 mg/kg/d (28d) | rat, male/female | OECD 407   |

**3,5,5-Trimethylhexanal, CAS: 5435-64-3**

**Assessment**

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

- STOT RE

### Carcinogenicity, Mutagenicity, Reproductive toxicity

| 3,5,5-Trimethylhexanal (5435-64-3) |
|------------------------|-------------------------------|
| Type                  | Dose | Species | Evaluation | Method       |
| Mutagenicity          |      | Salmonella typhimurium | negative  | OECD 471 (Ames) | In vitro study |
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| Mutagenicity | mouse | negative | EU B12 | Oral |

3,5,5-Trimethylhexanal, CAS: 5435-64-3

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.

3,5,5-Trimethylhexanal, CAS: 5435-64-3

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

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

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

Acute aquatic toxicity
3,5,5-Trimethylhexanal (5435-64-3)

<table>
<thead>
<tr>
<th>Species</th>
<th>Exposure time</th>
<th>Dose</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprinus carpio (Carp)</td>
<td>96h</td>
<td>LC50: 45 mg/l</td>
<td>OECD 203</td>
</tr>
<tr>
<td>Daphnia magna (Water flea)</td>
<td>48h</td>
<td>LC50: ~ 10,1 mg/l</td>
<td>OECD 202</td>
</tr>
<tr>
<td>Desmodesmus subspicatus</td>
<td>72h</td>
<td>EC50: ~ 33 mg/l</td>
<td>OECD 201</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

3,5,5-Trimethylhexanal, CAS: 5435-64-3

Biodegradation
~ 33 % (28 d), activated sludge, non-adapted, aerobic, OECD 301 B.

12.3. Bioaccumulative potential

3,5,5-Trimethylhexanal (5435-64-3)

<table>
<thead>
<tr>
<th>Type</th>
<th>Result</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>log Pow</td>
<td>~ 3,3</td>
<td>measured, OECD 117</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil

3,5,5-Trimethylhexanal (5435-64-3)
10300

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12.5. Results of PBT and vPvB assessment

3,5,5-Trimethylhexanal, CAS: 5435-64-3
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

3,5,5-Trimethylhexanal, CAS: 5435-64-3
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. 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

14.1. UN number
UN 1989

14.2. UN proper shipping name
Aldehydes, n.o.s. (3,5,5-Trimethylhexanal)

14.3. Transport hazard class(es)
3

14.4. Packing group
III

14.5. Environmental hazards
no

14.6. Special precautions for user
ADR Tunnel restriction code
(D/E)
Classification Code
F1
Hazard Number
30

ADN

ADN Container

14.1. UN number
UN 1989
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14.2. UN proper shipping name
Aldehydes, n.o.s. (3,5,5-Trimethylhexanal)

14.3. Transport hazard class(es)
3

14.4. Packing group
III

14.5. Environmental hazards
no

14.6. Special precautions for user
Classification Code
F1

Hazard Number
30

ICAO-TI / IATA-DGR

14.1. UN number
UN 1989

14.2. UN proper shipping name
Aldehydes, n.o.s. (3,5,5-Trimethylhexanal)

14.3. Transport hazard class(es)
3

14.4. Packing group
III

14.5. Environmental hazards
no

14.6. Special precautions for user
no data available

IMDG

14.1. UN number
UN 1989

14.2. UN proper shipping name
Aldehydes, n.o.s. (3,5,5-Trimethylhexanal)

14.3. Transport hazard class(es)
3

14.4. Packing group
III

14.5. Environmental hazards
no

14.6. Special precautions for user
EmS

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)
Category
Annex I, part 1:
P5a - c; depending on conditions

DI 1999/13/EC (VOC Guideline)

<table>
<thead>
<tr>
<th>Component</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,5,5-Trimethylhexanal</td>
<td>regulated</td>
</tr>
<tr>
<td>CAS: 5435-64-3</td>
<td></td>
</tr>
</tbody>
</table>

International Inventories
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3,5,5-Trimethylhexanal, CAS: 5435-64-3
AICS (AU)
DSL (CA)
IECSC (CN)
EC-No. 2266030 (EU)
ENCS (2)-494 (JP)
ISHL (2)-494 (JP)
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
H226: Flammable liquid and vapour.
H315: Causes skin irritation.
H317: May cause an allergic skin reaction.
H412: Harmful to aquatic life with long lasting effects.

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 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. OQ 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