SAFETY DATA SHEET

Formic acid >99 %

Ref. 00035/6.0/REG_EU/EN

Revision Date: 29.11.2010 Previous date: 30.04.2008 Print Date: 28.09.2011

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product information

Commercial Product Name
Formic acid >99 %

Registration number
01-2119491174-37 (FI)

Use of the Substance/Mixture
Preparation of ensilage, pickling of metals, adjustment of pH value in textile and leather industry etc.

Company/Undertaking Identification
Kemira ChemSolutions b.v.
P.O. Box 60
4000 AB Tiel
NETHERLANDS
Telephone: +31344615224, Telefax: +31344611475
ProductSafety.NL.Tiel@kemira.com

Emergency telephone number
+31 344 615224
Carechem 24 International: +44 (0) 1235 239 670

2. HAZARDS IDENTIFICATION

Classification according to Regulation (EU) 1272/2008(CLP)
Flammable liquid; Category 3; Flammable liquid and vapour.
Skin corrosion; Category 1A; Causes severe skin burns and eye damage.

Classification according to EU Directives 67/548/EEC or 1999/45/EC
Flammable; Flammable.
Corrosive; Causes severe burns.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

<table>
<thead>
<tr>
<th>CAS/EU number</th>
<th>REACH Registration Number</th>
<th>Chemical name of the substance</th>
<th>Concentration</th>
<th>Classification according to Regulation (EU) 1272/2008(CLP)</th>
<th>Classification according to EU Directives 67/548/EEC or 1999/45/EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-18-6</td>
<td>200-579-1</td>
<td>Formic acid</td>
<td>&gt;99 %</td>
<td>Skin Corr. 1A, H314 Flam. Liq. 3, H226</td>
<td>R10 C R35</td>
</tr>
</tbody>
</table>

Further information
Organic acid.
Food packaging certificate available from supplier.

4. FIRST AID MEASURES

Inhalation
Move to fresh air. Keep warm and in a quiet place. Call a physician if symptoms occur.

Skin contact
Wash off immediately with plenty of water removing all contaminated clothes and shoes. Get immediate medical advice/attention.

Eye contact
Rinse immediately with plenty of water, also under the eyelids, for at least 30 minutes. Get immediate medical advice/attention.

Ingestion
Rinse mouth. Few gulps of water can be drunk to reduce irritation. Do NOT induce vomiting. Get immediate medical advice/attention.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Alcohol-resistant foam, Dry powder, Carbon dioxide (CO2), Water mist

Specific hazards during fire fighting
Heating can release hazardous gases.
Carbon monoxide

Special protective equipment for fire-fighters
In the event of fire, wear self-contained breathing apparatus. Splashproof protective suit.

Specific methods
Cool containers / tanks with water spray.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Keep people away from and upwind of spill/leak. Avoid contact with skin and eyes. Use personal protective equipment.

Environmental precautions
Should not be released into the environment. Dam up. Take up mechanically and collect into suitable containers for disposal. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder).

Methods for cleaning up
Neutralize with sodium carbonate. Dispose of as special waste in compliance with local and national regulations.

7. HANDLING AND STORAGE

Handling
Handle and open container with care. Wear personal protective equipment. Provide sufficient air exchange and/or exhaust in work rooms. In case of insufficient ventilation, wear suitable respiratory equipment. Ensure that eyewash stations and safety showers are close to the workstation location.

Storage
Keep away from open flames, hot surfaces and sources of ignition. Protect from sunlight. Keep away from combustible material. The product may form CO (carbon monoxide) under prolonged storage. Before entering storage tanks, the CO (carbon monoxide) level should be checked. Materials for packaging:
Suitable material: original acid resistant container
Materials to avoid:
Combustible material, Bases, Copper, Aluminium

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limit Values

Limit values in other countries

**Finland:**
Formic acid
HTP-values 8h = 3 ppm = 5 mg/m³
HTP-arvot 15 min = 10 ppm = 19 mg/m³

**Sweden:**
Formic acid
NGV = 3 ppm = 5 mg/m³
KTV = 5 ppm = 9 mg/m³

**Germany:**
Formic acid
AGW = 5 ppm = 9,5 mg/m³, DFG: Senate commission for the review of compounds at the work place dangerous for the health (MAK-commission), 2;(I)

**Austria:**
Formic acid
TMW = 5 ppm = 9 mg/m³
KZW = 5 ppm = 9 mg/m³, Mow

**Belgium:**
Formic acid
TGG 8 hr = 5 ppm = 9,5 mg/m³
TGG 15 min = 10 ppm = 19 mg/m³

**Switzerland:**
Formic acid
TWA = 5 ppm = 9,5 mg/m³, : NIOSH
STEL = 10 ppm = 19 mg/m³, : NIOSH, 4 times 15 min. per shift

**Czech Republic:**
Formic acid
twa = 9 mg/m³
t = 18 mg/m³

**Denmark:**
Formic acid
GV = 5 ppm = 9 mg/m³, : Guiding list of organic solvents.

**Estonia:**
Formic acid
TWA = 5 ppm = 9 mg/m³
STEL = 5 ppm = 9 mg/m³
Piirnorm = 5 ppm = 9 mg/m³

Spain:
Formic acid
VLA-EC = 10 ppm = 18 mg/m³
VLA-ED = 5 ppm = 9 mg/m³, VLI: Chemical agent with an indicative limit value set up by the EU.

France:
Formic acid
VLCT (VLE) = 5 ppm = 9 mg/m³, : Regulatory indicative exposure limits

Great Britain:
Formic acid
TWA = 5 ppm = 9.6 mg/m³, : Where no specific short-term exposure limit is listed, a figure three times the long-term exposure should be used

Greece:
Formic acid
TWA = 5 ppm = 9 mg/m³

Hungary:
Formic acid
PEAK = 9 mg/m³, m: caustic substance (burns the skin, mucous membranes, eyes or all three)
TWA = 9 mg/m³, EU2: Value disclosed in Directive 96/94/EC

Ireland:
Formic acid
OELV - 8 hrs (TWA) = 5 ppm = 9 mg/m³, : Where no specific short-term exposure limit is listed, a figure three times the long-term exposure limit value should be used

Italy:
Formic acid
TWA = 5 ppm = 9 mg/m³

Lithuania:
Formic acid
IPRD = 5 ppm = 9 mg/m³

Luxembourg:
Formic acid
TWA = 5 ppm = 9 mg/m³

Latvia:
Formic acid
AER 8 st = 5 ppm = 9 mg/m³

Netherlands:
Formic acid
STEL = 5 mg/m³

Norway:
Formic acid
TWA = 5 ppm = 9 mg/m³

Poland:
Formic acid
NDS = 5 mg/m³
NDSch = 15 mg/m³

Portugal:
Formic acid
VLE-MP = 5 ppm, (1): Included by specific national legislation or by not transposed communitary legislation
VLE_CD = 10 ppm, (1): Included by specific national legislation or by not transposed communitary legislation

**Slovenia:**
Formic acid
VM = 5 ppm = 9 mg/m³, EU: European Union - limit (threshold) value set at the level of European Union (EU)

**Slovakia:**
Formic acid
TWA = 5 ppm = 9 mg/m³

### Exposure controls

#### Occupational exposure controls
Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product. Ensure that eyewash stations and safety showers are close to the workstation location.

**Respiratory protection**
In case of insufficient ventilation, wear suitable respiratory equipment. (filter E)

**Hand protection**
Glove material: butyl-rubber, Break through time: > 8 h
Glove material: neoprene, Break through time: > 8 h
Glove material: PVC, Break through time: > 4 h

**Eye protection**
Tightly fitting safety goggles.

**Skin and body protection**
Splashproof protective suit.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### General Information (appearance, odour)

<table>
<thead>
<tr>
<th>Physical state</th>
<th>liquid,</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>colourless, clear</td>
</tr>
<tr>
<td>Odour</td>
<td>pungent</td>
</tr>
</tbody>
</table>

**Important health safety and environmental information**

<table>
<thead>
<tr>
<th>pH</th>
<th>&lt; 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point/boiling range</td>
<td>101 °C</td>
</tr>
<tr>
<td>Flash point</td>
<td>48 °C (closed cup) (Pensky-Martens)</td>
</tr>
</tbody>
</table>

**Explosive properties:**

<table>
<thead>
<tr>
<th>Lower explosion limit</th>
<th>18 %(%V) (lower flammability limit) Based on the chemical structure, Not explosive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper explosion limit</td>
<td>51 %(%V) (upper flammability limit) Based on the chemical structure, Not explosive</td>
</tr>
</tbody>
</table>

**Oxidizing properties**

Based on the chemical structure, not oxidizing

**Vapour pressure**

ca. 4.4 kPa (20 °C)

**Density**

1.220 kg/m³

**Solubility(ies):**

Water solubility

completely soluble

**Partition coefficient: n-octanol/water**

SAFETY DATA SHEET

Formic acid >99 %

Viscosity:
- Viscosity, dynamic: 1.8 mPa.s (20 °C) (OECD TG 114)
- Viscosity, kinematic: 1.47 mm²/s (20 °C) (OECD TG 114)

Other data:
- Thermal decomposition: 350 °C (OECD TG 113)
- Autoignition temperature: ca. 520 °C
- Surface tension: 71.5 mN/m (20 °C) (OECD Test Guideline 115)
- Melting point/range: 8.4 °C

10. STABILITY AND REACTIVITY

Conditions to avoid:
- High temperatures.
- Thermal decomposition: 350 °C (OECD TG 113)

Materials to avoid:
- Combustible material, Bases, Copper, Aluminium

Hazardous decomposition products:
- Thermal decomposition products: Carbon monoxide
- Strong acid decomposes slowly to form CO (carbon monoxide).

11. TOXICOLOGICAL INFORMATION

Acute toxicity:
- LD50/Oral/rat/male and female: 730 mg/kg
- LC50/Inhalation/4 h/rat/male and female: 7.4 mg/l

Irritation and corrosion:
- Skin: Causes severe skin burns. Based on Animal Evidence and Experience with human exposure Corrosive to skin
- Eyes: Causes serious eye damage. Based on Animal Evidence and Experience with human exposure Corrosive to eyes

Sensitisation:
- This substance is not classified as a sensitizer.

Long term toxicity:
- Repeated dose toxicity:
  - Oral/rat/male and female/52 weeks/OECD Test Guideline 453:
    - NOAEL: 142 mg/kg
  - Remarks: calculated, Read-across (Analogy)
Inhalation/rodent/male and female/90 days/OECD Test Guideline 413:
Remarks: NOAEC: Local 0.122 mg/l, Systemic toxicity 0.244 mg/l

Inhalation/rodent/male and female/90 days/OECD Test Guideline 413:
Remarks: LOAEC: Local 0.244 mg/l

Carcinogenicity
Did not show carcinogenic effects in animal experiments. Information given is based on data obtained from similar substances.

Mutagenicity
- Salmonella typhimurium (bacterium)/Ames test/OECD Test Guideline 471:
  Result: negative
  Metabolic activation: with and without

- Mammalian cells (CHO)/In vitro gene mutation study in mammalian cells/OECD TG 476:
  Result: negative
  Metabolic activation: with and without

- In vitro cytogenicity study in mammalian cells/Cytogenetic assay/OECD TG 479:
  Result: negative
  Metabolic activation: with and without

- Human lymphocytes/Cytogenetic assay/OECD TG 479:
  Result: negative
  Metabolic activation: no

- Oral/Drosophila melanogaster/Drosophila SLRL/OECD Test Guideline 477:
  Result: negative

Reproductive toxicity
- Oral/rodent/male and female/Two-generation reproductive toxicity/OECD Test Guideline 416:
  NOAEL = 676 mg/kg bw/dw
  NOAEL F1 = 676 mg/kg bw/dw
  NOAEL F2 = 676 mg/kg bw/dw
  Remarks: calculated, Read-across (Analogy)

  In animal studies, did not interfere with reproduction. Information given is based on data obtained from similar substances.

Teratogenicity
- Oral:
  Animal testing did not show any effects on foetal development. Information given is based on data obtained from similar substances.

Human experience
- Inhalation
  Symptoms: sore throat, cough and difficulties in breathing

- Skin contact
  Symptoms: severe burns
  May cause skin irritation and/or dermatitis.
Eye contact
At high concentrations vapours may cause inflammation of conjuctiva and cornea.

12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Aquatic toxicity

Acute aquatic toxicity: Not harmful to aquatic organisms.
LC50/96 h/Danio rerio (zebra fish)/static test/OECD Test Guideline 203: 130 mg/l
fresh water Test results on an analogous product
LC50/96 h/Scophthalmus maximus (juvenile turbot)/semi-static test/Other: 1.720 mg/l
Marine water Test results on an analogous product
EC50/48 h/Daphnia magna (Water flea)/static test/OECD Test Guideline 202: 365 mg/l
fresh water Test results on an analogous product
LC50/96 h/Crangon crangon (shrimp)/semi-static test/Other guidelines: 1.308 mg/l
Marine water Test results on an analogous product
EC50/72 h/Pseudokirchneriella subcapitata (green algae)/static test/OECD Test Guideline 201: 1.240 mg/l
fresh water Test results on an analogous product
NOEC/13 d/active sludge, community/static test: 72 mg/l
Remarks: fresh water
Respiration inhibition of activated sludge: no (at low concentrations)

Toxicity to other organisms

NOEC/13 d/active sludge, community/static test: 72 mg/l
Remarks: fresh water

Mobility

Vapour pressure: ca. 4.4 kPa (20 °C)
Water solubility: completely soluble
Henry's Constant: 0.019 Pa m³/mol (25 °C); The substance will not evaporate into the atmosphere from the water surface.
Surface tension: 71.5 mN/m (20 °C) (OECD Test Guideline 115); Surface activity is not to be expected.
Adsorption and/or desorption: Not expected to adsorb on soil.

Persistence and degradability

Biological degradability:

Readily biodegradable, according to appropriate OECD test.

Biodegradability in Seawater: Readily biodegradable
Biochemical Oxygen Demand (BOD): 86 mg/g (5 d)
Chemical Oxygen Demand (COD): 348 mg/g
SAFETY DATA SHEET

Formic acid >99 %

Chemical degradation:
- $t_{1/2}$-value: > 5 Days (pH 5, 50 °C) (Hydrolysis)
- Remarks: pH 4/7/9
- Does not hydrolyse.

- $t_{1/2}$-value: 30.1 Days (Photodegradation)
- Degradation by hydroxyl radicals.

Bioaccumulative potential
- Bioconcentration factor (BCF)/calculated: 3.2
- Does not significantly accumulate in organisms.

Other adverse effects

13. DISPOSAL CONSIDERATIONS

Product
Solutions with low pH-value must be neutralized before discharge. Dispose of as special waste in compliance with local and national regulations.

Contaminated packaging
Must be disposed of in accordance with local and national regulations.

14. TRANSPORT INFORMATION

UN number
1779

Packing group
II

Land transport
- ADR /RID:
- Class: 8
- Description of the goods: UN1779, FORMIC ACID
- Packaging group: II
- Risk code: 83
- ADR/RID-Labels: 8, 3

Sea transport
- IMDG:
- Class: 8
- Description of the goods: UN1779, FORMIC ACID
- Packaging group: II
- IMDG-Labels: 8, 3
- Environmentally Hazardous: Not a Marine Pollutant

Air transport
- ICAO/IATA:
- Class: 8
- Description of the goods: UN1779, Formic acid
- Packaging group: II
- ICAO-Labels: 8, 3
15. REGULATORY INFORMATION

Information on the warning label

Symbol(s)

Signal word: Danger

Hazard pictograms

Hazardous components which must be listed on the label

<table>
<thead>
<tr>
<th>EINECS-No.</th>
<th>CAS-No.</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>200-579-1</td>
<td>64-18-6</td>
<td>Formic acid</td>
</tr>
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</table>

Hazard statements

<table>
<thead>
<tr>
<th>H226</th>
<th>Flammable liquid and vapour.</th>
</tr>
</thead>
<tbody>
<tr>
<td>H314</td>
<td>Causes severe skin burns and eye damage.</td>
</tr>
</tbody>
</table>

Precautionary statements

<table>
<thead>
<tr>
<th>P260</th>
<th>Do not breathe mist/vapours.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P280</td>
<td>Wear protective gloves/ protective clothing/ eye protection/ face protection.</td>
</tr>
<tr>
<td>P301 + P330 + P331</td>
<td>IF SWALLOWED: rinse mouth. Do NOT induce vomiting.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P303 + P361 + P353</th>
<th>IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P305 + P351 + P338</td>
<td>IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.</td>
</tr>
<tr>
<td>P310</td>
<td>Immediately call a POISON CENTER or doctor/ physician.</td>
</tr>
</tbody>
</table>

Other information
The product is classified and labelled in accordance with EC directives.

16. OTHER INFORMATION

Full text of H-Statements referred to under sections 2 and 3.

- H314 Causes severe skin burns and eye damage.
- H226 Flammable liquid and vapour.

Text of R-phrases mentioned in Section 3

- R10 Flammable.
- R35 Causes severe burns.

Training advice

Restrictions on use

Further information

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Sources of key data used to compile the Safety Data Sheet

Regulations, databases, literature, own tests.

Additions, Deletions, Revisions

Relevant changes have been marked with vertical lines.