SAFETY DATA SHEET

FORMIC ACID 85%

SECTION 1. IDENTIFICATION

Product name : FORMIC ACID 85%


Manufacturer or supplier's details

Company name of supplier : Eastman Chemical Company

Address : 200 South Wilcox Drive
Kingsport TN 37660-5280

Telephone : (423) 229-2000

Emergency telephone : CHEMTREC: +1-800-424-9300, +1-703-527-3887 CCN7321

Recommended use of the chemical and restrictions on use

Recommended use : pickling acids
adjustment of pH value in textile and leather industry

Restrictions on use : No information available.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids : Category 4

Acute toxicity (Oral) : Category 4

Acute toxicity (Inhalation) : Category 3

Skin corrosion : Category 1

Serious eye damage : Category 1

GHS label elements
Hazard pictograms:

Signal Word: Danger

Hazard Statements:
H227 Combustible liquid.
H302 Harmful if swallowed.
H314 Causes severe skin burns and eye damage.
H331 Toxic if inhaled.

Precautionary Statements:
Prevention:
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P261 Avoid breathing vapors.
P264 Wash hands thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower.
P304 + P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310 Immediately call a POISON CENTER or doctor/ physician.
P363 Wash contaminated clothing before reuse.
P370 + P378 In case of fire: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide to extinguish.

Storage:
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal:
P501 Dispose of contents/container to an approved waste disposal plant.

Other hazards:
pungent
Odor

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>formic acid</td>
<td>64-18-6</td>
<td>&gt; 85 - 87</td>
</tr>
</tbody>
</table>
SECTION 4. FIRST AID MEASURES

General advice : Take off all contaminated clothing immediately. Remove victim from exposure and then have him lie down in the recovery position. If not breathing, give artificial respiration.

If inhaled : Remove person to fresh air and keep comfortable for breathing. Get immediate medical advice/attention.

In case of skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover wound with sterile dressing. Get immediate medical advice/attention.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

If swallowed : Rinse mouth with water. Drink plenty of water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Get immediate medical advice/attention.

Most important symptoms and effects, both acute and delayed : corrosive effects Harmful if swallowed. Causes serious eye damage. Toxic if inhaled. Causes severe burns. Harmful if swallowed. Causes serious eye damage. Toxic if inhaled. Causes severe burns.

Notes to physician : Treat symptomatically.

SECTION 5. FIRE-FIGHTING MEASURES

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

Hazardous combustion products : Carbon monoxide

Further information : Collect contaminated fire extinguishing water separately. This
must not be discharged into drains.

Special protective equipment for fire-fighters: Wear self-contained breathing apparatus and protective suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Keep people away from and upwind of spill/leak. Wear respiratory protection. Avoid contact with skin, eyes and clothing.

Environmental precautions: Do not empty into drains.

Methods and materials for containment and cleaning up: Large spills should be collected mechanically (remove by pumping) for disposal. Residues Soak up with inert absorbent material. Sand Universal binder

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion: Keep away from sources of ignition - No smoking.

Advice on safe handling: Use only with adequate ventilation. The pressure in sealed containers can increase under the influence of heat. Keep away from heat.

Ensure that eyewash stations and safety showers are close to the workstation location.

Conditions for safe storage: Keep away from sources of ignition - No smoking. 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 to avoid Bases Amines Strong acids and oxidizing agents Copper Aluminum Combustible material

Recommended storage temperature: < 30 °C

Storage period: <= 24 Months
SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>formic acid</td>
<td>64-18-6</td>
<td>TWA</td>
<td>5 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>10 ppm</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>5 ppm 9 mg/m3</td>
<td>NIOSH REL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>5 ppm</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>5 ppm 9 mg/m3</td>
<td>OSHA P0</td>
</tr>
</tbody>
</table>

Engineering measures: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Personal protective equipment

Respiratory protection: Respirator type:
Use NIOSH approved respiratory protection.

Hand protection
Material: Wear suitable gloves.
Material: Chloroprene
Material: butyl-rubber

Remarks: Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).

Eye protection: Tightly fitting safety goggles
Face-shield

Skin and body protection: Body protection suitability and breakthrough time will differ depending on the specific use conditions.
acid-resistant protective clothing
Chemical resistant apron
Footwear protecting against chemicals

Protective measures: Avoid contact with skin, eyes and clothing.
SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: liquid
Color: colorless, clear
Odor: pungent
Odor Threshold: not determined
pH: < 1
Melting point/range: -13.5 °C
Boiling point/boiling range: 107 °C
Flash point: 67 °C  
Method: Pensky-Martens closed cup
Evaporation rate: not determined
Flammability (solid, gas): Not applicable
Upper explosion limit: upper flammability limit 51 %(V) formic acid
Lower explosion limit: lower flammability limit 18 %(V) formic acid
Vapor pressure: < 4.4 kPa (20 °C)
Relative vapor density: No data available
Relative density: 1.2 (20 °C)
Density: 1.2 g/cm3 (20 °C)
Solubility(ies)
Water solubility: completely soluble
Partition coefficient: n-octanol/water
log Pow: -2.1 (23 °C)
pH: 7
formic acid
Decomposition temperature: 350 °C
Method: DSC
formic acid
Viscosity
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Version 1.1  Revision Date: 10/11/2016  SDS Number: 150000103880  Date of last issue: -  
Date of first issue: 09/06/2016

Viscosity, dynamic : No data available
Viscosity, kinematic : No data available
Explosive properties : Not classified
Oxidizing properties : Not classified
Surface tension : 71.5 mN/m, 20 °C, formic acid

SECTION 10. STABILITY AND REACTIVITY

Reactivity : Reacts with the following substances:
Bases
Amines

Chemical stability : Stable under normal conditions.
The product may form CO (carbon monoxide) under prolonged storage.

Possibility of hazardous reactions
Exothermic reaction
Reacts with the following substances:
Bases
Amines

Conditions to avoid
Do not expose to temperatures above: 30 °C
To avoid thermal decomposition, do not overheat.

Incompatible materials
Strong oxidizing agents
Strong acids
Bases
Amines
Copper
Aluminum
Combustible material

Hazardous decomposition products
Thermal decomposition
Carbon monoxide
The product may form CO (carbon monoxide) under prolonged storage.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity
Harmful if swallowed.
Toxic if inhaled.

Product:
SAFETY DATA SHEET

FORMIC ACID 85%

Version: 1.1  Revision Date: 10/11/2016  SDS Number: 150000103880  Date of last issue: -
SDSUS / PRD / 0001  Date of first issue: 09/06/2016

Acute oral toxicity: Acute toxicity estimate: 588.24 mg/kg
   Method: Calculation method

Acute inhalation toxicity: Acute toxicity estimate: 3.53 mg/l
   Exposure time: 4 h
   Test atmosphere: vapor
   Method: Calculation method
   Assessment: Corrosive to the respiratory tract.

Acute dermal toxicity: Assessment: Not classified

Ingredients:

formic acid:
   Acute oral toxicity: LD50 Oral (Rat): 730 mg/kg
   Acute inhalation toxicity: LC50 (Rat): 7.85 mg/l
   Exposure time: 4 h

Skin corrosion/irritation
   Causes severe burns.
   Ingredients:
       formic acid:
       Assessment: Corrosive

Serious eye damage/eye irritation
   Causes serious eye damage.
   Ingredients:
       formic acid:
       Assessment: Corrosive

Respiratory or skin sensitization
   Skin sensitization: Not classified based on available information.
   Respiratory sensitization: Not classified based on available information.

Germ cell mutagenicity
   Not classified based on available information.

Carcinogenicity
   Not classified based on available information.

Product:
   Remarks: This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.

IARC
   No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

OSHA
   No ingredient of this product present at levels greater than or
equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

NTP
No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity
Not classified based on available information.

STOT-single exposure
Not classified based on available information.

STOT-repeated exposure
Not classified based on available information.

Aspiration toxicity
Not classified based on available information.

Information on likely routes of exposure

Product:
Inhalation: Symptoms: Inhalation of vapors is irritating to the respiratory system, may cause throat pain and cough., Breathing difficulties

Skin contact: Symptoms: Causes skin burns., May cause skin irritation and/or dermatitis.

Eye contact: Symptoms: Causes serious eye damage.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ingredients:
formic acid:
Toxicity to fish: LC50 (Danio rerio (zebra fish)): 130 mg/l
Exposure time: 96 h

Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 365 mg/l
Exposure time: 48 h

Toxicity to algae: EC50 (Chlorella pyrenoidosa): 1,240 mg/l
Exposure time: 72 h

Persistence and degradability

Ingredients:
formic acid:
Biodegradability: Result: Readily biodegradable.
Bioaccumulative potential

**Ingredients:**

**formic acid:**

<table>
<thead>
<tr>
<th>Bioaccumulation</th>
<th>Bioconcentration factor (BCF): 3.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks</td>
<td>Does not bioaccumulate.</td>
</tr>
</tbody>
</table>

| Partition coefficient: n-octanol/water | log Pow: -2.1 |

Mobility in soil

**Product:**

<table>
<thead>
<tr>
<th>Mobility</th>
<th>Medium: Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks</td>
<td>soluble</td>
</tr>
</tbody>
</table>

Other adverse effects

**Product:**

<table>
<thead>
<tr>
<th>Results of PBT and vPvB assessment</th>
<th>This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Ozone-Depletion Potential</th>
<th>Regulation: 40 CFR Protection of Environment; Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remarks</td>
<td>This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).</td>
</tr>
</tbody>
</table>

**Ingredients:**

**formic acid:**

<table>
<thead>
<tr>
<th>Results of PBT and vPvB assessment</th>
<th>This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).</th>
</tr>
</thead>
</table>

SECTION 13. DISPOSAL CONSIDERATIONS

**Disposal methods**

**Waste from residues:**

- In accordance with local and national regulations.
- Do not dispose of waste into sewer.
- Can be incinerated, when in compliance with local regulations.

**Contaminated packaging:**

- In accordance with local and national regulations.
- The hazard and precautionary statements displayed on the label also apply to any residues left in the container.
SECTION 14. TRANSPORT INFORMATION

International Regulation

IATA-DGR
UN/ID No. : UN 1779
Proper shipping name : Formic acid
Class : 8
Subsidiary risk : 3
Packing group : II
Labels : Corrosive, Flammable Liquids
Packing instruction (cargo aircraft) : 855
Packing instruction (passenger aircraft) : 851

IMDG-Code
UN number : UN 1779
Proper shipping name : FORMIC ACID

Class : 8
Subsidiary risk : 3
Packing group : II
Labels : 8 (3)
EmS Code : F-E, S-C
Marine pollutant : no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

Domestic regulation

49 CFR
UN/ID/NA number : UN 1779
Proper shipping name : FORMIC ACID

Class : 8
Subsidiary risk : 3
Packing group : II
Labels : Class 8 - Corrosive, Class 3 - Flammable Liquid
ERG Code : 153
Marine pollutant : no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

SARA 311/312 Hazards : Fire Hazard
Acute Health Hazard
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SARA 302
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313
The following components are subject to reporting levels established by SARA Title III, Section 313:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>formic acid</td>
<td>64-18-6</td>
<td>85%</td>
</tr>
</tbody>
</table>

Clean Air Act
This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).
This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).
This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).
The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCM Intermediates or Final VOC's (40 CFR 60.489):

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>formic acid</td>
<td>64-18-6</td>
<td>85%</td>
</tr>
</tbody>
</table>

Clean Water Act
The following Hazardous Substances are listed under the U.S. Clean Water Act, Section 311, Table 116.4A:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>formic acid</td>
<td>64-18-6</td>
<td>85%</td>
</tr>
</tbody>
</table>

The following Hazardous Chemicals are listed under the U.S. Clean Water Act, Section 311, Table 117.3:

<table>
<thead>
<tr>
<th>Chemical</th>
<th>CAS Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>formic acid</td>
<td>64-18-6</td>
<td>85%</td>
</tr>
</tbody>
</table>

This product does not contain any toxic pollutants listed under the U.S. Clean Water Act Section 307.

The ingredients of this product are reported in the following inventories:

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH INV</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>DSL</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>AICS</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>NZIoC</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>ENCS</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>ISHL</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>KECI</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>PICCS</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>IECSC</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
<tr>
<td>TCSI</td>
<td>Not listed</td>
</tr>
<tr>
<td>TSCA</td>
<td>On the inventory, or in compliance with the inventory</td>
</tr>
</tbody>
</table>
TSCA list
No substances are subject to a Significant New Use Rule.

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECS - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50% of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RO - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative
Further information

NFP:A:

HMISS III:

Revision Date: 10/11/2016

The information provided in this Material 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.

US / ZB