1. Identification

Product Name: Formic acid, OPTIMA LC/MS Grade (99.5%)

Cat No.: A117-50; A117-10X1AMP; A117-1AMP; A117-05AMP; A117-2AMP; NC1450425; XXA117100ML; NC1484204; XXA1171LI

CAS-No: 64-18-6

Synonyms: Methanoic acid; FA (OPTIMA LC/MS)

Recommended Use: Laboratory chemicals.

Uses advised against: Food, drug, pesticide or biocidal product use

2. Hazard(s) identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute oral toxicity</td>
<td>Category 4</td>
</tr>
<tr>
<td>Acute Inhalation Toxicity - Vapors</td>
<td>Category 3</td>
</tr>
<tr>
<td>Skin Corrosion/irritation</td>
<td>Category 1 A</td>
</tr>
<tr>
<td>Serious Eye Damage/Eye Irritation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Specific target organ toxicity (single exposure)</td>
<td>Category 2</td>
</tr>
<tr>
<td>Target Organs - Respiratory system.</td>
<td></td>
</tr>
</tbody>
</table>

Label Elements

Signal Word: Danger

Hazard Statements
Flammable liquid and vapor
Harmful if swallowed
Causes severe skin burns and eye damage
Toxic if inhaled
May cause respiratory irritation
Precautionary Statements

Prevention
Wash face, hands and any exposed skin thoroughly after handling
Do not eat, drink or smoke when using this product
Use only outdoors or in a well-ventilated area
Do not breathe dust/fume/gas/mist/vapors/spray
Wear protective gloves/protective clothing/eye protection/face protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Keep container tightly closed
Ground/bond container and receiving equipment
Use explosion-proof electrical/ventilating/lighting/equipment
Use only non-sparking tools
Take precautionary measures against static discharge
Keep cool
Wear respiratory protection

Response
Immediately call a POISON CENTER or doctor/physician

Inhalation
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Immediately call a POISON CENTER or doctor/physician

Skin
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse

Eyes
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing

Ingestion
Rinse mouth
Do NOT induce vomiting

Fire
In case of fire: Use CO2, dry chemical, or foam for extinction

Storage
Store in a well-ventilated place. Keep container tightly closed
Store locked up

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

Hazards not otherwise classified (HNOC)
Corrosive to the respiratory tract

3. Composition/Information on Ingredients

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>64-18-6</td>
<td>&gt;95</td>
</tr>
</tbody>
</table>

4. First-aid measures

General Advice
Immediate medical attention is required. Show this safety data sheet to the doctor in attendance.
Formic acid, OPTIMA LC/MS Grade (99.5%)

Revision Date 18-Jan-2018

Eye Contact
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Skin Contact
Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation
Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Move to fresh air. Immediate medical attention is required. If not breathing, give artificial respiration.

Ingestion
Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms and effects
Breathing difficulties. Causes burns by all exposure routes. Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting. Product is a corrosive material. Use of gastric lavage or emesis is contraindicated. Possible perforation of stomach or esophagus should be investigated. Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation.

Notes to Physician
Treat symptomatically

### 5. Fire-fighting measures

**Suitable Extinguishing Media**
Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Cool closed containers exposed to fire with water spray.

**Unsuitable Extinguishing Media**
No information available

**Flash Point**
50 °C / 122 °F

**Method**
No information available

**Autoignition Temperature**
520 °C / 968 °F

**Explosion Limits**
- Upper: 45 vol %
- Lower: 10 vol %

**Sensitivity to Mechanical Impact**
No information available

**Sensitivity to Static Discharge**
No information available

**Specific Hazards Arising from the Chemical**
Flammable. Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated.

**Hazardous Combustion Products**
Carbon monoxide (CO) Carbon dioxide (CO₂) Hydrogen Thermal decomposition can lead to release of irritating gases and vapors.

**Protective Equipment and Precautions for Firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Thermal decomposition can lead to release of irritating gases and vapors.

### NFPA

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Instability</th>
<th>Physical hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>1</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### 6. Accidental release measures

**Personal Precautions**
Use personal protective equipment. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Ensure adequate ventilation. Remove all sources of ignition. Take precautionary measures against static discharges.

**Environmental Precautions**
Should not be released into the environment. Do not flush into surface water or sanitary sewer system. See Section 12 for additional ecological information.

**Methods for Containment and Clean**
Soak up with inert absorbent material. Keep in suitable, closed containers for disposal.
### 7. Handling and storage

**Handling**
Use only under a chemical fume hood. Wear personal protective equipment. Do not get in eyes, on skin, or on clothing. Do not breathe vapors or spray mist. Do not ingest. Keep away from open flames, hot surfaces and sources of ignition. Use only non-sparking tools. Take precautionary measures against static discharges.

**Storage**
Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat and sources of ignition. Containers should be vented periodically in order to overcome pressure buildup. Store in explosion-proof refrigerator. Flammables area.

### 8. Exposure controls / personal protection

**Exposure Guidelines**

<table>
<thead>
<tr>
<th>Component</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
<th>Mexico OEL (TWA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>TWA: 5 ppm</td>
<td>(Vacated) TWA: 5 ppm</td>
<td>IDLH: 30 ppm</td>
<td>TWA: 5 ppm</td>
</tr>
<tr>
<td></td>
<td>STEL: 10 ppm</td>
<td>(Vacated) TWA: 9 mg/m³</td>
<td>TWA: 5 ppm</td>
<td>TWA: 9 mg/m³</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA: 5 ppm</td>
<td>TWA: 9 mg/m³</td>
<td>TWA: 5 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TWA: 9 mg/m³</td>
<td>TWA: 9 mg/m³</td>
</tr>
</tbody>
</table>

**Legend**
ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

**Engineering Measures**
Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment. Ensure adequate ventilation, especially in confined areas.

**Personal Protective Equipment**

- **Eye/face Protection**
  Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA’s eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166. Tightly fitting safety goggles. Face-shield.

- **Skin and body protection**
  Chemical resistant apron. Boots. Chemical protection suit (EN 14605).

- **Respiratory Protection**
  Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

**Hygiene Measures**
Handle in accordance with good industrial hygiene and safety practice.

### 9. Physical and chemical properties

- **Physical State**: Liquid
- **Appearance**: Colorless
- **Odor**: Pungent
- **Odor Threshold**: No information available
- **pH**: 2.1 (aq. 5% sol)
- **Melting Point/Range**: 8 °C / 46.4 °F
- **Boiling Point/Range**: 101 °C / 213.8 °F @ 760 mmHg
- **Flash Point**: 50 °C / 122 °F
- **Evaporation Rate**: No information available
- **Flammability (solid, gas)**: Not applicable
Formic acid, OPTIMA LC/MS Grade (99.5%)  

**Upper**  
45 vol % 

**Lower**  
10 vol % 

**Vapor Pressure**  
44 mbar @ 20 °C 

**Vapor Density**  
No information available 

**Specific Gravity**  
1.220 

**Solubility**  
miscible 

**Partition coefficient; n-octanol/water**  
No data available 

**Autoignition Temperature**  
520 °C / 968 °F 

**Decomposition Temperature**  
No information available 

**Viscosity**  
1.47 mPa.s @ 20 °C 

**Molecular Formula**  
C H2 O2 

**Molecular Weight**  
46.02 

### 10. Stability and reactivity

**Reactive Hazard**  
None known, based on information available 

**Stability**  
Strong reducing agent. Fire and explosion risk in contact with oxidizing agents. Hygroscopic. heat sensitive. Decomposes to water and carbon dioxide. 

**Conditions to Avoid**  
Incompatible products. Excess heat. Keep away from open flames, hot surfaces and sources of ignition. Exposure to moist air or water. 

**Incompatible Materials**  
Strong oxidizing agents, Metals, Powdered metals, Strong bases 

**Hazardous Decomposition Products**  
Carbon monoxide (CO), Carbon dioxide (CO2), Hydrogen, Thermal decomposition can lead to release of irritating gases and vapors 

**Hazardous Polymerization**  
Hazardous polymerization does not occur. 

**Hazardous Reactions**  
None under normal processing. 

### 11. Toxicological information

**Acute Toxicity**

**Product Information**

- **Oral LD50**  
  Category 4. 

- **Dermal LD50**  
  Based on ATE data, the classification criteria are not met. 

- **Vapor LC50**  
  Category 3. 

**Component Information**

<table>
<thead>
<tr>
<th>Component</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>730 mg/kg ( Rat )</td>
<td>Not listed</td>
<td>15 g/m³ ( Rat ) 15 min</td>
</tr>
</tbody>
</table>

**Toxicologically Synergistic Products**  
No information available 

**Delayed and immediate effects as well as chronic effects from short and long-term exposure**

**Irritation**  
Causes severe burns by all exposure routes Irritating to respiratory system 

**Sensitization**  
No information available 

**Carcinogenicity**  
The table below indicates whether each agency has listed any ingredient as a carcinogen. 

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>IARC</th>
<th>NTP</th>
<th>ACGIH</th>
<th>OSHA</th>
<th>Mexico</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>64-18-6</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
<td>Not listed</td>
</tr>
</tbody>
</table>

**Mutagenic Effects**  
No information available 

**Reproductive Effects**  
No information available. 

**Developmental Effects**  
No information available.
Formic acid, OPTIMA LC/MS Grade (99.5%)

Teratogenicity
No information available.

STOT - single exposure
Respiratory system

STOT - repeated exposure
None known

Aspiration hazard
No information available

Symptoms / effects, both acute and delayed
Symptoms of overexposure may be headache, dizziness, tiredness, nausea and vomiting:
Product is a corrosive material. Use of gastric lavage or emesis is contraindicated.
Possible perforation of stomach or esophagus should be investigated: Ingestion causes severe swelling, severe damage to the delicate tissue and danger of perforation

Endocrine Disruptor Information
No information available

Other Adverse Effects
The toxicological properties have not been fully investigated.

12. Ecological information

Ecotoxicity
Contains a substance which is:. Harmful to aquatic organisms. The product contains following substances which are hazardous for the environment.

<table>
<thead>
<tr>
<th>Component</th>
<th>Freshwater Algae</th>
<th>Freshwater Fish</th>
<th>Microtox</th>
<th>Water Flea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>EC50 = 25 mg/L/96h</td>
<td>Leuciscus idus: LC50 = 46-100 mg/L/96h</td>
<td>EC50 = 46.7 mg/L/17h</td>
<td>EC50 = 34 mg/L/48h</td>
</tr>
</tbody>
</table>

Persistence and Degradability
Miscible with water Persistence is unlikely based on information available.

Bioaccumulation / Accumulation
No information available.

Mobility
Will likely be mobile in the environment due to its water solubility.

<table>
<thead>
<tr>
<th>Component</th>
<th>log Pow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>-0.54</td>
</tr>
</tbody>
</table>

13. Disposal considerations

Waste Disposal Methods
Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

<table>
<thead>
<tr>
<th>Component</th>
<th>RCRA - U Series Wastes</th>
<th>RCRA - P Series Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid - 64-18-6</td>
<td>U123</td>
<td>-</td>
</tr>
</tbody>
</table>

14. Transport information

DOT
UN-No: UN1779
Proper Shipping Name: FORMIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 3
Packing Group: II

TDG
UN-No: UN1779
Proper Shipping Name: FORMIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 3
Packing Group: II

IATA
UN-No: UN1779
Proper Shipping Name: FORMIC ACID
Hazard Class: 8
Subsidiary Hazard Class: 3
15. Regulatory information

All of the components in the product are on the following Inventory lists: X = listed

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL</th>
<th>NDSL</th>
<th>EINECS</th>
<th>ELINCS</th>
<th>NLP</th>
<th>PICCS</th>
<th>ENCS</th>
<th>AICS</th>
<th>IECSC</th>
<th>KECL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>200-579-1</td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>64-18-6</td>
<td>&gt;95</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories See section 2 for more information

CWA (Clean Water Act)

<table>
<thead>
<tr>
<th>Component</th>
<th>CWA - Hazardous Substances</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>X</td>
<td>5000 lb</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration Not applicable

CERCLA This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Component</th>
<th>Hazardous Substances RQs</th>
<th>CERCLA EHS RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>5000 lb</td>
<td>-</td>
</tr>
</tbody>
</table>

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know
Formic acid, OPTIMA LC/MS Grade (99.5%)

Regulations

<table>
<thead>
<tr>
<th>Component</th>
<th>Massachusetts</th>
<th>New Jersey</th>
<th>Pennsylvania</th>
<th>Illinois</th>
<th>Rhode Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formic acid</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>X</td>
</tr>
</tbody>
</table>

U.S. Department of Transportation

Reportable Quantity (RQ): Y
DOT Marine Pollutant: N
DOT Severe Marine Pollutant: N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade
Moderate risk, Grade 2

16. Other information

Prepared By
Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date
02-Nov-2009
Revision Date
18-Jan-2018
Print Date
18-Jan-2018
Revision Summary
This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
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

End of SDS