

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Revision Date 05/20/2017

Version 1.1

SECTION 1. Identification**Product identifier**

Product number	533002
Product name	Formic acid 98% - 100% for LC-MS LiChropur®
CAS-No.	64-18-6

Relevant identified uses of the substance or mixture and uses advised against

Identified uses	Reagent for analysis
-----------------	----------------------

Details of the supplier of the safety data sheet

Company	EMD Millipore Corporation 290 Concord Road, Billerica, MA 01821, United States of America General Inquiries: +1-978-715-4321 Monday to Friday, 9:00 AM to 4:00 PM Eastern Time (GMT-5) MilliporeSigma is a business of Merck KGaA, Darmstadt, Germany.
---------	---

Emergency telephone	800-424-9300 CHEMTREC (USA) +1-703-527-3887 CHEMTREC (International) 24 Hours/day; 7 Days/week
----------------------------	--

SECTION 2. Hazards identification**GHS Classification**

Flammable liquid, Category 3, H226
Acute toxicity, Category 4, Oral, H302
Acute toxicity, Category 3, Inhalation, H331
Skin corrosion, Category 1A, H314
Serious eye damage, Category 1, H318

For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS-Labeling*Hazard pictograms**Signal Word*

Danger

Hazard Statements

H226 Flammable liquid and vapor.
H302 Harmful if swallowed.

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Inhalation

After inhalation: fresh air. Immediately call in physician. If breathing stops: immediately apply artificial respiration, if necessary also oxygen.

Skin contact

In case of skin contact: Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician immediately.

Eye contact

After eye contact: rinse out with plenty of water. Immediately call in ophthalmologist.

Ingestion

After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation!). Call a physician immediately. Do not attempt to neutralize.

Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed

conjunctivitis, Dermatitis

Irritation and corrosion, Cough, Shortness of breath

Risk of blindness!

Indication of any immediate medical attention and special treatment needed

No information available.

SECTION 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media

Water, Foam, Carbon dioxide (CO₂), Dry powder

Unsuitable extinguishing media

For this substance/mixture no limitations of extinguishing agents are given.

Special hazards arising from the substance or mixture

Combustible.

Vapors are heavier than air and may spread along floors.

Forms explosive mixtures with air at elevated temperatures.

Development of hazardous combustion gases or vapors possible in the event of fire.

Advice for firefighters

Special protective equipment for fire-fighters

Stay in danger area only with self-contained breathing apparatus. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

Further information

Suppress (knock down) gases/vapors/mists with a water spray jet.

Remove container from danger zone and cool with water. Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Advice for non-emergency personnel: Do not breathe vapors, aerosols. Avoid substance contact. Ensure adequate ventilation. Keep away from heat and sources of ignition. Evacuate the danger area, observe emergency procedures, consult an expert.

Advice for emergency responders:

Protective equipment see section 8.

Environmental precautions

Do not let product enter drains. Risk of explosion.

Methods and materials for containment and cleaning up

Cover drains. Collect, bind, and pump off spills.

Observe possible material restrictions (see sections 7 and 10).

Take up with liquid-absorbent and neutralizing material (e.g. Chemizorb® H⁺, Art. No. 101595).

Dispose of properly. Clean up affected area.

SECTION 7. Handling and storage

Precautions for safe handling

Work under hood. Do not inhale substance/mixture. Avoid generation of vapors/aerosols.

Observe label precautions.

Advice on protection against fire and explosion

Keep away from open flames, hot surfaces and sources of ignition. Take precautionary measures against static discharge.

Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers

No metal containers.

May decompose forming gaseous products, especially when stored over long periods. Close containers in such a way to enable internal pressure to escape (e.g. excess pressure valve). Dry. Keep in a well-ventilated place. Keep away from heat and sources of ignition. Keep locked up or in an area accessible only to qualified or authorized persons. Protected from light.

Store at +15°C to +25°C (+59°F to +77°F).

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

SECTION 8. Exposure controls/personal protection

Exposure limit(s)

Ingredients

Basis	Value	Threshold limits	Remarks
<i>Formic acid 64-18-6</i>			
CAD AB OEL	Time Weighted Average (TWA):	5 ppm 9.4 mg/m ³	
	Short Term Exposure Limit (STEL):	10 ppm 19 mg/m ³	
CAD BC OEL	Short Term Exposure Limit (STEL):	10 ppm	
	Time Weighted Average (TWA):	5 ppm	
CAD MB OEL	Time Weighted Average (TWA):	5 ppm	
	Short Term Exposure Limit (STEL):	10 ppm	
CAD ON OEL	Time Weighted Average (TWAEV):	5 ppm	
	Short Term Exposure Limit (STEV):	10 ppm	
OEL (QUE)	Time Weighted Average (TWA):	5 ppm 9.4 mg/m ³	
	Short Term Exposure Limit (STEL):	10 ppm 19 mg/m ³	

Engineering measures

Technical measures and appropriate working operations should be given priority over the use of personal protective equipment.

Individual protection measures

Protective clothing should be selected specifically for the workplace, depending on concentration and quantity of the hazardous substances handled. The chemical resistance of the protective equipment should be inquired at the respective supplier.

Hygiene measures

Immediately change contaminated clothing. Apply skin- protective barrier cream. Wash hands and face after working with substance.

Eye/face protection

Tightly fitting safety goggles

Hand protection

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Other protective equipment:

Flame retardant antistatic protective clothing.

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Respiratory protection

required when vapors/aerosols are generated.

SECTION 9. Physical and chemical properties

Physical state	liquid
Color	colorless
Odor	stinging
Odor Threshold	0.02 - 49.1 ppm
pH	2.2 at 10 g/l 68 °F (20 °C)
Melting point	39 °F (4 °C) Method: OECD Test Guideline 102
Boiling point/boiling range	214 °F (101 °C) at 1,013 hPa
Flash point	121.1 °F (49.5 °C) at 1,013 hPa Method: Tested according to Directive 92/69/EEC.
Evaporation rate	No information available.
Flammability (solid, gas)	No information available.
Lower explosion limit	12 %(V)
Upper explosion limit	38 %(V)
Vapor pressure	42 hPa at 68 °F (20 °C) Method: OECD Test Guideline 104
Relative vapor density	1.59
Density	1.22 g/cm ³ at 68 °F (20 °C) Method: OECD Test Guideline 109
Relative density	No information available.

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Water solubility	at 68 °F (20 °C) soluble
Partition coefficient: n-octanol/water	log Pow: -2.1 (23 °C) OECD Test Guideline 107 Bioaccumulation is not expected.
Autoignition temperature	982 °F(528 °C) at 1,008 hPa Method: Tested according to Directive 92/69/EEC.
Decomposition temperature	662 °F (350 °C) Method: OECD Test Guideline 113 GLP: yes
Viscosity, dynamic	1.8 mPa.s at 68 °F (20 °C) Method: OECD Test Guideline 114
Explosive properties	Not classified as explosive.
Oxidizing properties	none
Corrosion	< 3.7 mm/a negligible

SECTION 10. Stability and reactivity

Reactivity

Vapor/air-mixtures are explosive at intense warming.

Chemical stability

heat-sensitive

Sensitivity to light

Possibility of hazardous reactions

Risk of ignition or formation of inflammable gases or vapors with:

Aluminum

Risk of explosion with:

organic nitro compounds, sodium hypochlorite, hydrogen peroxide, furfuryl alcohol

Generates dangerous gases or fumes in contact with:

alkalines, Strong oxidizing agents, sulfuric acid, nonmetallic oxides, metal catalysts, Oxides of phosphorus, Nitric acid, nitrates

Exothermic reaction with:

alkaline earth hydroxides, alkali hydroxides, bases, Amines

Conditions to avoid

Heating.

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Incompatible materials

Metals

Hazardous decomposition products

no information available

SECTION 11. Toxicological information

Information on toxicological effects

Likely route of exposure

Inhalation, Eye contact, Skin contact

Acute oral toxicity

LD50 Rat: 730 mg/kg

OECD Test Guideline 401

absorption

Symptoms: If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach.

Acute inhalation toxicity

LC50 Rat: 7.85 mg/l; 4 h ; vapor

OECD Test Guideline 403

Symptoms: burns of mucous membranes, Cough, Shortness of breath, Possible damages:, damage of respiratory tract, Lung edema
absorption

Skin irritation

Rabbit

Result: Causes burns.

OECD Test Guideline 404

Causes severe burns.

Dermatitis

Eye irritation

Causes serious eye damage. conjunctivitis Lacrimal irritation due to vapors.

Risk of blindness!

Sensitization

Buehler Test Guinea pig

Result: negative

Method: OECD Test Guideline 406

Genotoxicity in vitro

sister chromatid exchange assay

Chinese hamster lung cells

Result: negative

Method: OECD Test Guideline 479

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Ames test

Salmonella typhimurium

Result: negative

Method: OECD Test Guideline 471

In vitro mammalian cell gene mutation test

Chinese hamster ovary cells

Result: negative

Method: OECD Test Guideline 476

Carcinogenicity

Did not show carcinogenic effects in animal experiments. (IUCLID)

Reproductive toxicity

No impairment of reproductive performance in animal experiments. (IUCLID)

Specific target organ systemic toxicity - single exposure

The substance or mixture is not classified as specific target organ toxicant, single exposure.

Specific target organ systemic toxicity - repeated exposure

The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Aspiration hazard

Regarding the available data the classification criteria are not fulfilled.

Carcinogenicity

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.

ACGIH

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

Further information

After absorption:

acidosis, hemolysis

Damage to:

Kidney

This substance should be handled with particular care.

SECTION 12. Ecological information

Ecotoxicity

Toxicity to fish

LC50 Leuciscus idus (Golden orfe): 46 - 100 mg/l; 96 h (IUCLID)

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Toxicity to daphnia and other aquatic invertebrates

EC50 Daphnia magna (Water flea): 34.2 mg/l; 48 h (IUCLID)

Toxicity to algae

IC50 Desmodesmus subspicatus (green algae): 27 mg/l; 72 h (Lit.)

Toxicity to bacteria

EC10 activated sludge: 72 mg/l; 13 d (External MSDS)

EC50 Pseudomonas putida: 47 mg/l; 17 h (IUCLID)

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)

semi-static test NOEC Daphnia magna (Water flea): ≥ 100 mg/l; 21 d

Analytical monitoring: yes

OECD Test Guideline 211

Persistence and degradability

Biodegradability

100 %; 28 d; aerobic

OECD Test Guideline 301C

Readily biodegradable.

Bioaccumulative potential

Partition coefficient: n-octanol/water

log Pow: -2.1 (23 °C)

OECD Test Guideline 107

Bioaccumulation is not expected.

Bioaccumulation

(Does not significantly accumulate in organisms.)

Mobility in soil

No information available.

Other adverse effects

Henry constant

0.019 Pa·m³/mol

at 77 °F(25 °C)

Surface tension

71.5 mN/m

at 68 °F(20 °C)

Method: OECD Test Guideline 115

Additional ecological information

Forms corrosive mixtures with water even if diluted. Harmful effect due to pH shift. Neutralization possible in waste water treatment plants. No interference with wastewater treatment plants are to be expected when used properly.

Discharge into the environment must be avoided.

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number
Product name

533002
Formic acid 98% - 100% for LC-MS LiChropur®

Version 1.1

SECTION 13. Disposal considerations

The information presented only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. Disposal should be in accordance with applicable regional, national and local laws and regulations.

SECTION 14. Transport information

Land transport (DOT)

UN number UN 1779
Proper shipping name FORMIC ACID
Class 8 (3)
Packing group II
Environmentally hazardous --

Air transport (IATA)

UN number UN 1779
Proper shipping name FORMIC ACID
Class 8 (3)
Packing group II
Environmentally hazardous --
Special precautions for user yes
Not permitted for transport

Sea transport (IMDG)

UN number UN 1779
Proper shipping name FORMIC ACID MORE THAN 85%
Class 8 (3)
Packing group II
Environmentally hazardous --
Special precautions for user yes
EmS F-E S-C

SECTION 15. Regulatory information

United States of America

Canada

WHMIS Classification

B3 Combustible Liquid
E Corrosive Material

Combustible Liquid, Corrosive to skin, Corrosive to eyes, Corrosive by inhalation.

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

Notification status

TSCA: All components of the product are listed in the TSCA-inventory.

DSL: All components of this product are on the Canadian DSL

SECTION 16. Other information

Training advice

Provide adequate information, instruction and training for operators.

Labeling

Hazard pictograms



Signal Word

Danger

Hazard Statements

H226 Flammable liquid and vapor.

H302 Harmful if swallowed.

H314 Causes severe skin burns and eye damage.

H331 Toxic if inhaled.

EUH071 Corrosive to the respiratory tract.

Precautionary Statements

Prevention

P210 Keep away from heat.

P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.

P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position 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.

P308 + P310 IF exposed or concerned: immediately call a POISON CENTER or doctor/ physician.

Key or legend to abbreviations and acronyms used in the safety data sheet

Used abbreviations and acronyms can be looked up at www.wikipedia.org.

Revision Date 05/20/2017

SAFETY DATA SHEET

according to the Global Harmonized System (and with all of the information required by the CPR)

Product number

533002

Version 1.1

Product name

Formic acid 98% - 100% for LC-MS LiChropur®

The information contained herein is based on the present state of our knowledge. It characterizes the product with regard to appropriate safety precautions. It does not represent a warranty of any product properties and we assume no liability for any loss or injury which may result from the use of this information. Users should conduct their own investigations to determine the suitability of the information.

All rights reserved. Millipore and the "M" Mark are registered trademarks of Merck KGaA, Darmstadt, Germany.