

Safety Data Sheet

Product name: Formic acid

CAS No.: 64-18-6

Prepared in accordance with GB/T 16483, GB/T 17519

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

>Product identifier

- Product name: Formic acid
- CBnumber: CB4854063
- CAS: 64-18-6
- EINECS Number: 200-579-1
- Synonyms: Formic acid, HCOOH

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

- Relevant identified uses: For R&D use only. Not for medicinal, household or other use.
- Uses advised against: none

>Company Identification

- Company: Linyi Tuohui New Materials Co., Ltd.
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SECTION 2: Hazards identification

>GHS Label elements, including precautionary statements

- Symbol(GHS) 
- Signal word Danger

Precautionary statements

P210 Keep away from heat/sparks/open flames/hot surfaces. — No smoking.

P260 Do not breathe dust/fume/gas/mist/vapours/spray.

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

P303+P361+P353 IF ON SKIN (or hair): Remove/Take off Immediately all contaminated clothing.

Rinse SKIN with water/shower.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P337+P313 IF eye irritation persists: Get medical advice/attention.

P370+P378 In case of fire: Use ... for extinction.

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

Hazard statements

H226 Flammable liquid and vapour

H302 Harmful if swallowed

H314 Causes severe skin burns and eye damage

H315 Causes skin irritation

H318 Causes serious eye damage

H319 Causes serious eye irritation

H331 Toxic if inhaled

SECTION 3: Composition/information on ingredients

>Substance

- Product name: Formic acid
- Synonyms: Formic acid, HCOOH
- CAS: 64-18-6
- EC number: 200-579-1
- MF: CH₂O₂
- MW: 46.03

SECTION 4: First aid measures

>Description of first aid measures

General advice

First aider needs to protect himself. Show this material safety data sheet to the doctor in attendance.

If inhaled

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

In case of skin contact

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

In case of eye contact

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

If swallowed

After swallowing: make victim drink water (two glasses at most), avoid vomiting (risk of perforation). Pulmonary failure possible after aspiration of vomit. Call a physician immediately. Do not attempt to neutralise.

>Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

>Indication of any immediate medical attention and special treatment needed

No data available

SECTION 5: Firefighting 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

Nature of decomposition products not known. 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 vapours possible in the event of fire.

>Advice for firefighters

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

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

>NFPA 704

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SECTION 6: Accidental release measures

>Personal precautions, protective equipment and emergency procedures

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. For personal protection 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 carefully with liquid-absorbent material (e.g.

Chemizorb). Dispose of properly. Clean up affected area.

>Reference to other sections

For disposal see section 13.

SECTION 7: Handling and storage

>Precautions for safe handling

> Advice on safe handling

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

> Advice on protection against fire and explosion

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

> Hygiene measures

Immediately change contaminated clothing. Apply preventive skin protection. Wash hands and face after working with substance.

For precautions see section 2.2.

>Conditions for safe storage, including any incompatibilities

> Storage conditions

Keep container tightly closed in a dry and 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.

Vent periodically. Handle and open container with care. Hygroscopic. Refrigerate before opening.

>Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

SECTION 8: Exposure controls/personal protection

>control parameter

Hazard composition and occupational exposure limits

Does not contain substances with occupational exposure limits.

>Exposure controls

Personal protective equipment

Eye/face protection

Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU). Tightly fitting safety goggles

Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it.

Full contact

Material: Nature latex/chloroprene Minimum layer thickness: 0,6 mm Break through time: 480 min

Material tested:Lapren (KCL 706 / Aldrich Z677558, Size M)

Splash contact

Material: Nature latex/chloroprene Minimum layer thickness: 0,6 mm Break through time: 480 min

Material tested:Lapren (KCL 706 / Aldrich Z677558, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de,
test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the EC approved gloves. This

recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

Body Protection

Flame retardant antistatic protective clothing.

Respiratory protection

Recommended Filter type: Filter E-(P3)

The entrepreneur has to ensure that maintenance, cleaning and testing of respiratory protective devices are carried out according to the instructions of the producer.

These measures have to be properly documented.

Control of environmental exposure

Do not let product enter drains. Risk of explosion.

Exposure limits

TLV-TWA 5 ppm ($\sim 9 \text{ mg/m}^3$) (ACGIH, MSHA, OSHA, and NIOSH); IDLH 100 ppm (180 mg/m^3) (NIOSH).

SECTION 9: Physical and chemical properties

>Information on basic physicochemical properties

- Appearancecolorless liquid
- Odourstinging
- Odour Threshold0,02 ppm
- pH2,2 at 10 g/l at 20 °C
- Melting point/freezing pointMelting point/range: 8,2 - 8,4 °C - lit.
- Initial boiling point and boiling range100 - 101 °C - lit.
- Flash point49,5 °C - closed cup - Regulation (EC) No. 440/2008, Annex, A.9
- Evaporation rateNo data available
- Flammability (solid, gas)No data available
- Upper/lower flammability or explosive limits Upper explosion limit: 38 %(V) Lower explosion limit: 18 %(V)

- Vapour pressure 171 hPa at 50 °C - OECD Test Guideline 104
- Vapour density 1,59 - (Air = 1.0)
- Relative density 1,22 at 20 °C - OECD Test Guideline 109
- Water solubility at 20 °C miscible in all proportions, (experimental)
- Partition coefficient: n-octanol/water log Pow: -2,1 at 23 °C - OECD Test Guideline 107 - Bioaccumulation is not expected.
- Autoignition temperature 528 °C at 1.008 hPa - Tested according to Directive 92/69/EEC.
- Decomposition temperature 350 °C -
- Viscosity Viscosity, kinematic: 1,47 mm²/s at 20 °C - OECD Test Guideline 114 1,02 mm²/s at 40 °C - OECD Test Guideline 114 Viscosity, dynamic: 1,8 mPa.s at 20 °C - OECD Test Guideline 114 2,2 mPa.s at 40 °C - OECD Test Guideline 114
- Explosive properties No data available
- Oxidizing properties No data available
- Henry's Law Constant At 25 °C: 95.2, 75.1, 39.3, 10.7, and 3.17 at pH values of 1.35, 3.09, 4.05, 4.99, and 6.21, respectively (Hakuta et al., 1977)
- λ_{max} : 260 nm A_{max} : 0.03
 λ : 280 nm A_{max} : 0.01

>Other safety information

Surface tension 71,5 mN/m at 1g/l at 20 °C

- OECD Test Guideline 115
Dissociation constant 3,7 at 20 °C
- OECD Test Guideline 112

Relative vapor density

1,59 - (Air = 1.0)

SECTION 10: Stability and reactivity

>Reactivity

Vapor/air-mixtures are explosive at intense warming.

>Chemical stability

The product is chemically stable under standard ambient conditions (room temperature) . Contains the following stabilizer(s):

water (5 %)

>Possibility of hazardous reactions

No data available

>Conditions to avoid

Heating.

>Incompatible materials

Strong oxidizing agents, Strong bases, Powdered metals

>Hazardous decomposition products

In the event of fire: see section 5

SECTION 11: Toxicological information

>Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - male and female - 730 mg/kg (OECD Test Guideline 401)

LC50 Inhalation - Rat - male and female - 4 h - 7,85 mg/l (OECD Test Guideline 403)

Skin corrosion/irritation

Skin - Rabbit

Result: Severe skin irritation

(Draize Test)

Serious eye damage/eye irritation

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

Respiratory or skin sensitization

Buehler Test - Guinea pig Result: negative

(OECD Test Guideline 406)

Prolonged or repeated exposure may cause allergic reactions in certain sensitive individuals.

Germ cell mutagenicity

Ames test

Salmonella typhimurium Result: negative

sister chromatid exchange assay Chinese hamster lung cells Result: negative

sister chromatid exchange assay Human lymphocytes

Result: negative

In vitro mammalian cell gene mutation test Chinese hamster ovary cells

Result: negative

Chromosome aberration test in vitro Chinese hamster ovary cells

Result: negative

OECD Test Guideline 477 *Drosophila melanogaster* - male Result: negative

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.

Reproductive toxicity

No data available

Specific target organ toxicity - single exposure

Specific target organ toxicity - repeated exposure

Aspiration hazard

Toxicity

LD50 in mice (mg/kg): 1100 orally; 145 i.v. (Malorny)

SECTION 12: Ecological information

>Toxicity

Toxicity to fish

static test LC50 - *Danio rerio* (zebra fish) - 130 mg/l - 96 h (OECD Test Guideline 203)

Remarks: (in analogy to similar products)

The value is given in analogy to the following substances: ammonium formate

Toxicity to daphnia and other aquatic invertebrates

static test EC50 - *Daphnia magna* (Water flea) - 365 mg/l - 48 h (OECD Test Guideline 202)

Remarks: (in analogy to similar products)

The value is given in analogy to the following substances: ammonium formate

Toxicity to algae

static test ErC50 - *Pseudokirchneriella subcapitata* - 1.240 mg/l - 72 h

(OECD Test Guideline 201)

Remarks: (in analogy to similar products)

The value is given in analogy to the following substances: ammonium formate

Toxicity to bacteria

static test NOEC - activated sludge - 72 mg/l - 13 d

Remarks: (ECHA)

>Persistence and degradability

Biodegradability aerobic - Exposure time 14 d

Result: 100 % - Readily biodegradable. (OECD Test Guideline 301C)

Biochemical Oxygen Demand (BOD)

86 mg/g

Remarks: (External MSDS)

Ratio BOD/ThBOD 8,60 %

>Bioaccumulative potential

Bioaccumulation is unlikely.

Does not significantly accumulate in organisms.

>Mobility in soil

No data available

>Results of PBT and vPvB assessment

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

>Toxics Screening Level

The initial threshold screening level (ITSL) for Formic Acid is 2 µg/m³ based on a 24 hour averaging time.

>Other adverse effects

Additional ecological information

No data available

SECTION 13: Disposal considerations

>Waste treatment methods

Incompatibilities

Incompatible with strong acids; bases, ammonia, aliphatic amines; alkanolamines, isocyanates, alkylene oxides; epichlorohydrin. Contact with active metals or nitrides form flammable gaseous hydrogen. Incompatible with strongly oxidizing acids, peroxides, and hydroperoxides. Attacks metals: aluminum, cast iron and steel; many plastics, rubber and coatings.

Waste Disposal

Incineration with added solvent. Consult with environmental regulatory agencies for guidance on acceptable disposal practices. Generators of waste containing this contaminant ($\geq$ kg/mo) must conform with EPA regulations governing storage, transportation, treatment, and waste disposal.

SECTION 14: Transport information

>UN number

ADR/RID: 1779 IMDG: 1779

SECTION 15: Regulatory information

>Safety, health and environmental regulations/legislation specific for the substance or mixture

Regulations on the Safety Management of Hazardous Chemicals

China Catalog of Hazardous chemicals 2015:Listed. website: <https://www.mem.gov.cn/>

Measures for Environmental Management of New Chemical Substances

Chinese Chemical Inventory of Existing Chemical Substances (China IECSC):Listed. website: <https://www.mee.gov.cn/>

EC Inventory:Listed.

European Inventory of Existing Commercial Chemical Substances (EINECS):Listed. website: <https://echa.europa.eu/>

Korea Existing Chemicals List (KECL):Listed. website: <http://ncis.nier.go.kr>

New Zealand Inventory of Chemicals (NZIoC):Listed. website: <https://www.epa.govt.nz/>

Philippines Inventory of Chemicals and Chemical Substances (PICCS):Listed. website: <https://emb.gov.ph/>

United States Toxic Substances Control Act (TSCA) Inventory:Listed. website: <https://www.epa.gov/>

Vietnam National Chemical Inventory:Listed. website: <https://chemicaldata.gov.vn/>

SECTION 16: Other information

>Abbreviations and acronyms

- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- CAS: Chemical Abstracts Service
- EC50: Effective Concentration 50%
- IATA: International Air Transportation Association

- IMDG: International Maritime Dangerous Goods
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- STEL: Short term exposure limit
- TWA: Time Weighted Average

>References

- 【1】 CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>
- 【2】 ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>
- 【3】 ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>
- 【4】 eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- 【5】 ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>
- 【6】 Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>
- 【7】 HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>
- 【8】 IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>
- 【9】 IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>
- 【10】 Sigma-Aldrich, website: <https://www.sigmaaldrich.com/>

>Other Information

The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate inhalation therapy by a doctor or a person authorized by him/her, should be considered. The odour warning when the exposure limit value is exceeded is insufficient.