

Chemical Safety Data Sheet MSDS / SDS

Formaldehyde SDS

Revision Date:2024-04-25 Revision Number:1

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

Product name: Formaldehyde

CAS: 50-00-0

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: Chemicalbook.in

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SECTION 2: Hazards identification**Classification of the substance or mixture**

Acute toxicity - Category 3, Oral

Acute toxicity - Category 3, Dermal

Skin corrosion, Sub-category 1B
Skin sensitization, Category 1
Acute toxicity - Category 3, Inhalation
Germ cell mutagenicity, Category 2
Carcinogenicity, Category 1B

GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H301 Toxic if swallowed
H311 Toxic in contact with skin
H314 Causes severe skin burns and eye damage
H317 May cause an allergic skin reaction
H331 Toxic if inhaled
H341 Suspected of causing genetic defects
H350 May cause cancer

Precautionary statement(s)

Prevention

P264 Wash ... thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P272 Contaminated work clothing should not be allowed out of the workplace.
P271 Use only outdoors or in a well-ventilated area.
P203 Obtain, read and follow all safety instructions before use.

Response

P301+P316 IF SWALLOWED: Get emergency medical help immediately.
P321 Specific treatment (see ... on this label).
P330 Rinse mouth.
P302+P352 IF ON SKIN: Wash with plenty of water/...

P316 Get emergency medical help immediately.
P361+P364 Take off immediately all contaminated clothing and wash it before reuse.
P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P363 Wash contaminated clothing before reuse.
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.
P333+P317 If skin irritation or rash occurs: Get medical help.
P362+P364 Take off contaminated clothing and wash it before reuse.
P318 IF exposed or concerned, get medical advice.

Storage

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

Disposal

P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

Substance

Chemical name:	Formaldehyde
Common names and synonyms:	Formaldehyde
CAS number:	50-00-0
EC number:	200-001-8
Concentration:	100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. Artificial respiration may be needed. Refer immediately for medical attention.

Following skin contact

Remove contaminated clothes. Rinse skin with plenty of water or shower. Seek medical attention if you feel unwell.

Following eye contact

Rinse with plenty of water (remove contact lenses if easily possible). Refer immediately for medical attention.

Following ingestion

Rinse mouth. Do NOT induce vomiting. Refer immediately for medical attention.

Most important symptoms/effects, acute and delayed

Exposure Routes: inhalation, skin and/or eye contact Symptoms: Irritation eyes, nose, throat, respiratory system; lacrimation (discharge of tears); cough; wheezing; [potential occupational carcinogen] Target Organs: Eyes, respiratory system (NIOSH, 2016) The probable oral lethal dose for humans is 0.5-5 g/kg, or between 1 ounce and 1 pint for a 150 pound person. Acute -- below 1 ppm, odor perceptible to most. 2-3 ppm, mild tingling of eyes. 4-5 ppm, increased discomfort, mild lacrimation. 10 ppm, profuse lacrimation; can be withstood only for few minutes. 10-20 ppm, breathing difficult, cough, severe burning of nose and throat. 50-100 ppm, acute irritation of respiratory tract, very serious injury likely. Skin -- primary irritation from strong solutions, gas. Delayed -- sensitization dermatitis. Suspected carcinogen. Effects in women include menstrual disorders and secondary sterility. Solutions splashed in eyes have caused injuries ranging from severe, permanent corneal opacification and loss of vision to minor discomfort. In people sensitized to formaldehyde, late asthmatic reactions may be provoked by brief exposures at approximately 3 ppm. (EPA, 1998)

Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]: May cause toxic effects if inhaled or ingested/swallowed. Contact with substance may cause severe burns to skin and eyes. Fire will produce irritating, corrosive and/or toxic gases. Vapors may cause dizziness or suffocation. Runoff from fire control or dilution water may cause pollution. (ERG, 2016)

Vapor or dust irritates eyes, mucous membranes, and skin; may cause dermatitis. Ingestion of solid or of a solution in water irritates mouth, throat, and stomach and may cause death. (USCG, 1999)

Indication of immediate medical attention and special treatment needed, if necessary

Emergency and supportive measures: 1. Maintain open airway and assist ventilation if necessary. 2. Inhalation. Treat bronchospasm and pulmonary edema if they occur. Administer supplemental oxygen, and observe for at least 4 to 6 hours. 3. Ingestion. a. Treat coma and shock if they occur. b. Administer intravenous saline or other crystalloids to replace fluid losses caused by gastroenteritis. Avoid fluid overload in patients with inhalation exposure because of the risk of pulmonary edema. c. Treat metabolic acidosis with sodium bicarbonate.

SECTION 5: Firefighting measures

Suitable extinguishing media

Use water spray, dry chemical, alcohol foam, or carbon dioxide. Use water to keep fire exposed containers cool. If leak or spill has not ignited, use water spray to disperse vapors, and to protect men attempting to stop leak. Water spray may be used to flush spills away from exposures and to dilute spills to nonflammable mixtures.

Specific hazards arising from the chemical

Excerpt from ERG Guide 171 [Substances (Low to Moderate Hazard)]: Some may burn but none ignite readily. Containers may explode when heated. Some may be transported hot. For UN3508, be aware of possible short circuiting as this product is transported in a charged state. (ERG, 2016)

Toxic vapors such as carbon dioxide and carbon monoxide are generated during combustion. Explosion hazard: when aqueous formaldehyde solutions are heated above their flash points, a potential for explosion hazard exists. High formaldehyde concentration or methanol content lowers flash point. Reacts with nitrogen oxides at about 180; the reaction becomes explosive. Also reacts violently with perchloric acid-aniline, performic acid, nitromethane, magnesium carbonate, and hydrogen peroxide. When heated, irritant formaldehyde gas evolved from solution. The main products of decomposition are carbon monoxide and hydrogen. Metals such as platinum, copper, chromia, and alumina also catalyze the formation of methanol, methylformate, formic acid, carbon dioxide, and methane. Reacts with peroxide, nitrogen oxide, and performic acid causing explosions. Can react with hydrogen chloride or other inorganic chlorides to form bis-chloromethylether (BCME), a known carcinogen. Very reactive, combines readily with many substances, 40% solution is powerful reducing agent. Incompatible with amines, azo compounds, dithiocarbamates, alkali and alkaline earth metals, nitrides, nitro compounds, unsaturated aliphatics and sulfides, organic peroxides, oxidizing agents, and reducing agents. Aqueous solutions are unstable. Commercial formaldehyde-alcohol solutions are stable. Gas is stable in absence of water. Avoid oxidizing and alkaline materials. Hazardous polymerization may occur. Compound will polymerize with active organic materials such as phenol. Will polymerize violently in the presence of caustics and nitrides; (amines) exothermic reaction, (Azo compound) exothermic reaction giving off nitrogen gas, (caustics) heat generation and violent polymerization, (dithiocarbamates) formation of flammable gases and toxic fumes, formation of carbon disulfide may result, (alkali and alkaline earth metals) heat generation and formation of a flammable hydrogen gas. (EPA, 1998)

Excerpt from ERG Guide 132 [Flammable Liquids - Corrosive]: Flammable/combustible material. May be ignited by heat, sparks or flames. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks). Vapor explosion hazard indoors, outdoors or in sewers. Those substances designated with a (P) may polymerize explosively when heated or involved in a fire. Runoff to sewer may create fire or explosion hazard. Containers may explode when heated. Many liquids are lighter than water. (ERG, 2016)

Behavior in Fire: Changes to formaldehyde gas, which is highly flammable. (USCG, 1999)

Special protective actions for fire-fighters

Use water in large amounts, water spray.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal protection: chemical protection suit and filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Remove all ignition sources. Do NOT let this chemical enter the environment.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Remove all ignition sources. Turn off gas at source if possible. Remove gas with fine water spray.

Methods and materials for containment and cleaning up

Use fluorocarbon water spray, Cellosize and Hycar to diminish vapors. Sodium carbonate, ammonium hydroxide, or sodium sulfite can neutralize the spill.

SECTION 7: Handling and storage

Precautions for safe handling

NO open flames. Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

Conditions for safe storage, including any incompatibilities

Fireproof. Cool. Separated from incompatible materials. See Chemical Dangers.... Minimum storage temperature to prevent polymerization range from 83 deg F for 37% formaldehyde containing 0.05% methyl alcohol to 29 deg F for formaldehyde containing 15% methyl alcohol.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: 0.1 ppm as TWA; 0.3 ppm as STEL; (SEN); A1 (confirmed human carcinogen).MAK: 0.37 mg/m³, 0.3 ppm; peak limitation category: I(2); sensitization of skin (SH); carcinogen category: 4; pregnancy risk group: C; germ cell mutagen group: 5

Biological limit values

no data available

Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear face shield or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Liquid. Liquid.
Colour:	Colorless, cloudiness or opalescence in formaldehyde is caused by polymer precipitation.
Odour:	Pungent, suffocating odor
Melting point/freezing point:	-18.8 °C. Remarks:30.19 % formaldehyde, 1 % methanol, cooling speed 1 K/min.;-25.9 °C. Remarks:40.08 % formaldehyde, 1.05 % methanol, cooling speed 1 K/min.;-9 °C. Remarks:50 % formaldehyde, 1,6 % methanol; substance solidifies as a glass.

Boiling point or initial boiling point and boiling range:	-19.1 °C. Atm. press.:1 013.25 hPa.
Flammability:	Flammable Gas
Lower and upper explosion limit/flammability limit:	Lower flammable limit: 7.0% by volume; Upper flammable limit: 73% by volume
Flash point:	85 °C.
Auto-ignition temperature:	395 °C. Atm. press.:1 013.25 hPa.
Decomposition temperature:	120-180°C
pH:	2.8 - 4.
Kinematic viscosity:	dynamic viscosity (in mPa s) = >= 2.083 - <= 2.835. Temperature:20°C. Remarks:Viscosity measured at 20 °C with different formaldehyde solutions. See table below for complete data.
Solubility:	Miscible with water
Partition coefficient n-octanol/water:	log Pow = 0.35. Temperature:25 °C. Remarks:The substance is not within the applicability domain of the model.
Vapour pressure:	14 hPa. Temperature:20 °C. Remarks:Reported as 14 mbar.;92 hPa. Temperature:50 °C. Remarks:Reported as 92 mbar.
Density and/or relative density:	>= 1.069 - <= 1.12 g/cm ³ . Temperature:20 °C.
Relative vapour density:	1.03 (vs air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

NIOSH considers formaldehyde to be a potential occupational carcinogen. /Formaldehyde/ Formalin (as formaldehyde)
The substance polymerizes in contact with alkalis and if dissolved in water. Upon heating, toxic fumes are formed. Reacts violently with strong oxidants, strong acids and strong bases. This generates explosion hazard.
The substance may polymerize if it is not stabilized. Reacts with acids and strong oxidants.
Decomposes on heating and on contact with acids, bases and oxidants. This produces flammable formaldehyde.

Chemical stability

On standing, especially in the cold, may become cloudy, and on exposure to very low temperature ppt of trioxymethylene formed; in air it slowly oxidizes to formic acid /40% solution/.

Possibility of hazardous reactions

Flammable liquid when exposed to heat or flame; can react vigorously with oxidizers. ... The gas is a more dangerous fire hazard than the vapor. The gas mixes well with air, explosive mixtures are easily formed., Dust explosion possible if in powder or granular form, mixed with air. If dry, it can be charged electrostatically by swirling, pneumatic transport, pouring, etc. FORMALDEHYDE (ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.) may react violently with strong oxidizing agents (hydrogen peroxide, performic acid, perchloric acid in the presence of aniline, potassium permanganate, nitromethane). May react with bases (sodium hydroxide, potassium hydroxide, ammonia), and with nitrogen dioxide (explosive reaction around 180°C). May react with hydrochloric acid to form highly toxic bis(chloromethyl) ether. Polymerization reaction with phenol may develop sudden destructive pressure [Bretherick, 5th ed., 1995, p.168]. May generate flammable and/or toxic gases in combination with azo, diazo compounds, dithiocarbamates, nitrides, and strong reducing agents. May generate toxic formaldehyde gas when heated. Can react with air to give first peroxy acids, and ultimately formic acid. These reactions are activated by light, catalyzed by salts of transition metals, and are autocatalytic (catalyzed by the products of the reaction). Incompatible with liquid oxygen.

Conditions to avoid

no data available

Incompatible materials

Amines) exothermic reaction, (AZO compd) exothermic reaction giving off nitrogen gas, (caustics) heat generation and violent polymerization, (dithiocarbamates) formation of flammable gasses and toxic fumes, formation of carbon disulfide may result, (alkali and alkaline earth metals) heat generation and formation of flammable hydrogen gas, (nitrides) heat generation, formation of flammable ammonia gas and violent polymerization, (nitro compd) heat generation, (unsaturated aliphatics and sulfides) heat generation, (organic peroxides) violent reaction, (oxidizing agents) heat generation, fire, and decomposition, (reducing agents) heat generation and formation of flammable gasses. From table

Hazardous decomposition products

Uncatalyzed decomposition is very slow below 300 deg C; extrapolation of kinetic data to 400 deg C indicates that the rate of decomposition is about 0.44%/min at 101 kPa (1 atm). The main products are carbon monoxide and hydrogen. Metals such as platinum, copper, chromia, and alumina also catalyze the formation of methanol, methylformate, formic acid, carbon dioxide, and methane.

SECTION 11: Toxicological information

Acute toxicity

Oral: LD50 - rat (male) - 460 mg/kg bw. Remarks: 2% formalin.

Inhalation: LC50 - rat (male/female) - < 463 ppm.

Dermal: LD50 Rabbit percutaneous 270 mg/kg Formalin

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

There is sufficient evidence in humans for the carcinogenicity of formaldehyde. Formaldehyde causes cancer of the nasopharynx and leukaemia. Also, a positive association has been observed between exposure to formaldehyde and sinonasal cancer. There is sufficient evidence in experimental animals for the carcinogenicity of formaldehyde. The Working Group was not in full agreement on the evaluation of formaldehyde causing leukaemias in humans, with a small majority viewing the evidence as sufficient of carcinogenicity and the minority viewing the evidence as limited. Particularly relevant to the discussions regarding sufficient evidence was a recent study accepted for publication which, for the first time, reported aneuploidy in blood of exposed workers characteristic of myeloid leukaemia and myelodysplastic syndromes, with supporting information suggesting a decrease in the major circulating blood-cell types and in circulating haematological precursor cells. The authors and Working Group felt that this

study needed to be replicated. Formaldehyde is carcinogenic to humans (Group 1).

Reproductive toxicity

An increased incidence of menstrual disorders were observed in female workers using urea-formaldehyde resins. However, possible confounding factors were not evaluated in this study. A study of hospital equipment sterilizing workers did not report an association between formaldehyde exposure and increased spontaneous abortions. Developmental effects, such as birth defects, have not been observed in animal studies with formaldehyde.

STOT-single exposure

The substance is severely irritating to the eyes and skin. The vapour is severely irritating to the respiratory tract. Inhalation of high concentrations may cause lung oedema, but only after initial corrosive effects on the eyes and the upper respiratory tract have become manifest.

STOT-repeated exposure

Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. Repeated or chronic inhalation of the vapour may cause chronic inflammation of the upper respiratory tract. This substance is carcinogenic to humans.

Aspiration hazard

A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C.

SECTION 12: Ecological information

Toxicity

Toxicity to fish: LC50 - *Morone saxatilis* - 6.7 mg/L - 96 h. Remarks: Formaldehyde 100%.

Toxicity to daphnia and other aquatic invertebrates: EC50 - *Daphnia pulex* - 5.8 mg/L - 48 h. Remarks: Formaldehyde 100%.

Toxicity to algae: EC50 - *Desmodesmus subspicatus* (previous name: *Scenedesmus subspicatus*) - 3.48 mg/L - 72 h.

Toxicity to microorganisms: EC50 - activated sludge - 19 mg/L - 3 h. Remarks: Respiration rate.

Persistence and degradability

AEROBIC: Formaldehyde, present at 100 mg/L, reached 91% of its theoretical BOD in 2 weeks using an activated sludge inoculum at 30 mg/L in the Japanese MITI test which classified the compound as readily biodegradable(1). Using OECD Guide-line 301D (Ready

Biodegradability: Closed Bottle Test), formaldehyde achieved 90% in 28 days using non-acclimated inoculum which classified the compound as readily biodegradable(2). Formaldehyde in aqueous effluent was degraded by activated sludge and sewage in 48-72 hr(3-6). In a die-away test using water from a stagnant lake, degradation was complete in 30 hours under aerobic conditions(6). Other biodegradation screening tests gave half-lives ranging from <1 to 17.3 days(7-12).

Bioaccumulative potential

An estimated BCF of 3 was calculated for formaldehyde(SRC), using a log Kow of 0.35(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC). Experiments performed on a variety of fish and shrimp showed no bioconcentration of formaldehyde(4,5).

Mobility in soil

The Koc of formaldehyde is estimated as 8(SRC), using a log Kow of 0.35(1) and a regression-derived equation(2). According to a classification scheme(3), this estimated Koc value suggests that formaldehyde is expected to have very high mobility in soil(SRC). Formaldehyde gas adsorbs on clay minerals to a degree at high gas concentrations which is an important quality in its use as a soil fumigant(4). In addition, formaldehyde may interact with humic substances in soil(5) resulting in decreased mobility.

Other adverse effects

no data available

SECTION 13: Disposal considerations

Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

UN Number

ADR/RID: UN1198 (For reference only, please check.)

IMDG: UN1198 (For reference only, please check.)

IATA: UN1198 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: FORMALDEHYDE SOLUTION, FLAMMABLE (For reference only, please check.)

IMDG: FORMALDEHYDE SOLUTION, FLAMMABLE (For reference only, please check.)

IATA: FORMALDEHYDE SOLUTION, FLAMMABLE (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 3 (For reference only, please check.)

IMDG: 3 (For reference only, please check.)

IATA: 3 (For reference only, please check.)

Packing group, if applicable

ADR/RID: III (For reference only, please check.)

IMDG: III (For reference only, please check.)

IATA: III (For reference only, please check.)

Environmental hazards

ADR/RID: No

IMDG: No

IATA: No

Special precautions for user

no data available

Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question

European Inventory of Existing Commercial Chemical Substances (EINECS)

Listed.

EC Inventory

Listed.

United States Toxic Substances Control Act (TSCA) Inventory

Listed.

China Catalog of Hazardous chemicals 2015

Listed.

New Zealand Inventory of Chemicals (NZIoC)

Listed.

(PICCS)

Listed.

Vietnam National Chemical Inventory

Listed.

IECSC)

Listed.

Korea Existing Chemicals List (KECL)

Listed.

SECTION 16: Other information

Abbreviations and acronyms

CAS: Chemical Abstracts Service

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

RID: Regulation concerning the International Carriage of Dangerous Goods by Rail

IMDG: International Maritime Dangerous Goods

IATA: International Air Transportation Association

TWA: Time Weighted Average

STEL: Short term exposure limit

LC50: Lethal Concentration 50%

LD50: Lethal Dose 50%

EC50: Effective Concentration 50%

References

IPCS - The International Chemical Safety Cards (ICSC), website: <http://www.ilo.org/dyn/icsc/showcard.home>

HSDB - Hazardous Substances Data Bank, website: <https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

IARC - International Agency for Research on Cancer, website: <http://www.iarc.fr/>

eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en

CAMEO Chemicals, website: <http://cameochemicals.noaa.gov/search/simple>

ChemIDplus, website: <http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp>

ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: <http://www.phmsa.dot.gov/hazmat/library/erg>

Germany GESTIS-database on hazard substance, website: <http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp>

ECHA - European Chemicals Agency, website: <https://echa.europa.eu/>

Other Information

Immediate administration of an appropriate inhalation therapy by a doctor, or by an authorized person, should be considered. Methanol, added as stabilizer or inhibitor to commercial formulations, can influence the physical and toxicological properties of this substance. See ICSC 0057.

Disclaimer: The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. We as supplier shall not be held liable for any