

Chemical Safety Data Sheet MSDS / SDS

Hydrogen cyanide 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: Hydrogen cyanide

CAS: 74-90-8

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 2, Oral

Acute toxicity - Category 1, Dermal

Acute toxicity - Category 2, Inhalation
Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1
Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 1

GHS label elements, including precautionary statements

Pictogram(s)



Signal word

Danger

Hazard statement(s)

H300 Fatal if swallowed
H310 Fatal in contact with skin
H330 Fatal if inhaled
H410 Very toxic to aquatic life with long lasting effects

Precautionary statement(s)

Prevention

P264 Wash ... thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P262 Do not get in eyes, on skin, or on clothing.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P284 [In case of inadequate ventilation] wear respiratory protection.
P273 Avoid release to the environment.

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.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P320 Specific treatment is urgent (see ... on this label).
P391 Collect spillage.

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: Hydrogen cyanide

Common names and synonyms: Hydrogen cyanide

CAS number: 74-90-8

EC number: 200-821-6

Concentration: 100%

SECTION 4: First aid measures

Description of necessary first-aid measures

If inhaled

Fresh air, rest. Half-upright position. No mouth-to-mouth artificial respiration. Administration of oxygen may be needed. Refer for medical attention. See Notes.

Following skin contact

Rinse skin with plenty of water or shower. Refer for medical attention . Wear protective gloves when administering first aid.

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth. Do NOT induce vomiting. NO mouth-to-mouth artificial respiration. Administration of oxygen may be needed. Refer for medical attention . See Notes.

Most important symptoms/effects, acute and delayed

Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]: TOXIC; inhalation, ingestion or skin contact with material may cause severe injury or death. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)

Excerpt from ERG Guide 117 [Gases - Toxic - Flammable (Extreme Hazard)]: TOXIC; Extremely Hazardous. May be fatal if inhaled or absorbed through skin. Initial odor may be irritating or foul and may deaden your sense of smell. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution. (ERG, 2016)

It is super toxic. Breathing in a small amount of the gas or swallowing a very small amount may be fatal. Average fatal dose is 50-60 mg. A few minutes of exposure to 300 ppm may result in death. Exposure to 150 ppm for 1/2 to 1 hour may endanger life. (EPA, 1998)

Excerpt from ERG Guide 117 [Gases - Toxic - Flammable (Extreme Hazard)]: TOXIC; Extremely Hazardous. May be fatal if inhaled or absorbed through skin. Initial odor may be irritating or foul and may deaden your sense of smell. Contact with gas or liquefied gas may cause burns, severe injury and/or frostbite. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution. (ERG, 2016)

Excerpt from ERG Guide 152 [Substances - Toxic (Combustible)]: Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. Contact with molten substance may cause severe burns to skin and eyes. Avoid any skin contact. Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. (ERG, 2016)

Excerpt from ERG Guide 131 [Flammable Liquids - Toxic]: TOXIC; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn 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)

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

PREHOSPITAL/ Management of cyanide poisoning begins with removal to fresh air. Dermal decontamination is unnecessary if exposure has been only to vapor, but wet clothing should be removed and the underlying skin should be washed with soap and water or water alone if liquid on the skin is a possibility. Attention to the basics of intensive supportive care is critical and includes mechanical ventilation as needed, circulatory support with crystalloids and vasopressors, correction of metabolic acidosis with IV sodium bicarbonate, and seizure control with benzodiazepine administration. ... Administration of 100% oxygen has been found empirically to exert a beneficial effect and should be a part of general supportive care for every cyanide-poisoned patient.

SECTION 5: Firefighting measures

Suitable extinguishing media

Fire situation may require evacuation. Allow burning of material until flow of gas can be stopped. Use water spray, dry chemical, "alcohol resistant" foam, or carbon dioxide. Water may be ineffective. Approach fire from upwind. Fight fire from protected location or maximum possible distance.

Specific hazards arising from the chemical

Excerpt from ERG Guide 154 [Substances - Toxic and/or Corrosive (Non-Combustible)]: Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Some are oxidizers and may ignite combustibles (wood, paper, oil, clothing, etc.). Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. For electric vehicles or equipment, ERG Guide 147 (lithium ion batteries) or ERG Guide 138 (sodium batteries) should also be consulted. (ERG, 2016)

Excerpt from ERG Guide 117 [Gases - Toxic - Flammable (Extreme Hazard)]: These materials are extremely flammable. May form explosive mixtures with air. May be ignited by heat, sparks or flames. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may travel to source of ignition and flash back. Runoff may create fire or explosion hazard. Cylinders exposed to fire may vent and release toxic and flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. (ERG, 2016)

Unstabilized hydrocyanic acid may polymerize spontaneously with explosive violence. Flashback along vapor trail may occur. The explosion hazard is severe when this material is exposed to heat, flame, or oxidizers. It forms explosive mixtures with air, and will react with water, steam, acid, or acid fumes to produce highly toxic fumes of cyanides. It may decompose explosively upon contact with alkaline material. Avoid acetaldehyde, alkaline materials, oxidizers, water, steam, acid, and acid fumes.

Hydrocyanic acid solution is sensitive to light. It may become unstable and subject to explosion if stored for an extended time or exposed to high temperature and pressure. Avoid heat, flame or oxidizers. Hazardous polymerization may occur. Unstabilized hydrocyanic acid may polymerize spontaneously with explosive violence. Can polymerize at 122-140F or when catalyzed with traces of alkali. (EPA, 1998)

Excerpt from ERG Guide 117 [Gases - Toxic - Flammable (Extreme Hazard)]: These materials are extremely flammable. May form explosive mixtures with air. May be ignited by heat, sparks or flames. Vapors from liquefied gas are initially heavier than air and spread along ground. Vapors may travel to source of ignition and flash back. Runoff may create fire or explosion hazard. Cylinders exposed to fire may vent and release toxic and flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. (ERG, 2016)

Excerpt from ERG Guide 152 [Substances - Toxic (Combustible)]: Combustible material: may burn but does not ignite readily. Containers may explode when heated. Runoff may pollute waterways. Substance may be transported in a molten form. (ERG, 2016)

Excerpt from ERG Guide 131 [Flammable Liquids - Toxic]: HIGHLY FLAMMABLE: Will be easily 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 and poison 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)

Special protective actions for fire-fighters

Shut off supply; if not possible and no risk to surroundings, let the fire burn itself out. In other cases extinguish with powder, water spray, alcohol-resistant foam, carbon dioxide. In case of fire: keep cylinder cool by spraying with water. Combat fire from a sheltered position.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures

Remove all ignition sources. Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Ventilation. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. NEVER direct water jet on liquid.

Environmental precautions

Evacuate danger area! Consult an expert! Personal protection: gas-tight chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment. Ventilation. Remove all ignition sources. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations. NEVER direct water jet on liquid.

Methods and materials for containment and cleaning up

1. Remove all ignition sources. 2. Ventilate area of spill or leak. 3. If in gaseous form, stop flow of gas. If source of leak is cylinder & leak cannot be stopped in place, remove ... to safe place in open air ... repair leak or allow cylinder to empty.

SECTION 7: Handling and storage

Precautions for safe handling

NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. 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. Separated from food and feedstuffs. Cool. Store only if stabilized. Keep cylinders of hydrogen cyanide (HCN) cool and away from open flames. Make certain that HCN cylinders are adequately supported and grounded during storage and emptying. Store cylinders in a vertical position. Do not drop cylinders or damage them by impact. Cylinders must be returned to the supplier within 90 days of the filling date marked on the cylinders, regardless of whether or not the contents have been used. This is due to the possibility of HCN becoming unstable over time. If there is any indication that the HCN is becoming unstable, such as a darkening of the product or an increase in cylinder pressure, contact the supplier immediately for instructions.

SECTION 8: Exposure controls/personal protection

Control parameters

Occupational Exposure limit values

TLV: (ceiling value): 4.7 ppm as STEL; (skin). EU-OEL: 1 mg/m³, 0.9 ppm as TWA; 5 mg/m³, 4.5 ppm as STEL; (skin)

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 ventilation, local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state:	Hydrocyanic acid, aqueous solution, with not more than 20% hydrogen cyanide is a clear colorless aqueous solution of a gas. Has a faint odor of almonds. Can evolve hydrogen cyanide gas, which is (barely) lighter than air. Flame can flash back to the source of a gas leak very easily. Lethal doses of gas may be inhaled. Lethal doses of cyanide can be absorbed from the solution through the skin.
Colour:	Colorless gas or liquid
Odour:	Characteristic sweetish, like almond
Melting point/freezing point:	-14°C
Boiling point or initial boiling point and boiling range:	25 - 26°C
Flammability:	Extremely flammable. Gives off irritating or toxic fumes (or gases) in a fire.
Lower and upper explosion limit/flammability limit:	Lower flammable limit: 5.6% by volume; Upper flammable limit: 40.0% by volume
Flash point:	17.5°C
Auto-ignition temperature:	1004° F (USCG, 1999)
Decomposition temperature:	no data available
pH:	Very weak acid (does not redden litmus)
Kinematic viscosity:	no data available
Solubility:	Miscible (NIOSH, 2016)
Partition coefficient n-octanol/water:	log Kow = -0.25

Vapour pressure:	630 mm Hg (EPA, 1998)
Density and/or relative density:	0.69
Relative vapour density:	0.901 (EPA, 1998) (Relative to Air)
Particle characteristics:	no data available

SECTION 10: Stability and reactivity

Reactivity

The substance may polymerize due to heating under the influence of bases, over 2% water, or if not chemically stabilized. This generates fire or explosion hazard. On combustion, forms toxic and corrosive gases including nitrogen oxides. The solution in water is a weak acid. Reacts violently with oxidants and hydrogen chloride in alcoholic mixtures. This generates fire and explosion hazard.

Hydrogen cyanide (AC) is unstable with heat, alkaline materials, and water. Hydrogen cyanide (AC) reacts with amines, oxidants, acids, sodium hydroxide, calcium hydroxide, sodium carbonate, caustic substances, and ammonia. Hydrogen cyanide (AC) may polymerize at 122°F to 140°F (50°C to 60°C); polymerization can occur violently in the presence of heat, alkaline materials, or moisture.

Chemical stability

Soln sensitive to light

Possibility of hazardous reactions

Flammable and dangerous fire hazard ... May be ignited by fires, heated materials, and sparks. The gas mixes well with air, explosive mixtures are easily formed. Hazardous concentrations may develop quickly in enclosed or poorly-ventilated areas. Hydrogen cyanide (AC) gas mixes well with air; explosive mixtures are easily formed. HYDROCYANIC ACID, AQUEOUS SOLUTION, WITH NOT MORE THAN 20% HYDROGEN CYANIDE reacts with acid to evolve hydrogen cyanide, a very poisonous colorless gas smelling of bitter almonds which is a deadly human poison by all routes. Carbon dioxide from the air is sufficiently acidic to liberate HCN from aqueous solutions of hydrocyanic acid [Lewis]. The solution also can evolve gaseous hydrogen cyanide when heated. Inhalation of gaseous HCN is quickly fatal by respiratory arrest. The gas forms flammable or explosive mixtures with air (may be difficult to ignite at lower concentrations). It presents an explosion hazard when heated with or exposed to other oxidizing agents and may polymerize explosively at elevated temperature (50-60°C) or in the presence of traces of alkali [Wohler, L. et al., Chem. Ztg., 1926, 50, p. 761, 781]. It reacts violently with acetaldehyde. During the preparation of imidoester hydrochlorides, hydrogen chloride was rapidly passed over an alcoholic solution of hydrogen cyanide. An explosion ensued, despite

cooling of the process [J. Org. Chem., 1955, 20, 1573]. In the absence of a stabilizer (e.g. phosphoric acid) it may undergo explosively rapid spontaneous (autocatalytic) polymerization leading to a fire. The reaction is autocatalytic because of ammonia formation [Bond, J., Loss Prev. Bull., 1991, 101, p.3].

Conditions to avoid

no data available

Incompatible materials

Unless stabilized and maintained, samples stored more than 90 days are hazardous. The gas can form explosive mixtures with air. Material containing more than 2-5% water are less stable than dry material and can be self-reactive, forming explosive mixtures with air. Heat above 50-60 deg C or contact with amines or strong bases can cause polymerization. ... attacks some plastics, rubber, and coatings.

Hazardous decomposition products

Extremely toxic vapors /unspecified/ are generated even at ordinary temperatures.

SECTION 11: Toxicological information

Acute toxicity

Oral: LD50 Mouse oral 3700 ug/kg

Inhalation: LC50 Rat inhalation 3778 mg/cu m (10 sec)

Dermal: no data available

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

EPA-II

Reproductive toxicity

No studies were located on the reproductive or developmental effects of cyanide in humans from inhalation exposure. Animal studies have suggested that oral exposure to cassava (a cyanide-containing vegetable) may be associated with malformations in the fetus and low fetal body weights.

STOT-single exposure

The substance is irritating to the eyes and respiratory tract. The substance may be irritating to the skin. The substance may cause effects on the cellular respiration. This may result in convulsions and unconsciousness. Exposure could cause death. Medical observation is indicated. See Notes.

STOT-repeated exposure

The substance may have effects on the thyroid.

Aspiration hazard

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

SECTION 12: Ecological information

Toxicity

Toxicity to fish: LC50 *Lepomis macrochirus* (bluegill swim up fry) 232-365 ug/L/96 hr, flow-through bioassay

Toxicity to daphnia and other aquatic invertebrates: no data available

Toxicity to algae: no data available

Toxicity to microorganisms: no data available

Persistence and degradability

Waste water treatment; sludge digestion: at 25 mg/L: no adverse effect in 24 days; at 30 mg/L: initial retarding effect for 6 days; at 50 mg/L: 10% reduction in gas production.

Bioaccumulative potential

An estimated BCF of 3 was calculated in fish for hydrogen cyanide(SRC), using log Kow of -0.25(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).

Mobility in soil

Hydrogen cyanide is only weakly absorbed by organic matter(1). Hydrogen cyanide is not strongly partitioned into the sediments or suspended adsorbents, primarily due to its high solubility in water. Cyanide mobility is least where soils exhibit low pH, high concn of free iron oxides, and positively charged particles (eg, kaolin, chlorite, gibbsite). Mobility is greatest at high pH, high concn of free calcium carbonate (high negative charge) and low clay content. Adsorption of hydrogen cyanide by montmorillonitic clays is fairly weak and is decreased by the presence of water(2).

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: UN3294 (For reference only, please check.)
IMDG: UN3294 (For reference only, please check.)
IATA: UN3294 (For reference only, please check.)

UN Proper Shipping Name

ADR/RID: HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45% hydrogen cyanide (For reference only, please check.)
IMDG: HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45% hydrogen cyanide (For reference only, please check.)
IATA: HYDROGEN CYANIDE, SOLUTION IN ALCOHOL with not more than 45% hydrogen cyanide (For reference only, please check.)

Transport hazard class(es)

ADR/RID: 6.1 (For reference only, please check.)
IMDG: 6.1 (For reference only, please check.)
IATA: 6.1 (For reference only, please check.)

Packing group, if applicable

ADR/RID: I (For reference only, please check.)
IMDG: I (For reference only, please check.)
IATA: I (For reference only, please check.)

Environmental hazards

ADR/RID: Yes
IMDG: Yes
IATA: Yes

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

The occupational exposure limit value should not be exceeded during any part of the working exposure. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Isolate contaminated clothing by sealing in a bag or other container. The odour warning when the exposure limit value is exceeded is insufficient. The recommendations on this Card also apply to hydrogen cyanide, stabilized, absorbed in a porous inert material. Other UN numbers: 1613, Hydrogen cyanide, aqueous solution, not more than 20% hydrogen cyanide; 1614, Hydrogen cyanide, stabilized, containing less than 3% water and absorbed in a porous inert material; 3294, Hydrogen cyanide, solution in alcohol with not more than 45% hydrogen cyanide. Never work alone in an area if hydrogen cyanide exposure is possible. Depending on the degree of exposure, periodic medical examination is suggested.

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