

# Safety Data Sheet

According To Regulation (EC) No 1907/2006 (REACH)

## QUARTZ

Version: 2.0  
Form No: SDS/002

Print Date : 02.03.2020  
Revision Date : 02.03.2020

### 1. IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY/UNDERTAKING

#### 1.1 Product Identifier

<b>Substance Name</b>	<b>QUARTZ</b>
<b>CAS<sup>1</sup> No</b>	14808-60-7
<b>EINECS<sup>2</sup> No</b>	238-878-4
<b>EINECS Name</b>	Quartz (SiO <sub>2</sub> )
<b>Molecular Formula</b>	O <sub>2</sub> Si
<b>Synonyms</b>	SiO <sub>2</sub> , "crystalline silica", agate, flint, amethyst, celite, chalcedony, cherts, "silica flour", chertz, flintshot, "Gold Bond R", Imsil, Novaculite, "ground quartz", onyx, alpha-quartz, "rose quartz", Min-u-sil, Sil-co-sil, "silicic anhydride", "silicon dioxide", oxide, "Silver Bond B", Snowit, Silex, "Silica 300WQ", "quartz sand", "Silica Ferro 400", "WIA Raw Materials Code 0710", "Alsigran Micro 5", "ASTM Testig Sands", "Glass Sand", "Flint Silica", "DM Series", F-Series, "Foundry Sands", FJ-Series\FP-Series, H-Series, L-Series, N-Seies, NJ-Series, OK-Series, P-Series, T-Series, "Hydraulic Fracing Sands", "Min-U-Sil Ground Silica", "Mystic White #1 Dry", "Penn Sand", Q-Rok, Supersil, "Mason Sand", "GS Series", "Per Spec"

#### 1.2 Relevant Identified Uses Of The Product And Uses Advised Against

<b>Relevant Identified Uses</b>	In glass; ceramics, porcelain, pottery, vitreous enamels; in foundry metal moulding; refractory bricks; silica bricks; tombstones, water glass. Abrasive for metal finishing; metal polish; scouring and grinding compound. As sand: a component of building materials, concrete, mortar, macadam mixes As a silicone rubber reinforcing agent; flattening agent / filler in paints, primers, undercoats, woodfiller. In domestic scouring cleaners and powders. Minor component of cosmetics, pharmaceuticals, toothpaste, medicinals, insecticides, defoaming agents. Elemental silicon and ferrosilicon source. Pure quartz crystals in electronic components, piezoelectric control in oscillators, frequency standards, wave filters, radio and TV components.
<b>Uses Advised Against</b>	No data available

#### 1.3 Details Of The Supplier Of The Safety Data Sheet

<b>Supplier (Manufacturer)</b>	<b>KALTUN MADENCILIK SAN. VE TIC. A.S.</b>
<b>Address</b>	Aydin - Mugla Kara Yolu Kenari Cine AYDIN TURKEY
<b>Telephone</b>	+ 90 256 729 16 00
<b>Fax</b>	+ 90 256 729 16 15
<b>Company E-mail</b>	<a href="mailto:kaltun@kaltun.com.tr">kaltun@kaltun.com.tr</a>
<b>Company Web Page</b>	<a href="http://www.kaltun.com.tr">www.kaltun.com.tr</a>

#### 1.4 Information Providing Authority About Safety Data Sheet

Sabriye GÜNGÖR – Quality Assurance Manager

#### 1.5 Emergency Telephone Number

<b>Company Emergency</b>	+ 90 256 729 16 00
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### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification Of The Substance

##### 2.1.1 Classification According to Regulation (EC) No 1272/2008

- Eye Irritation Category 2B
- Specific Target Organ Toxicity - Repeated exposure, Category 2

#### 2.2 Label Elements

##### 2.2.1 CLP<sup>3</sup> Label Elements



<b>Signal Word</b>	WARNING	
<b>Hazard Statement(s)</b>	H320	Causes eye irritation
	H373	May cause damage to organs through prolonged or repeated exposure inhalation.
<b>Supplementary Statement(s)</b>	No Data Available	
<b>Precautionary Statement(s)</b>	<b>Prevention</b>	
	P260	Do not breathe dusts.
	P264	Wash thoroughly after handling.
	<b>Response</b>	
	P305+P351+P338	Wash thoroughly after handling.
	P314	Get medical advice/attention if you feel unwell.
	P337+P313	If eye irritation persists: Get medical advice/attention.

#### 2.3 Hazard Identification

Crystalline silica is listed by IARC<sup>4</sup> as "Carcinogenic to humans (Group 1)" Prolonged exposure to dust containing respirable quartz may cause silicosis or pneumoconiosis

##### 2.3.1 Skin Contact

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

Open cuts, abraded or irritated skin should not be exposed to this material. Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

##### 2.3.2 Eye Contact

Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the

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*conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.*

### 2.3.3 Ingestion

*Although ingestion is not thought to produce harmful effects (as classified under EC Directives), the material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.*

*Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastro-intestinal tract*

### 2.3.4 Inhalation

*The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress. Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.*

*Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.*

*If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures. Effects on lungs are significantly enhanced in the presence of respirable particles. Overexposure to respirable dust may produce wheezing, coughing and breathing difficulties leading to or symptomatic of impaired respiratory function.*

*Acute silicosis occurs under conditions of extremely high silica dust exposure particularly when the particle size of the dust is small. It differs greatly from classical silicosis both clinically and pathologically. The disease is rapidly progressive with diffuse pulmonary involvement developing only months after the initial exposure and causing deaths within 1 to 2 years. It is often complicated by an associated tuberculosis. The lungs of victims contain no classical silicotic nodules or only a few, microscopic abortive nodules, whereas the air spaces are diffusively filled and distended with silica-containing, lipoprotein paste in which degenerating and necrotic macrophages are sometimes discernible - the condition is sometimes described as alveolar lipoproteinosis. The uptake of silica particles by macrophages and lysosomal incorporation, is followed by rupture of the lysosomal membrane and release of lysosomal enzymes into cytoplasm of the macrophage. This causes the macrophage to be digested by its own enzymes and after lysis the free silica is released to be ingested by other macrophages thus continuing initiate collagen formation in the lung tissue producing the characteristic nodule found in classical (chronic) silicosis.*

### 2.3.5 Long term effects

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*Harmful: danger of serious damage to health by prolonged exposure through inhalation.*

*Serious damage (clear functional disturbance or morphological change which may have toxicological significance) is likely to be caused by repeated or prolonged exposure. As a rule the material produces, or contains a substance which produces severe lesions. Such damage may become apparent following direct application in subchronic (90 day) toxicity studies or following sub-acute (28 day) or chronic (two-year) toxicity tests. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems. Chronic symptoms produced by crystalline silicas included decreased vital lung capacity and chest infections. Lengthy exposure may cause silicosis a disabling form of pneumoconiosis which may lead to fibrosis, a scarring of the lining of the air sacs in the lung. Symptoms may appear 8 to 18 months after initial exposure. Smoking increases this risk. Classic silicosis is a chronic disease characterised by the formation of scattered, rounded or stellate silica-containing nodules of scar tissue in the lungs ranging from microscopic to 1.0 cm or more. The nodules isolate the inhaled silica particles and protect the surrounding normal and functioning tissue from continuing injury. Simple silicosis (in which the nodules are less than 1.0 cm in diameter) is generally asymptomatic but may be slowly progressive even in the absence of continuing exposure. Simple silicosis can develop in complicated silicoses (in which nodules are greater than 1.0 cm in diameter) and can produce disabilities including an associated tuberculous infection (which 50 years ago accounted for 75% of the deaths among silicotic workers). Crystalline silica deposited in the lungs causes epithelial and macrophage injury and activation. Crystalline silica translocates to the interstitium and the regional lymph nodes and cause the recruitment of inflammatory cells in a dose dependent manner. In humans, a large fraction of crystalline silica persists in the lungs. The question of potential carcinogenicity associated with chronic inhalation of crystalline silica remains equivocal with some studies supporting the proposition and others finding no significant association. The results of recent epidemiological studies suggest that lung cancer risk is elevated only in those patients with overt silicosis. A relatively large number of epidemiological studies have been undertaken and in some, increased risk gradients have been observed in relation to dose surrogates - cumulative exposure, duration of exposure, the presence of radiographically defined silicosis, and peak intensity exposure. Chronic inhalation in rats by single or repeated intratracheal instillation produced a significant increase in the incidences of adenocarcinomas and squamous cell carcinomas of the lung. Lifetime inhalation of crystalline silica (87% alpha-quartz) at 1 mg/m<sup>3</sup> (74% respirable) by rats, produced an increase in animals with keratinising cystic squamous cell tumours, adenomas, adenocarcinomas, adenosquamous cell carcinomas, squamous cell carcinoma and nodular bronchiolar alveolar hyperplasia accompanied by extensive subpleural and peribronchiolar fibrosis, increased pulmonary collagen content, focal lipoproteinosis and macrophage infiltration. Thoracic and abdominal malignant lymphomas developed in rats after single intrapleural and intraperitoneal injection of suspensions of several types of quartz.*

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*Some studies show excess numbers of cases of scleroderma, connective tissue disorders, lupus, rheumatoid arthritis chronic kidney diseases, and end-stage kidney disease in workers*

**NOTE:**

*Some jurisdictions require health surveillance be conducted on workers occupationally exposed to silica, crystalline. Such surveillance should emphasise*

- demography, occupational and medical history and health advice*
- standardised respiratory function tests such as FEV1, FVC and FEV1/FVC*
- standardised respiratory function tests such as FV1, FVC and FEV1/FVC*
- chest X-ray, full size PA view*
- records of personal exposure*

*Overexposure to respirable dust may cause coughing, wheezing, difficulty in breathing and impaired lung function. Chronic symptoms may include decreased vital lung capacity, chest infections*

*Repeated exposures, in an occupational setting, to high levels of fine- divided dusts may produce a condition known as pneumoconiosis which is the lodgement of any inhaled dusts in the lung irrespective of the effect. This is particularly true when a significant number of particles less than 0.5 microns (1/50,000 inch), are present. Lung shadows are seen in the X-ray. Symptoms of pneumoconiosis may include a progressive dry cough, shortness of breath on exertion (exertional dyspnea), increased chest expansion, weakness and weight loss. As the disease progresses the cough produces a stringy mucous, vital capacity decreases further and shortness of breath becomes more severe. Other signs or symptoms include altered breath sounds, diminished lung capacity, diminished oxygen uptake during exercise, emphysema and pneumothorax (air in lung cavity) as a rare complication.*

*Removing workers from possibility of further exposure to dust generally leads to halting the progress of the lung abnormalities. Where worker-exposure potential is high, periodic examinations with emphasis on lung dysfunctions should be undertaken. Dust inhalation over an extended number of years may produce pneumoconiosis.. Pneumoconiosis is the accumulation of dusts in the lungs and the tissue reaction in its presence. It is further classified as being of noncollagenous or collagenous types. Noncollagenous pneumoconiosis, the benign form, is identified by minimal stromal reaction, consists mainly of reticulin fibres, an intact alveolar architecture and is potentially reversible.*

**2.3.6 Adverse Environmental Effects**

*Presents no particular risk to the environment, provided the disposal requirements (see section 13) and national or local regulations are complied with*

**2.3.7 Physical and chemical hazards :**

*No particular fire or explosion hazard*

**2.4 Additional Information**

*Caution - substance not yet tested completely  
Full text of R-, H- and EUH-phrases: see section 16*

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### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Description Of The Substance

Quartz (SiO<sub>2</sub>)

#### 3.2 Hazardous ingredients

NAME	EINECS NO	CAS NO.	CONTENT	CLASSIFICATION
				CLP
Quartz	238-878-4	14808-60-7	100	 WARNING Eye Irr. Cat.2B STOT-Repeated.Exp.Cat.2 H320,H373

#### 3.3 Additional information

- Full text of R-, H- and EUH-phrases: see section 16.

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### 4.1.1 General information

- Show this safety data sheet to the doctor in attendance.

##### 4.1.2 Following inhalation

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained.
- Perform CPR if necessary and transport to hospital, or doctor.



##### 4.1.3 Following skin contact

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.



##### 4.1.4 Following eye contact

- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.



##### 4.1.5 Following ingestion

- Immediately rinse mouth with water.
- Immediately give a glass of water.
- First aid is not generally required.
- If in doubt, contact a Poisons Information Centre or a doctor.



##### 4.1.6 Self-protection of the first aider

- Protect skin and eyes.

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- Wear protective cloths.

### 4.1.7 Notes for the doctor

- Treat symptomatically.
- Exposed workers should be medically examined regularly with emphasis on respiratory system. Individuals with pulmonary disease should be precluded from exposure.

### 4.2 Indication of any immediate medical attention and special treatment needed

- Keep the injured under health care for bronchitis, trachea and lung edemas.
- Aggravating harmful effects can take place

## 5. FIRE-FIGHTING MEASURES

### 5.1 General Information and Flammable Properties

- Noncombustible.
- Not considered a significant fire risk, however containers may burn.

### 5.2 Extinguishing media:

- There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area

### 5.3 Special hazards arising from the product

Decomposition may produce toxic fumes of:

- Silicon dioxide (SiO<sub>2</sub>)
- Metal oxides
- May emit poisonous fumes.
- May emit corrosive fumes.
- At temperatures above 870 C. it changes crystal structure to more health hazardous forms.

### 5.4 Advice for fire-fighters

When silica dust is dispersed in air, firefighters should wear inhalation protection as hazardous substances from the fire may be adsorbed on the silica particles.

When heated to extreme temperatures, (>1700 °C) amorphous silica can fuse.

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use firefighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

### 5.5 Additional information

- If involved in a fire, keep containers cool with water spray.
- If safe to do so, remove containers from path of fire. Consider evacuation.

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

- Breathing apparatus.
- Clear area of all unprotected personnel.

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- See Section 8

### 6.2 Environmental precautions

- If contamination of sewers or waterways has occurred advise emergency services or local regulatory body.
- Spillages or uncontrolled discharges into watercourses must be alerted to the Environmental Agency or other appropriate regulatory body.
- See section 12

### 6.3 Methods and material for containment and cleaning up

#### 6.3.1 For containment

##### Minor Spills:

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.

##### Major Spills: Moderate hazard.

- **CAUTION:** Advise personnel in area.
- Alert Emergency Services and tell them location and nature of hazard.
- Control personal contact by wearing protective clothing.
- Prevent, by any means available, spillage from entering drains or water courses.
- Recover product wherever possible.
- **IF DRY:** Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal.
- **IF WET:** Vacuum/shovel up and place in labeled containers for disposal.
- **ALWAYS:** Wash area down with large amounts of water and prevent runoff into drains.
- If contamination of drains or waterways occurs, advise Emergency Services.

#### 6.3.2 For cleaning up

- Clean mechanically.

#### 6.3.3 Other information

- Keep in suitable, closed containers for disposal.

### 6.4 Reference to other sections

- See Section 13.

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

#### 7.1.1 Protective measures



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### Personal preventions

- Avoid all personal contact, including inhalation.
  - Wear protective clothing when risk of exposure occurs.
  - Use in a well-ventilated area.
  - Prevent concentration in hollows and sumps.
  - DO NOT enter confined spaces until atmosphere has been checked.
  - DO NOT allow material to contact humans, exposed food or food utensils.
  - Avoid contact with incompatible materials.
  - When handlings, DO NOT eat, drink or smoke.
  - Keep containers securely sealed when not in use.
  - Avoid physical damage to containers.
  - Always wash hands with soap and water after handling.
  - Work clothes should be laundered separately. Launder contaminated clothing before re-use.
  - Use good occupational work practice.
  - Observe manufacturer's storing and handling recommendations.
  - Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

### Fire preventions

- See section 5

### Dust generation preventions:

- Check the amounts in atmosphere where the people work in accordance with the professional exposure limits.

### Environmental precautions:

- Ensure adequate ventilation.

### 7.1.2 Advice on general occupational hygiene

- Do not to eat, drink and smoke in work areas;
- Wash hands after use;
- Remove contaminated clothing and protective equipment before entering eating areas.

### 7.2 Conditions for safe storage, including any incompatibilities

#### Suitable container:

Polyethylene or polypropylene container.

- Check all containers are clearly labeled and free from leaks.

#### Storage incompatibility:

#### Silicas:

- react with hydrofluoric acid to produce silicon tetra fluoride gas
- react with xenon hexafluoride to produce explosive xenon trioxide
- reacts exothermically with oxygen di fluoride, and explosively with chlorine trifluoride (these halogenated materials are not commonplace industrial materials) and other fluorine-containing compounds
- may react with fluorine, chlorates

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- are incompatible with strong oxidizers, manganese trioxide, chlorine trioxide, strong alkalis, metal oxides, concentrated orthophosphoric acid, vinyl acetate
- may react vigorously when heated with alkali carbonates.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluoride are hypergolic oxidizers. They ignite on contact (without external source of heat or ignition) with recognized fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.

Package Material Incompatibilities:  
No data available

### 7.3 Specific end uses

- See section 1.2

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### 8.1 Control parameters

The concentration of dust, for application of respirable dust limits, is to be determined from the fraction that penetrates a separator whose size collection efficiency is described by a cumulative log-normal function with a median aerodynamic diameter of  $4.0 \mu\text{m}$  (+-)  $0.3 \mu\text{m}$  and with a geometric standard deviation of  $1.5 \mu\text{m}$  (+-)  $0.1 \mu\text{m}$ , i.e. Generally less than  $5 \mu\text{m}$ .

Because the margin of safety of the quartz TLV<sup>5</sup> is not known with certainty and given the associated link between silicosis and lung cancer it is recommended that quartz concentrations be maintained as far below the TLV as prudent practices will allow.

**WARNING:** For inhalation exposure **ONLY:**

This substance has been classified by the ACGIH<sup>6</sup> as A2 Suspected Human Carcinogen.

#### 8.1.1 Occupational exposure limits

**Silica crystalline - quartz: - CAS# 14808-60-7 – EINECS 238-878-4**

- United Kingdom, WEL - TWA: (listed as silica, crystalline (general form)):  $0.3 \text{ mg/m}^3$  TWA<sup>7</sup> (respirable)
- United Kingdom, WEL - STEL: (listed as silica, crystalline (general form)):  $0.9 \text{ mg/m}^3$  STEL<sup>8</sup> (respirable)
- Belgium - TWA:  $0.1 \text{ mg/m}^3$  VLE (respirable dust)
- France - VME<sup>9</sup>:  $0.1 \text{ mg/m}^3$  VME (listed under silica crystalline)
- Germany:  $0.15 \text{ mg/m}^3$  TWA (respirable fraction)
- Malaysia:  $0.1 \text{ mg/m}^3$  TWA (respirable fraction)
- Netherlands:  $0.075 \text{ mg/m}^3$  MAC (respirable dust)
- Russia:  $1 \text{ mg/m}^3$  TWA
- Spain:  $0.1 \text{ mg/m}^3$  VLA-ED (respirable fraction)

According to current knowledge this concentration should neither impair the health of, nor cause undue discomfort to, nearly all workers. These Exposure Standards are guides to be used in the control of occupational health hazards. All atmospheric contamination should be kept to as low a level as is workable. These exposure standards should not be used as fine dividing lines between safe and dangerous concentrations of chemicals. They are not a measure of relative toxicity.

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### 8.2 Exposure controls

#### 8.2.1 Appropriate engineering controls:

- Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.
- An approved self contained breathing apparatus (SCBA) may be required in some situations.
- Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
Solvent vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)
<b>Within each range the appropriate value depends on:</b>	
<b>Lower end of the range</b>	<b>Upper end of the range</b>
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

#### 8.2.2 Personal protection equipment

##### 8.2.2.1 Eye / Face protection:

- Safety glasses with side shields.
- Chemical goggles.

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- *Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC<sup>10</sup> NIOSH<sup>11</sup> Current Intelligence Bulletin 59]*

### 8.2.2.2 Skin protection

#### Hand protection

*Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:*

- *frequency and duration of contact,*
- *chemical resistance of glove material,*
- *glove thickness and*
- *dexterity*



*Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).*

- *When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.*
- *When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.*
- *Contaminated gloves should be replaced.*

*Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.*

*Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.*

- *polychloroprene*
- *nitrile rubber*
- *butyl rubber*
- *fluorocautchouc*
- *polyvinyl chloride*

*Gloves should be examined for wear and/ or degradation constantly.*

#### Body protection

- *Overalls.*
- *P.V.C. apron.*



#### Other protection

- *Handle in accordance with good industrial hygiene and safety practice.*
- *Wash hands before breaks and at the end of workday.*
- *Wash thoroughly after using product.*
- *Wash contaminated clothing.*

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- Wash hands before eating or drinking.
- Use Barrier cream.
- Use Skin cleansing cream.
- Use Eye wash unit.

### 8.2.2.3 Respiratory protection

If inhalation risk above the TLV exists, wear approved dust respirator.

Use respirators with protection factors appropriate for the exposure level.



- Up to 5 X TLV, use valveless mask type; up to 10 X TLV, use 1/2 mask dust respirator
- Up to 50 X TLV, use full face dust respirator or demand type C air supplied respirator
- Up to 500 X TLV, use powered air-purifying dust respirator or a Type C pressure demand supplied-air respirator
- Over 500 X TLV wear full-face self-contained breathing apparatus with positive pressure mode or a combination respirator with a Type C positive pressure supplied-air full-face respirator and an auxiliary self-contained breathing apparatus operated in pressure demand or other positive pressure mode
- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory. These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

### 8.2.3 Environmental exposure controls

- Legislation for the protection of the environment must be met in full.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Important health, safety and environmental information

#### 9.2 Appearance

Form/Physical state	Solid
Color	Colorless, white to off white fine crystals.
Odor	No odor

#### 9.3 Safety relevant basic data

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	<b>Value</b>
pH (1% Solution) (25 °C)	No data available
Boiling point/range (°C)101,3 kPa	2230
Meting Range (°C)	1610-1713
Flash Point (°C)closed cup	Not applicable
Lower Explosion Limit (as volume and in air)	Not applicable
Upper Explosion Limit (as volume and in air)	Not applicable
Ignition temperature (°C)	Not applicable
Vapour pressure	1,33@1732 °C
Molecular Weight	60,08
Solubility in water	None Soluble
Specific Gravity (Water=1)	2,635-2,660
Oxidation Property	No data available

**Note :** The above features was determined according to prescribed methods at the Classification, Packaging and Labeling of Hazardous Substances Regulation Section A-3 or a method comparable to the other.

### 10. STABILITY AND REACTIVITY

**10.1 Reactivity :** See section 7.2

**10.2 Chemical stability**

- Stable at ambient temperature and under normal conditions of use
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

**10.3 Possibility of hazardous reactions**

- See section 7.2

**10.4 Conditions to avoid:**

- Dust generation.

**10.5 Incompatible materials:**

- Dissolves readily in hydrofluoric acid, forming silicon tetra fluoride, a corrosive gas.
- Reacts violently with powerful oxidizers such as chlorine trifluoride, manganese trifluoride, oxygen di fluoride, vinyl acetate, and certain other fluorine-containing compounds.
- Will be attacked by strong alkalis.

**10.6 Hazardous decomposition products:**

- Decomposition may produce toxic fumes of:
- silicon dioxide (SiO<sub>2</sub>)
  - metal oxides

**10.7 Hazardous polymerization:**

- Has not been reported.

### 11. TOXICOLOGICAL INFORMATION

**11.1 General Information**

- No adverse health effects expected if the product is handled in accordance with this Safety Data Sheet and the product label.

**11.2 Acute toxicity**

Silica Crystalline - Quartz; [14808-60-7]

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- Inhalation (human) LCLo<sup>12</sup>: 0.3 mg/m<sup>3</sup>/10Y
- Inhalation (human) TCLo: 16 mppcf<sup>13</sup>/8H/17.9Y
- Inhalation (rat) TCLo: 50 mg/m<sup>3</sup>/6H/71W

### 11.3 Skin corrosion/irritation and Eye damage/irritation:

- Nil Reported

### 11.4 CMR effects (Carcinogenity) :

**Quartz -**

ACGIH: A2 - Suspected Human Carcinogen

California: carcinogen, initial date 10/1/88 (airborne particles of re

NTP<sup>14</sup>: Known carcinogen (listed as Silica, crystalline (general f

IARC<sup>15</sup>: Group 1 **CARCINOGENIC TO HUMANS**

- The International Agency for Research on Cancer (IARC) has classified occupational exposures to respirable (<5 um) crystalline silica as being carcinogenic to humans .
- This classification is based on what IARC considered sufficient evidence from epidemiological studies of humans for the carcinogenicity of inhaled silica in the forms of quartz and cristobalite.
- Crystalline silica is also known to cause silicosis, a non-cancerous lung disease

Other: See actual entry in RTECS for complete information.

### 11.5 CMR<sup>16</sup> effects (Mutagenicity and Toxicity for reproduction) :

- Not reported as mutagenic or toxic for reproduction

### 11.6 Other Toxicological Effects:

Allergic Effects	Not known
Effects on Repeated Doses	Crystalline silica is listed by IARC (International Agency for Research on (Cancer) as "Carcinogenic to humans (Group 1)" Prolonged exposure to dust containing respirable quartz may cause silicosis or pneumoconiosis.
Sensitization	None.
Developmental Toxicity (Teratogenicity)	None
Fertility	None
Aspiration hazard	None

### 11.7 STOT<sup>17</sup>-single/repeated exposures:

STOT-single exposure	None
STOT-repeated exposure	Prolonged exposure to dust containing respirable quartz may cause silicosis or pneumoconiosis.

### 11.8 Symptoms related to the physical, chemical and toxicological characteristics:

In case of inhalation	The material is not thought to produce respiratory irritation (as classified by EC Directives using animal models). Nevertheless inhalation of dusts, or fumes, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress. Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
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	<p><i>Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures. Effects on lungs are significantly enhanced in the presence of respirable particles. Overexposure to respirable dust may produce wheezing, coughing and breathing difficulties leading to or symptomatic of impaired respiratory function.</i></p> <p><i>Acute silicosis occurs under conditions of extremely high silica dust exposure particularly when the particle size of the dust is small. It differs greatly from classical silicosis both clinically and pathologically. The disease is rapidly progressive with diffuse pulmonary involvement developing only months after the initial exposure and causing deaths within 1 to 2 years. It is often complicated by associated tuberculosis. The lungs of victims contain no classical silicotic nodules or only a few, microscopic abortive nodules, whereas the air spaces are diffusively filled and distended with silica-containing, lipoprotein paste in which degenerating and necrotic macrophages are sometimes discernible - the condition is sometimes described as alveolar lipoproteinosis. The uptake of silica particles by macrophages and lysosomal incorporation is followed by rupture of the lysosomal membrane and release of lysosomal enzymes into cytoplasm of the macrophage. This causes the macrophage to be digested by its own enzymes and after lysis the free silica is released to be ingested by other macrophages thus continuing initiate collagen formation in the lung tissue producing the characteristic nodule found in classical (chronic) silicosis. acute bronchitis and pneumonia.</i></p>
<p><i>In case of skin contact</i></p>	<p><i>The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.</i></p> <p><i>Open cuts, abraded or irritated skin should not be exposed to this material</i></p> <p><i>Entry into the blood-stream through, for example, cuts, abrasions, puncture wounds or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.</i></p>
<p><i>In case of eye contact</i></p>	<p><i>Limited evidence exists, or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals and/or is expected to produce significant ocular lesions which are present twenty-four hours or more after instillation into the</i></p>



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	<p>eye(s) of experimental animals. Repeated or prolonged eye contact may cause inflammation characterised by temporary redness (similar to windburn) of the conjunctiva (conjunctivitis); temporary impairment of vision and/or other transient eye damage/ulceration may occur.</p>
In case of ingestion	<p>Although ingestion is not thought to produce harmful effects (as classified under EC Directives), the material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.</p> <p>Not normally a hazard due to the physical form of product. The material is a physical irritant to the gastro-intestinal tract</p>

### 11.9 Additional Toxicological Information:

- Toxicological classifications are based on available knowledge and information
- EEC classification : Xn-Harmful
- **RTECS**<sup>18</sup>[Quartz Cas # 14808-60-7] : **VV7330000**
- The special effects to health are considered by taking into account the information in section 3.

## 12. ECOLOGICAL INFORMATION

### 12.1 Eco toxicity:

#### SILICA CRYSTALLINE - QUARTZ:

##### For silica:

- The literature on the fate of silica in the environment concerns dissolved silica in the aquatic environment, irrespective of its origin (man-made or natural), or structure (crystalline or amorphous). Indeed, once released and dissolved into the environment no distinction can be made between the initial forms of silica. At normal environmental pH, dissolved silica exists exclusively as mono silicic acid [Si(OH)<sub>4</sub>]. At pH 9.4 the solubility of amorphous silica is about 120 mg SiO<sub>2</sub>/l. Quartz has a solubility of only 6 mg/l, but its rate of dissolution is so slow at ordinary temperature and pressure that the solubility of amorphous silica represents the upper limit of dissolved silica concentration in natural waters. Moreover, silicic acid is the bioavailable form for aquatic organisms and it plays an important role in the biogeochemical cycle of Si, particularly in the oceans.
- In the oceans, the transfer of dissolved silica from the marine hydrosphere to the biosphere initiates the global biological silicon cycle. Marine organisms such as diatoms, silicoflagellates and radiolarians build up their skeletons by taking up silicic acid from seawater. After these organisms die, the biogenic silica accumulated in them partly dissolves. The portion of the biogenic silica that does not dissolve settles and ultimately reaches the sediment. The transformation of opal (amorphous biogenic silica) deposits in sediments through diagenetic processes allows silica to re-enter the geological cycle. Silica is labile between the water and sediment interface.

##### Ecotoxicity:

- Fish LC50 (96 h): Brachydanio rerio >10000 mg/l; zebra fish >10000 mg/l

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- *Daphnia magna EC50 (24 h): >1000 mg/l; LC50 924 h): >10000 mg/l*
- *Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air. Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved/sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms.*
- *When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities.*
- *Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects.*
- *A metal ion is considered infinitely persistent because it cannot degrade further.*
- *The current state of science does not allow for an unambiguous interpretation of various measures of bioaccumulation.*
- *The counter-ion may also create health and environmental concerns once isolated from the metal. Under normal physiological conditions the counter-ion may be essentially insoluble and may not be bioavailable.*
- *Environmental processes may enhance bioavailability.*
- *DO NOT discharge into sewer or waterways.*

### 12.2 Photo degradation

*No data available*

### 12.3 Effects on Waste Water Treatment Plants

*Product has inhibitory effects on the activities of micro-organisms, whether the information is not related, the likely impact on waste water treatment plants is unknown.*

### 12.4 Mobility

- *No data available.*

<i>Water threat class</i>	<i>No data available</i>
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<i>Clean Water Impact</i>	<i>No data available</i>
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<i>Known or predicted environmental distribution</i>	<i>No data available.</i>
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### 12.5 Results of PBT<sup>19</sup> and vPvB<sup>20</sup> assessment

#### · Persistence and degradability:

<i>Decomposition Potential of the products</i>	<i>No data available</i>
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<i>The half-life of degradation</i>	<i>No data available</i>
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<i>Potential degradation of product content in the evaluation of wastewater treatment plants</i>	<i>No data available</i>
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#### · Bioaccumulation Potential :

<i>Biological environment (biota) accumulation potential</i>	<i>No data available</i>
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<i>Potential - nutrients pass through</i>	<i>No data available</i>
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<i>Reference Values - Log K<sub>ow</sub> , S<sub>w</sub> and BCF<sup>21</sup></i>	<i>No data available</i>
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### 12.6 Additional information

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- Do not allow to be released into the environment
- See the sections 6, 7, 13, 14 and 15.

### 13. DISPOSAL CONSIDERATIONS

#### 13.1 Product / Packaging disposal

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
- Bury residue in an authorized landfill.
- Recycle containers if possible, or dispose of in an authorized landfill.

#### 13.2 Contaminated packaging

- Recycle following cleaning or dispose of at an authorized site.

#### 13.3 Disposal Methods

- Dispose of chemicals waste or in accordance with local regulations.
- Follow all applicable local laws, rules and regulations regarding the proper disposal of this material.
- If this product has been altered or contaminated with other hazardous materials, appropriate waste analysis may be necessary to determine proper method for disposal.
- A qualified environmental professional should determine waste characterization, disposal and treatment methods for this material in accordance with applicable local regulations and requirements.

#### 13.4 European Waste Catalogue

- 01 04 10 Dusty and powdery waste other than those mentioned in 01 04 07

### 14. TRANSPORT INFORMATION

	ADR <sup>22</sup> /RID <sup>23</sup>	ADNR <sup>24</sup>	IMDG <sup>25</sup>	ICAO <sup>26</sup> /IATA <sup>27</sup>
TRANSPORTATION	Road	River	Marine	Airways

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<b>PROPER SHIPPING NAME</b>	This product is not regulated as a hazardous material.			
<b>UN/ID No.</b>	-	-	-	-
<b>CLASS</b>	Not restricted			
<b>PACKAGING GROUP</b>				
<b>LABELLING NO</b>	-			
<b>CLASSIFICATION CODE</b>	-	-	-	-
<b>HAZARD NO (HIN NO)</b>	-			
<b>EmS</b>			-	
<b>MARINE Pollutant</b>			-	

**Road Transport Notes:** This product is not regulated as a hazardous material. The above regulatory prescriptions are those valid on the date of publication of this sheet. Given the possible evolution of transport regulations for hazardous materials, in case the present sheet is dating back to more than 12 months ago, it would be advisable to check their validity with your commercial agency

## 15. REGULATORY INFORMATION

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

"EU Directive 2002/72/EC Plastic materials and articles intended to come into contact with foodstuffs - Annex III Section A Incomplete list of additives fully harmonized at Community level", "European Chemicals Agency (ECHA) List of substances identified for registration in 2010", "European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs", "OECD<sup>28</sup> Representative List of High Production Volume (HPV) Chemicals"

This safety data sheet is in compliance with the following EU legislation and its adaptations – as far as applicable - : 67/548/EEC, 1999/45/EC, 76/769/EEC, 98/24/EC, 92/85/EEC, 94/33/EC, 91/689/EEC, 1999/13/EC, as well as the following British legislation:

- The Control of Substances Hazardous to Health Regulations (COSHH) 2002
- COSHH Essentials

The Management of Health and Safety at Work Regulations 1999

### 15.2 Chemical safety assessment

No data available

#### CLP Annex VI

- Eye Irritation Category 2B
- Organ Damage Category 2

## 16. OTHER INFORMATION

### 16.1 Other information

- For additional information regarding **KALTUN MADENCILIK SAN. VE TIC. A.S.** Products please contact the **KALTUN MADENCILIK SAN. VE TIC. A.S.** Technical Services Department (+ 90 256 729 16 00 ) The above information complies with the 199/45/EC and 1907/2006 Directives and their amendments. In all cases of potential poisoning supportive therapy is of the utmost importance.
- If medical professionals require advice regarding first aid treatment, all **KALTUN MADENCILIK SAN. VE TIC. A.S.** products are registered with the Turkish National Poisons Unit (UZEM), UZEM local telephone no : 114

### 16.2 Related Person

- Mrs. Sabriye GUNGOR - **KALTUN MADENCILIK SAN. VE TIC. A.S.**
- Prepared by :Doruk Chemical Management Systems Co Ltd. [www.msdsmarket.com](http://www.msdsmarket.com)
- Competent Person Accreditation no: MUSTAFA SELÇUK BİLGİN

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- KDU-A-0-0026 06.08.2018
- [info@msdsmarket.com](mailto:info@msdsmarket.com) (contact for further information if needed)

### 16.3 Revision Date, Version and SDS no

- Date : March 03<sup>th</sup> , 2020
- Version : 2.0/EN
- MSDS No : SDS/002

### 16.4 Reason of re-issue

- First issue

### 16.5 Relevant R-, H- and EUH-phrases (number and full text):

<b>H320</b>	Causes eye irritation
<b>H373</b>	May cause damage to organs through prolonged or repeated exposure inhalation.

### 16.6 Legal disclaimer

- The purpose of the above information is to describe the products only in terms of health and safety requirements.
  - The information given should not, therefore, be construed as guaranteeing specific properties or as specification.
  - Customers should satisfy themselves as to the suitability and completeness of such information for their own particular use.
  - 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 guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification.*
- The above information relates only to the specific material(s) designated herein and may not be valid for such material(s) used in combination with any other materials or in any process or if the material is altered or processed, unless specified in the text.

<sup>1</sup> CAS : Chemical Abstract Service

<sup>2</sup> EINECS : European Inventory of Existing Chemical Substances

<sup>3</sup> CLP: Classification, Labelling & Packaging (EU regulation)

<sup>4</sup> IARC (International Agency for Research on (Cancer)

<sup>5</sup> TLV: Threshold Limit Value (American Conference of Governmental Industrial Hygienists, Inc.)

<sup>6</sup> ACGIH: American Conference of Governmental Industrial Hygienists

<sup>7</sup> TWA: Total Weighted Average (permissible exposure limit; Occupational Safety and Health Administration)

<sup>8</sup> STEL: Short Term Exposure Limit

<sup>9</sup> VME Valeur Limite de Moyenne d'Exposition Professionnelle (French: time-weighted average)

<sup>10</sup> CDC: Centers for Disease Control and Prevention (US government)

<sup>11</sup> NIOSH National Institute for Occupational Safety and Health (US CDC)

<sup>12</sup> LCLo: Lethal Concentration Low

<sup>13</sup> Mppcf : Million particles per cubic foot

<sup>14</sup> NTP: National Toxicology Program (NIEHS)

<sup>15</sup> IARC: International Agency for Research on Cancer (World Health Organization)

<sup>16</sup> CMR: Carcinogenic, Mutagenic or Toxic to Reproduction (chemical safety classification)

<sup>17</sup> STOT: Specific Target Organ Toxicity

<sup>18</sup> RTECS : Registry of Toxic Effects of Chemical Substances

<sup>19</sup> PBT: Persistent Bioaccumulative Toxic

<sup>20</sup> VPVB: Very Persistent, Very Bioaccumulative

<sup>21</sup> BCF: Bioconcentration Factor

<sup>22</sup> ADR: Accord Dangereux Routier (European regulations concerning the international transport of dangerous goods by road)

<sup>23</sup> RID: Regulations Concerning the International Transport of Dangerous Goods by Rail (European law)

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- 
- <sup>24</sup> ADNR: Regulation for the Carriage of Dangerous Substances on the Rhine (EU)  
<sup>25</sup> IMDG: International Maritime Dangerous Goods (United Nations)  
<sup>26</sup> ICAO: International Civil Aviation Organization  
<sup>27</sup> IATA: International Air Transport Association  
<sup>28</sup> OECD: Organisation for Economic Co-operation and Development