

THE BIOAVAILABLE SILICON

ECKOSIL



How does it work?

It provides a bioavailable Silicon in Orthosilicic Acid form, giving to the plant two different effects, the regulation of the absorption of the nutrients and protecting it against external aggressions. ECKOSIL has the capacity to absorb the superficial humidity of the plant and also increases the rigidity of the plants tissues.

- ▶ **Increases the stiffness of the tissues against low and high temperatures.**
- ▶ **Reduces water loss.**
- ▶ **Acts as a barrier to fungi and insects.**

ECKOSIL- has a unique manufacturing process that ensures bioavailable silicon.

The difference of the Orthosilicic Acid

SILICATE

ORTHOSILICIC
ACID (ECKOSIL)

PLANT



APPLICATION PROCEDURE:

Foliar application: 30-50ml/100L of water.
Root application: 1L/ ha.
Perform the treatments in greater physiological demand of the crop.

Visit our website www.asfertglobal.com


asfertglobal
innovation in plant sciences

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ISO 9001
BUREAU VERITAS
Certification



ECKOSIL



Silicon, soils and sustainable agriculture

The terrestrial crust presents elevated quantities of Silicon which are grouped into three fractions: liquid form (in the soil's solution), in the absorbed form and in the solid form. It is in the soil's solution that we can find the Orthosilicic Acid (H_4SiO_4) a form of Silicon that is bioavailable to the plants, and whose available quantity may be affected by several factors such as pH, temperature, particle size, potential redox, water content and organic matter.

As a rule, the soils with a low Silicon availability for the plants, show the following characteristics: they possess a large fraction of quartz sand, have been in production for a long period, are highly leached, are acid and have low bases saturation, or contain high levels of organic matter and very low mineral rates.

The acid soils, which naturally contain high levels of soluble Aluminium, constitute about 40% of the arable land worldwide. Silicon being a strong antagonist to the soluble Aluminium – the one element capable of fixing the Aluminium and avoiding its metabolic toxicity – and to many other heavy metals, it constitutes an important tool to sustainable agriculture, biological production and to improve the environment.

Silicon's importance

In the beginning of the XX century Silicon's role in crops developments started to be more thoroughly studied and its relevance was ascertained in 3 aspects:

- Diverse stresses of plants
- Increase of production
- Quality of production

The specific action of Silicon was determined in:

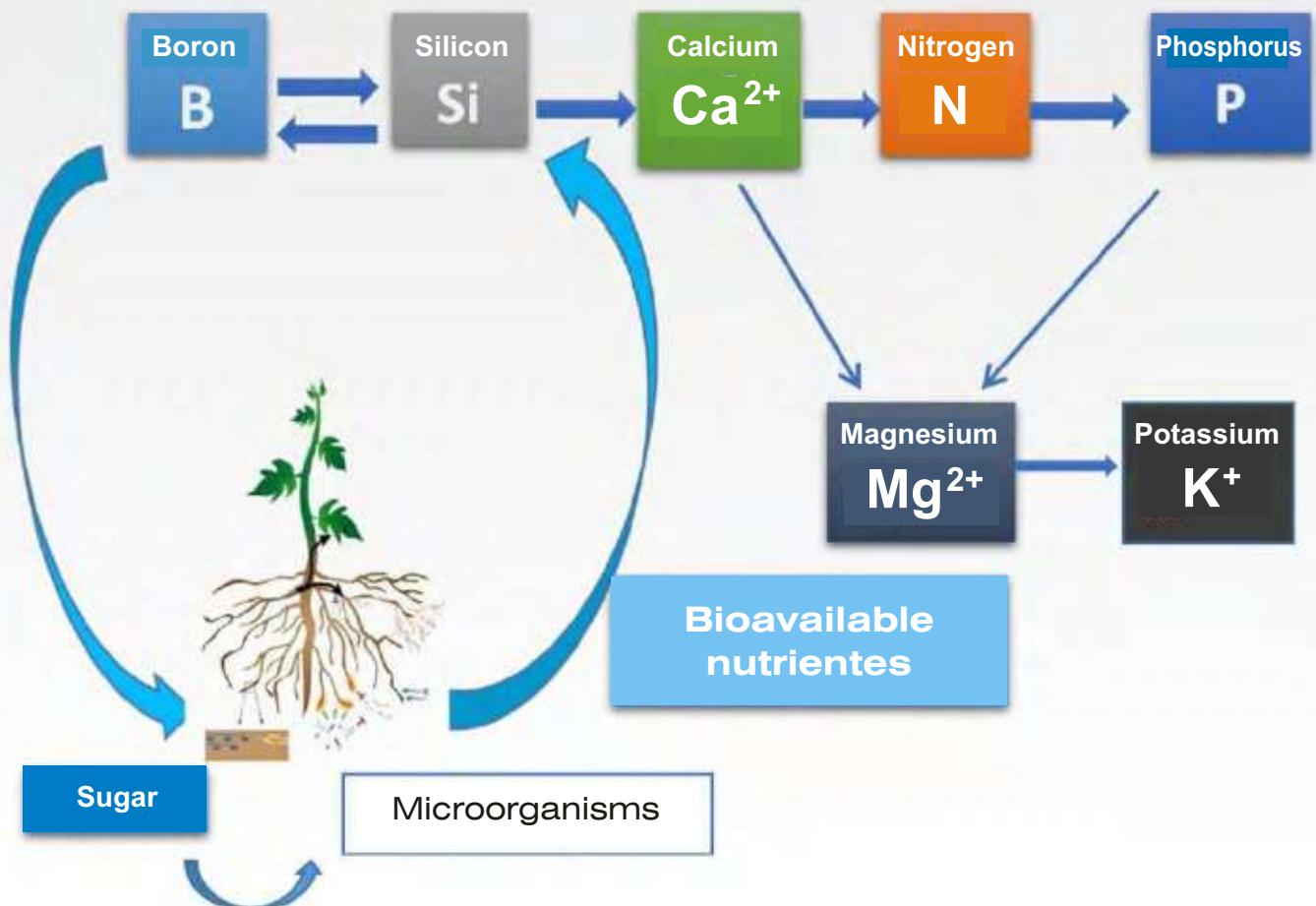
- Optimization of the absorption of other nutrients;
- Betterment of the tolerance to environmental stresses (drought, extreme temperatures, salinity, heavy metals);
- Reduction of the severity of attacks by diseases and pests;
- Improvement of external (weight, uniformity, appearance) and internal (vitamin and mineral rate, brix, consistency) parameters;
- Increase in the crops' productivity;
- Improvement of the soil's structure and fertility;
- Increase of biodiversity and activity of the soil's microorganisms;
- More efficient usage of water.

Silicon in the metabolism and physiology of the plants

Silicon plays an important regulation function in the absorption and transportation of some essential elements such as Calcium, Phosphorus, Potassium and Magnesium. However, it should be noted that Silicon's potential in the plants and its impact in their growth and development is more evident in stress conditions. Let's observe in more detail what happens in some of them:

Nutritional stress

Plants have a biological sequence defined for the absorption of nutrients, it is initiated with Boron, which stimulates the radicular system to drain the sugars into the rhizosphere, those sugars will serve as a power source for the microorganisms, which transform the silicates into Orthosilicic Acid through a process called silicification. The Orthosilicic Acid increases the absorption of Calcium, followed by organic Nitrogen (from L-amino acids), Magnesium, Phosphorus and Potassium, if a nutrient in the sequence isn't available (or less available), the absorption of every other element in the sequence will be compromised.



Calcium Deficiency

A common problem in vegetable nutrition is Calcium deficiency with severe implication on the level of the quality of the production. Besides not being very mobile, Calcium is replaced by other minerals which are frequently added to the soils in large quantities such as Nitrogen (nitrates' case) and Potassium.

Calcium is close to the beginning of the biochemical sequence (as we've previously seen), and in the case that the absorption of Calcium is in any way limited, every other nutrient is affected.

Phosphorus Deficiency

Silicon favours the transport of Phosphorus throughout the plants' vases, improving its assimilation. Silicon decreases the consumption of Manganese and Iron, nutrients that have a negative effect on the availability of Phosphorus in the plants.

Nitrogen Excess

The application of Silicon increases the contribution to the creation of new mechanical tissues and compensates the negative effect due to the Nitrogen excess, whose occurrence increases the plants' susceptibility to diseases. Silicon has the ability to minimize, in the crops, the symptoms due to Nitrogen excess.

Salinity Excess (NaCl)

An excessive rate of Sodium chloride inhibits the growth of the plants, in particular, of the radicular system. The Sodium's absorption in the plant is partially connected to the transpiration. Silicon reduces transpiration and the Sodium transfer to the plant is reduced to a similar rate, being able to achieve 50%.

Aluminium's Phytotoxicity

The toxicity due to Aluminium is a limiting factor to the crops in acid soils. The Aluminium ion inhibits the growth of the roots and nutrient assimilation. The mitigating effect of Silicon over the Aluminium's toxicity (described in the beginning of this document) was observed in numerous crops.



Abiotic stress due to climate situations (hail, frost, insufficient luminosity and hydric stress) Silicon increases the quantity of oxygen that reaches the roots, simultaneously strengthening the deposit of Silicon in the stem. This way, an increase in the size of the vascular bundles is verified and an increase of the thickness and resistance of the stem to the adverse conditions. Through the deposit of Silicon, and the subsequent thickening of the cuticle's tissues, the evapotranspiration rate is reduced and the probability of possible damages caused by hydric imbalances is minimized.

Stress due to diseases and pests

The accumulation of Silicon in the sub-epidermal layers reduces the probability of occurrence of weaker areas where the fungi would establish themselves. And the damages due to diseases and consequential losses of production are reduced. But Silicon also reaches the exterior of the epidermis through minuscule canals allowing formations of polymorphic crystals to be deposited in the external layers of the plant. Relatively to the insects, the Silicon crystals may have an irritating effect over them, giving the plants repulsive characteristic and thus reducing the risk of the occurrence of damage.

ECKOSIL

ECKOSIL is a solution that acts on a cellular level, providing the plants with Silicon in the form of Orthosilicic Acid, the only one capable of penetrating the cellular walls, combined with Iron, Zinc and Molybdenum.

Through its own nature ECKOSIL has the propriety of absorbing the superficial humidity of the plants, increasing the resistance of the plant to several biotic and abiotic stress, such as diseases and pests, extreme temperatures, drought and high concentration of toxic salts in the soil.

COMPOSITION

Iron (Fe) EDTA soluble in water 1.2% w/w
 Molybdenum (Mo) soluble in water 0.035% w/w
 Zinc (Zn) EDTA soluble in water 1.2% w/w
 Contains Silicon (SiO₂) in the form of Orthosilicic Acid

DIRECTIONS FOR USE

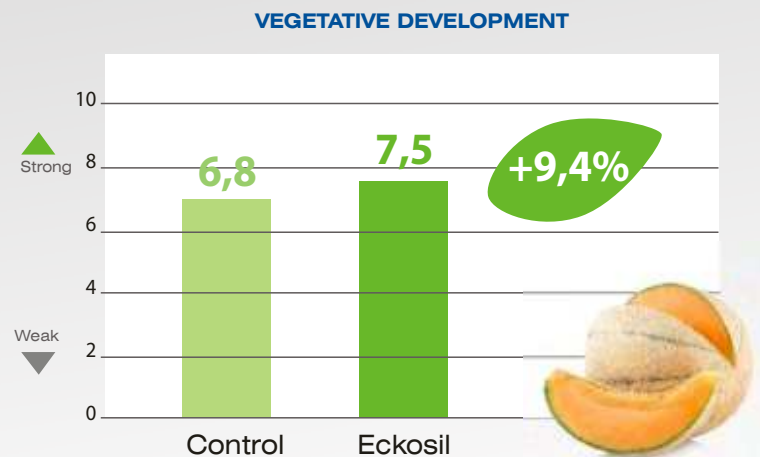
Foliar application: 30-50 ml / 100 l of water.
 Fertigation: 0,5 l - 1l/ha.
 Perform various applications in the moments of greatest physiological requirement.

ECKOSIL trial in pear - Promotion of the absorption of nutrients

Element	Modality		
	Control	0,5 l/ha	1 l/ha
Total Nitrogen(N)	1,98	2,18	2,45
Phosphorus (P)	0,17	0,20	0,19
Potassium (K)	1,14	1,67	1,35
Calcium (Ca)	1,35	1,34	1,86
Magnesium (Mg)	0,44	0,36	0,48
Sulfur (S)	0,18	0,23	0,22
Iron (Fe)	91,9	89,2	97,1
Manganese (Mn)	17,5	20,2	27,6
Boron (B)	21,3	21,9	23,9
Copper (Cu)	13,7	11,9	14,0
Zinc (Zn)	39,9	41,5	37,1
Molybdenum (Mo)	0,15	0,35	0,20
Sodium (Na)	269,17	236,3	202,19
Aluminium (Al)	78,7	70,5	98,1
Silicon (Si)	337,2	458,5	667,5

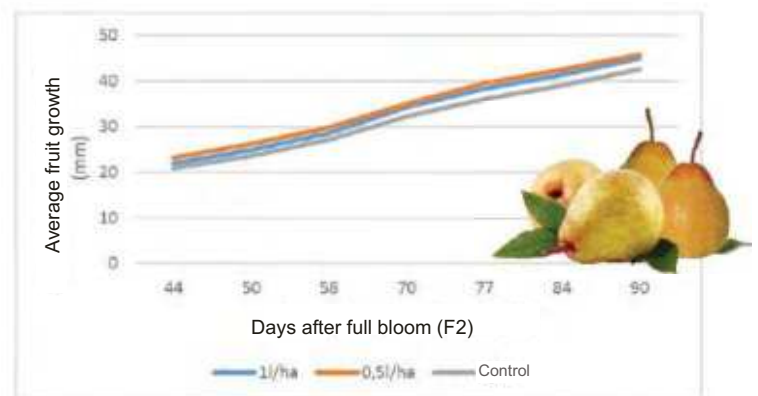
Source: INIAV (Station of Fruticulture Vieira Natividade, Alcobaça, Portugal)

ECKOSIL trial in melon - Hydric stress inhibiting action



Source: ACEPEL (Certified trials company, Saintes, France)

ECKOSIL trial in pear - Promotion of fruit's growth



Source: INIAV (Station of Fruticulture Vieira Natividade, Alcobaça, Portugal)

SAFETY DATA SHEET

(in accordance with Regulation (EU) 2015/830)



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SECTION 1: IDENTIFICATION OF THE MIXTURE AND OF THE COMPANY/UNDERTAKING.

1.1 Product identifier.

Product Name: ECKOSIL Liquid fertilizer with micronutrients.
Product Type: Mixture

1.2 Relevant identified uses of the mixture and uses advised against.

Material for agricultural use.

Uses advised against:

Uses other than those recommended.

1.3 Details of the supplier of the safety data sheet.

Company: **ASFERTGLOBAL, LDA**
Province: Santarém
Telephone: +351 243 779 431
Fax: +351 243 779 421
E-mail: anapereira@asfert.pt
Web: www.asfertglobal.com

1.4 Emergency telephone number: 112.

SECTION 2: HAZARDS IDENTIFICATION.

2.1 Classification of the mixture.

The product is not classified as hazardous within the meaning of Regulation (EU) No 1272/2008.

2.2 Label elements.

P102: Keep out of the reach of children.

P270: Do not eat, drink or smoke during use.

Store at a temperature of not more than 30 ° C or less than 5 ° C.

Keep away from sunlight.

Keep away from food, drink and animal feeding stuffs.

In case of contact with eyes and mucous membranes, rinse immediately with plenty of water and seek medical advice.

In case of contact with skin, wash immediately with plenty of water.

Wear suitable gloves.

Wear eye / face protection.

In case of accident or illness, seek medical advice immediately and show this product label.

Use only in case of recognized need. Do not exceed recommended dosages.

EUH statements:

EUH210 Safety data sheet available on request.

2.3 Other hazards.

In normal use conditions and in its original form, the product itself does not involve any other risk for health and the environment.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS.

3.1 Substances.

Not Applicable.

3.2 Mixtures.

This mixture does not contain substances that represent a health or environmental hazard according to Regulation (EC) No. 1272/2008, are assigned a community exposure limit in the workplace, nor are they classified as PBT / vPvB or included in the Candidate List.

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SECTION 4: FIRST AID MEASURES.

4.1 Description of first aid measures.

Due to the composition and type of the substances present in the product, no particular warnings are necessary.

Inhalation.

Take the victim into open air; keep them warm and calm. If breathing is irregular or stops, perform artificial respiration. Do not administer anything orally. If unconscious, place them in a suitable position and seek medical assistance.

Eye contact.

If wearing contact lenses, remove them. Wash eyes with plenty of clean and cool water for at least 10 minutes while pulling eyelids up, and seek medical assistance.

Skin contact.

Remove contaminated clothing. Wash skin vigorously with water and soap or a suitable skin cleaner. **NEVER** use solvents or thinners.

Ingestion.

If accidentally ingested, seek immediate medical attention. Keep calm. **NEVER** induce vomiting.

4.2 Most important symptoms and effects, both acute and delayed.

No known acute or delayed effects from exposure to the product.

4.3 Indication of any immediate medical attention and special treatment needed.

In case of doubt or when symptoms of feeling unwell persist, get medical attention. Never administer anything orally to persons who are unconscious.

SECTION 5: FIREFIGHTING MEASURES.

5.1 Extinguishing media.

Recommended extinguishing methods.

Extinguisher powder or CO₂. In case of more serious fires, also alcohol-resistant foam and water spray. Do not use a direct stream of water to extinguish.

5.2 Special hazards arising from the mixture.

Special risks.

Fire can cause thick, black smoke. As a result of thermal decomposition, dangerous products can form: carbon monoxide, carbon dioxide. Exposure to combustion or decomposition products can be harmful to your health.

5.3 Advice for firefighters.

Use water to cool tanks, cisterns, or containers close to the heat source or fire. Take wind direction into account. Prevent the products used to fight the fire from going into drains, sewers, or waterways.

Fire protection equipment.

According to the size of the fire, it may be necessary to use protective suits against the heat, individual breathing equipment, gloves, protective goggles or facemasks, and gloves.

SECTION 6: ACCIDENTAL RELEASE MEASURES.

6.1 Personal precautions, protective equipment and emergency procedures.

For exposure control and individual protection measures, see section 8.

6.2 Environmental precautions.

Product not classified as hazardous for the environment, avoid spillage as much as possible.

6.3 Methods and material for containment and cleaning up.

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Pick up the spill with non-combustible absorbent materials (soil, sand, vermiculite, diatomite, etc.). Pour the product and the absorbent in an appropriate container. The contaminated area should be immediately cleaned with an appropriate decontaminator. Pour the decontaminator on the remains in an opened container and let it act various days until no further reaction is produced.

6.4 Reference to other sections.

For exposure control and individual protection measures, see section 8.
For later elimination of waste, follow the recommendations under section 13.

SECTION 7: HANDLING AND STORAGE.

7.1 Precautions for safe handling.

The product does not require special handling measures, the following general measures are recommended:
For personal protection, see section 8. Never use pressure to empty the containers. They are not pressure-resistant containers.
In the application area, smoking, eating, and drinking must be prohibited.
Follow legislation on occupational health and safety.
Keep the product in containers made of a material identical to the original.

7.2 Conditions for safe storage, including any incompatibilities.

The product does not require special storage measures.
As general storage measures, sources of heat, radiation, electricity and contact with food should be avoided.
Keep away from oxidising agents and from highly acidic or alkaline materials.
Store the containers between 5 and 35° C, in a dry and well-ventilated place.
Store according to local legislation. Observe indications on the label.
The product is not affected by Directive 2012/18/EU (SEVESO III).

7.3 Specific end use(s).

Fertilizer.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION.

8.1 Control parameters.

The product does NOT contain substances with Professional Exposure Environmental Limit Values. The product does NOT contain substances with Biological Limit Values.

8.2 Exposure controls.

Measures of a technical nature:

Provide adequate ventilation, which can be achieved by using good local exhaust-ventilation and a good general exhaust system.

HAND PROTECTION:

PPE: Protective gloves.

Characteristics: CE marking, category II.

CEN standards: EN 374-1, EN 374-2, EN 374-3, EN 420

Maintenance:

Keep in a dry place, away from any sources of heat, and avoid exposure to sunlight as much as possible.

Do not make any changes to the gloves that may alter their resistance, or apply paints, solvents or adhesives.

Observations:

Gloves should be of the appropriate size and fit the user's hand well, not being too loose or too tight.

Always use with clean, dry hands.

Material: PVC (polyvinyl chloride)

Breakthrough time (min.): > 480

Material thickness (mm): 0,35

EYE PROTECTION:

PPE: Protective goggles with built-in frame.

Characteristics: CE marking, category II. Eye protector with built-in frame for protection against dust, smoke, fog and vapour.

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CEN standards: EN 165, EN 166, EN 167, EN 168

Maintenance:

Visibility through lenses should be ideal. Therefore, these parts should be cleaned daily. Protectors should be disinfected periodically following the manufacturer's instructions.

Observations:

Some signs of wear and tear include: yellow colouring of the lenses, superficial scratching of the lenses, scraping etc.

SKIN PROTECTION:

PPE: Protective clothing.

Characteristics: CE marking, category II. Protective clothing should not be too tight or loose in order not to obstruct the user's movements.

CEN standards: EN 340

Maintenance:

In order to guarantee uniform protection, follow the washing and maintenance instructions provided by the manufacturer.

Observations:

The protective clothing should offer a level of comfort in line with the level of protection provided in terms of the hazard against which it protects, bearing in mind environmental conditions, the user's level of activity and the expected time of use.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES.

9.1 Information on basic physical and chemical properties.

Appearance: Liquid

Colour: Dark RED

Odour: Characteristic

Odour threshold: N.A./N.A.

pH: 3.5 (1/10)

Melting point: N.A./N.A.

Boiling Point: ≥ 111 °C

Flash point: > 562 °C

Evaporation rate: N.A./N.A.

Inflammability (solid, gas): N.A./N.A.

Lower Explosive Limit: N.A./N.A.

Upper Explosive Limit: N.A./N.A.

Vapour pressure: 23,422

Vapour density: N.A./N.A.

Relative density: 1,20 g/cm³

Solubility: Soluble

Liposolubility: N.A./N.A.

Hydrosolubility: N.A./N.A.

Partition coefficient (n-octanol/water): N.A./N.A.

Auto-ignition temperature: N.A./N.A.

Decomposition temperature: N.A./N.A.

Viscosity: 100

Explosive properties: N.A./N.A.

Oxidizing properties: N.A./N.A.

N.A./N.A. = Not Available/Not Applicable due to the nature of the product

9.2 Other information.

Pour point: N.A./N.A.

Blink: N.A./N.A.

Kinematic viscosity: N.A./N.A.

N.A./N.A. = Not Available/Not Applicable due to the nature of the product

SECTION 10: STABILITY AND REACTIVITY.

10.1 Reactivity.

The product does not present hazards by their reactivity.

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10.2 Chemical stability.

Stable under the recommended handling and storage conditions (see section 7).

10.3 Possibility of hazardous reactions.

The product does not present possibility of hazardous reactions.

10.4 Conditions to avoid.

Avoid any improper handling.

10.5 Incompatible materials.

Keep away from oxidising agents and from highly alkaline or acidic materials in order to prevent exothermic reactions.

10.6 Hazardous decomposition products.

No decomposition if used for the intended uses.

SECTION 11: TOXICOLOGICAL INFORMATION.

11.1 Information on toxicological effects.

There are no tested data available on the product.

Repeated or prolonged contact with the product can cause the elimination of oil from the skin, giving rise to non-allergic contact dermatitis and absorption of the product through the skin.

Splatters in the eyes can cause irritation and reversible damage.

a) acute toxicity;

Not conclusive data for classification.

Acute Toxicity Estimate (ATE):

Mixtures:

ATE (Oral) > 10.000 mg/kg

b) skin corrosion/irritation;

Not conclusive data for classification.

c) serious eye damage/irritation;

Based on available data, the classification criteria are not met.

d) respiratory or skin sensitisation;

Not conclusive data for classification.

e) germ cell mutagenicity;

Not conclusive data for classification.

f) carcinogenicity;

Not conclusive data for classification.

g) reproductive toxicity;

Not conclusive data for classification.

h) STOT-single exposure;

Not conclusive data for classification.

i) STOT-repeated exposure;

Not conclusive data for classification.

j) aspiration hazard;

Not conclusive data for classification.

SECTION 12: ECOLOGICAL INFORMATION.

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12.1 Toxicity.

No information is available regarding the ecotoxicity of the substances present.

12.2 Persistence and degradability.

No information is available about persistence and degradability of the product.

12.3 Bioaccumulative potential.

No information is available regarding the bioaccumulation of the substances present.

12.4 Mobility in soil.

No information is available about the mobility in soil.
The product must not be allowed to go into sewers or waterways.
Prevent penetration into the ground.

12.5 Results of PBT and vPvB assessment.

No information is available about the results of PBT and vPvB assessment of the product.

12.6 Other adverse effects.

No information is available about other adverse effects for the environment.

SECTION 13 DISPOSAL CONSIDERATIONS.

13.1 Waste treatment methods.

Do not dump into sewers or waterways. Waste and empty containers must be handled and eliminated according to current, local/national legislation.
Follow the provisions of Directive 2008/98/EC regarding waste management.

SECTION 14: TRANSPORT INFORMATION.

Transportation is not dangerous. In case of road accident causing the product's spillage, proceed in accordance with point 6.

14.1 UN number.

Transportation is not dangerous.

14.2 UN proper shipping name.

Description:

ADR: Transportation is not dangerous.

IMDG: Transportation is not dangerous.

ICAO: Transportation is not dangerous.

14.3 Transport hazard class(es).

Transportation is not dangerous.

14.4 Packing group.

Transportation is not dangerous.

14.5 Environmental hazards.

Transportation is not dangerous.

14.6 Special precautions for user.

Transportation is not dangerous.

14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code.

Transportation is not dangerous.

SECTION 15: REGULATORY INFORMATION.

15.1 Safety, health and environmental regulations/legislation specific for the mixture.

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The product is not affected by the Regulation (EC) No 1005/2009 of the European Parliament and of the Council of 16 September 2009 on substances that deplete the ozone layer.

The product is not affected by Directive 2012/18/EU (SEVESO III).

The product is not affected by Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products.

The product is not affected by the procedure established Regulation (EU) No 649/2012, concerning the export and import of dangerous chemicals.

15.2 Chemical safety assessment.

No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16: OTHER INFORMATION.

It is recommended that the product only be employed for the purposes advised.

Abbreviations and acronyms used:

CEN: European Committee for Standardization.

PPE: Personal protection equipment.

Key literature references and sources for data:

<http://eur-lex.europa.eu/homepage.html>

<http://echa.europa.eu/>

Regulation (EU) 2015/830.

Regulation (EC) No 1907/2006.

Regulation (EU) No 1272/2008.

The information given in this Safety Data Sheet has been drafted in accordance with COMMISSION REGULATION (EU) 2015/830 of 28 May 2015 amending Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC.

The information in this Safety Data Sheet on the Preparation is based on current knowledge and on current EC and national laws, as far as the working conditions of the users is beyond our knowledge and control. The product must not be used for purposes other than those that are specified without first having written instructions on how to handle. It is always the responsibility of the user to take the appropriate measures in order to comply with the requirements established by current legislation. The information contained in this Safety Sheet only states a description of the safety requirements for the preparation, and it must not be considered as a guarantee of its properties.