

Centre Européen d'Etudes des Silicates (CEES)

The HERA (Human and Environmental Risk Assessment) project is a European voluntary initiative launched in 1999 by A.I.S.E. representing the formulators and manufacturers of household cleaning products and Cefic representing the suppliers and manufacturers of the raw materials.

The use of soluble silicates is manifold. Approximately 50 % of produced soluble silicates are further processed to derivatives; the remaining 50 % are used directly with detergents and pulp and paper as the predominate application areas. In this context and in the framework of HERA, CEES have agreed to develop a risk assessment on a category of five soluble silicates.

In short here are some questions and answers to better understand soluble silicates and what they are. More information and details may be found on www.cees-silicates.org and www.heraproject.com.

1. Soluble Silicates

Soluble Silicates are inorganic compounds made from sand and soda or potash. About 50% is used as raw material for the production of other silicon compounds, like zeolites or silica gel. Laundry and automatic dishwashing detergents represent the second largest application followed by a multitude of other more technical uses, like pulp and paper manufacture, adhesives and binders, surface coatings, water treatment and soil stabilization, to mention only a few.

2.1 What are Soluble Silicates and how do they work?

Soluble Silicates are inorganic compounds that are produced by fusing high purity quartz sand and soda (sodium carbonate) or potash (potassium carbonate) at 1300-1500 °C. They can be dissolved in water to produce silicate solutions. Only sodium silicates are used in household cleaning products. They are capable of softening the water by binding hardness ions and of adsorbing soil and keeping it suspended in the wash liquor. They also function as corrosion inhibitors and peroxide bleach stabilisers.

In which products are Soluble Silicates used?

Soluble silicates are used in machine-laundering detergents, in automatic dishwashing detergents and at low concentrations in surface and toilet cleaners.



2.2 Do Soluble Silicates pose a problem to my health?

The amount of soluble silicates encountered during normal household cleaning activities does not cause toxic effects. Nevertheless, care should be taken to prevent accidental spillage of undiluted detergent cleaning products since the alkalinity of soluble silicates may cause skin irritation or –for the highly alkaline types – even corrosion to the eye if not immediately rinsed off with water.

Can I get in contact with Soluble Silicates?

Yes. Possible routes of exposure are skin contact (via handling of detergents and cleaners or via residues on laundered fabrics), oral uptake (via residues left on dishes and cutlery) or inhalation (via dust from powdered detergents).

If yes, does this amount cause a problem or is it bad for my health?

No. All possible routes to get in contact with soluble silicates considered, the maximum estimated daily uptake is more than 10.000 fold below the concentration where health effects would be expected. In other words, the amount needed to cause a health problem is orders of magnitude higher than what will be taken up through the intended use of household cleaning products.

What about skin irritation and allergic effects?

Short-term contact to dry products, i.e. powders or tablets does not cause skin irritation. As a result of the dilution, solutions used for cleaning are also not irritating to the skin. However, undiluted liquid cleaning products containing soluble silicates may cause skin irritation by virtue of their alkalinity. Avoid accidental contact or immediately rinse with water after contact. This will remedy the effects.

The available investigations show that soluble silicates do not cause allergies. This is confirmed by decades of use in cleaning products without indications of sensitizing effects.

2.3 Do Soluble Silicates pose a problem to the environment?

No. The toxicity to aquatic organisms is low and results from the alkalinity which is neutralized during sewage treatment. As a matter of fact, soluble silicates are not subject to biodegradation, since they are inorganic substances. The amount introduced into the environment by the use of detergents is negligible when compared to the background input due to geochemical weathering of silicate minerals.

Does this ingredient come into the environment?

Yes. As a consequence of their inorganic nature, soluble silicates cannot be biodegraded. Measurements in sewage treatment plants showed that 10-20% is retained in the plant through adsorption, precipitation and sedimentation. The remaining 80-90% pass the sewage plant and are discharged into the surface water.

Do Soluble Silicates have a negative impact on the environment?

No. Relative to the natural background from weathering of minerals, the contribution by soluble silicates is negligibly small. Aquatic toxicity is low and at least a 100 times higher input of soluble silicates would be needed to cause adverse effects.

Can a trace of this ingredient enter our food-chain?

Compounds of silicon and oxygen, a chemical family to which among others the soluble silicates belong, are the primary constituent of earth's landmasses and consequently a ubiquitous component of the biomass and surface water. The contribution of soluble silicates, if any, to the background concentration in food and drinking water is negligible and indistinguishable from the contribution by other sources.

2.4 What is the overall conclusion?

The use of soluble silicates in detergents and household cleaning products does not pose a risk to human health or the environment.

2.5 Similar substances

Zeolites are similar in structure and like soluble silicates function as water softening agents.

June 2005