TECHNICAL INFORMATION 1251

SIPERNAT®, SPHERILEX®, ZEOFREE® AND AEROSIL® SILICA:

Essential ingredients for Personal Care Formulations made by Evonik



interactive content

EVONIK
Leading Beyond Chemistry

CONTENTS

1. INTRODUCTION 2
1.1 NATURAL OCCURRENCE 2
1.2 SYNTHETIC AMORPHOUS SILICA (SAS) & SILICATE GRADES 4
2. EFFECTS OF SILICA AT A GLANCE 6
3. RHEOLOGY 7
3.1 RHEOLOGY MODIFIER 7
3.2 SUSPENSION AID 8
3.3 THERMAL STABILITY 8
3.4 EMULSION STABILITY 9
3.5 SPF BOOSTER 10
4. PEELING EFFECT 12
5. SOFT FOCUS EFFECT 14
6. CARRIERS 14
7. THE SO-CALLED "DRY LIQUID CONCEPT" 15
8. HAIR STYLING EFFECTS 16
9. MATTIFYING, SENSORY MODIFICATION, SEBUM CONTROL 17
10. RECOMMENDED PRODUCTS 18
11. HANDLING, PACKAGING AND STORAGE 20
12. REGULATORY AND MANAGEMENT SYSTEMS 20
13. CONTACT 21

Would you like
to learn more?
Click on the star
for more information!



1. INTRODUCTION

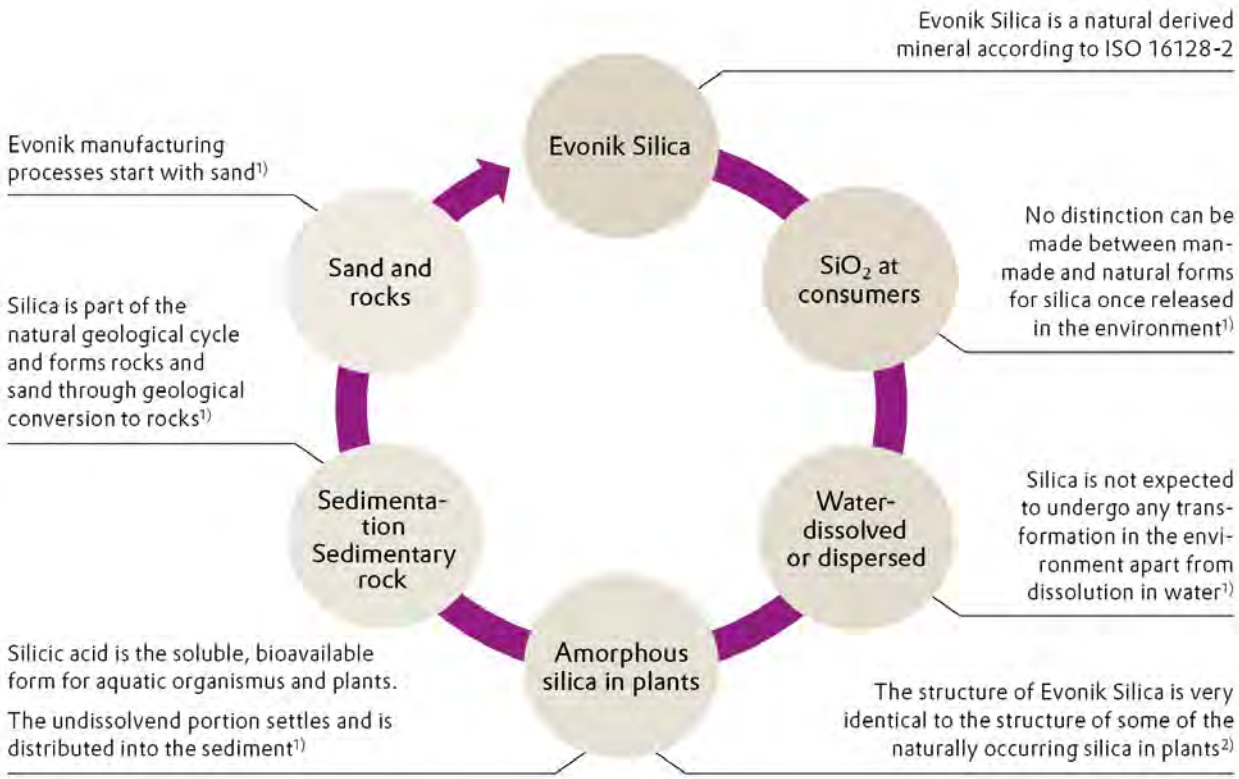
1.1 NATURAL OCCURRENCE

Evonik is one of the world's leading silica producers. We are the only company to provide both precipitated and fumed silica from a single source tailored for your application.

Over the past seventy years, synthetic amorphous silica created by Evonik Operations GmbH has been extensively used as a reliable raw material in cosmetic products. Evonik manufactures silica products of high purity with quality standards approved for personal care under the brand names **SIPERNAT®**, **SPHERILEX®** and **ZEOFREE®** precipitated silica and silicate and **AEROSIL®** fumed silica.

Silica is ubiquitous and occurs naturally in our environment in the form of minerals and plants.

Evonik is able to produce products of completely amorphous structure, as demonstrated by x-ray diffraction. This, so-called synthetic amorphous silica (SAS) has some solubility in water, is not bio-persistent, and does not accumulate in the body. As an inorganic mineral it is not biodegradable, but instead part of the natural geological cycle of silica. SAS is one of the most intensively researched materials and is considered a non-hazardous substance. The results of numerous existing toxicological studies lead us to trust that our synthetic amorphous silica (SAS) products are suitable and not harmful for the use in personal care products.



Source:
1) European Centre for Ecotoxicology and Toxicology of Chemicals, JACC report No. 51, Synthetic Amorphous Silica (CAS No. 7631-86-9), September 2006
2) Carole C. Perry (2003) Silicification: The Processes by Which Organismus Capture and Mineralize Silica. Reviews in Mineralogy and Geochemistry, 54 (1) 291-327

Evonik silica products are recognized in the personal care industry for their versatility and effectiveness, whether used to improve existing formulations or to develop new ones. Our products are characterized by their high purity and chemical inertness, which are especially important in cosmetic applications.

There are some overlaps in the properties, but fumed and precipitated silica grades made by Evonik have clear differences in relation to the specific surface area (BET), the pore structure, absorption capacity, the tamped density, and the loss on drying, just to name a few.

EVONIK IS ONE OF
THE WORLD'S LEADING
SILICA PRODUCERS

1.2 SYNTHETIC AMORPHOUS SILICA (SAS) & SILICATE GRADES

AEROSIL® fumed silica
INCI name "silica" (untreated hydrophilic fumed silica)
INCI name of surface modified hydrophobic fumed silica, depends on the surface treatment.

Example:
- **AEROSIL® R 972** (INCI: silica dimethyl silylate)
- **AEROSIL® R 816** (INCI: silica cetyl silylate)

Please follow the link to chapter
9. RECOMMENDED PRODUCTS

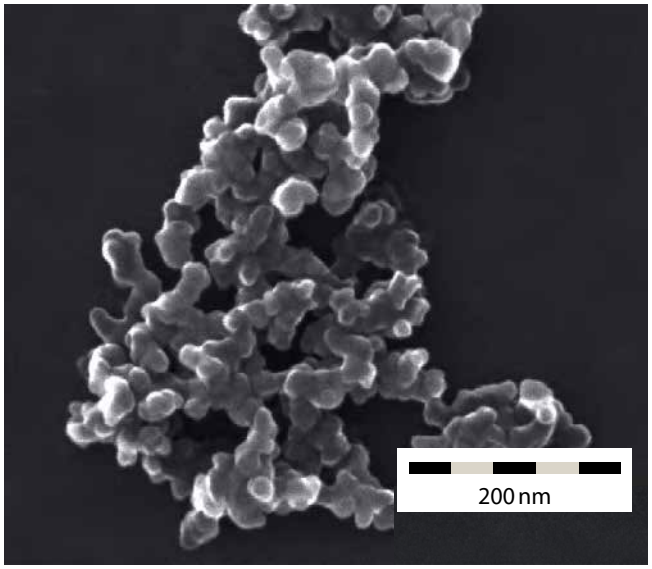


Figure 1 *AEROSIL® aggregate*

The manufacturing process of **AEROSIL®** fumed silica is based on the flame hydrolysis of silicon tetrachloride. Pyrogenic silica takes the form of a fluffy white powder. A closer look at a microscope image reveals chainlike, branched aggregates and agglomerates.

A picture of **AEROSIL®** shows an aggregate structure consisting of covalently bound primary particles as the smallest indivisible unit. These aggregates are building agglomerates. Silica produced via flame hydrolysis only has an external surface due to the lack of a defined pore structure.

The hydrophobic **AEROSIL®** "R" grades mentioned below have all been surface treated using different silanes or siloxanes. The hydrophobic, or water-repellent, behavior is caused by short chain or long-chain organic groups that are firmly anchored to the silica surface.

These treatments impart different degrees of hydrophobicity, which are quantified using methanol wettability (shown below).

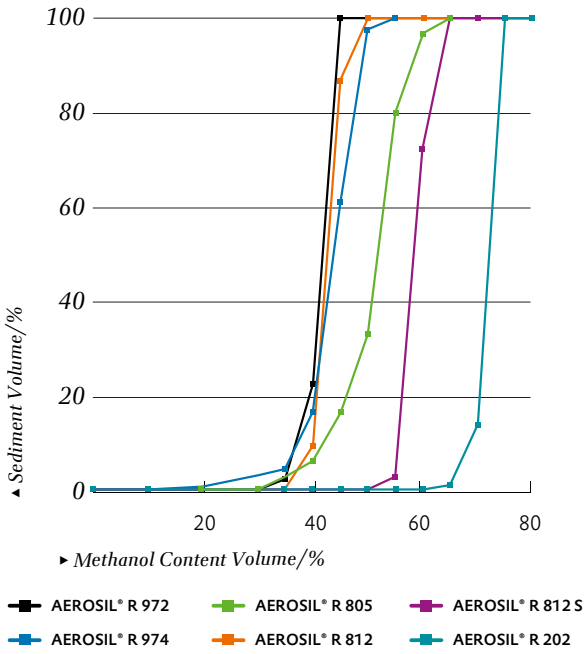


Figure 2 *Relative hydrophobicity of various **AEROSIL®** "R" products as related to their methanol wettability. The higher the methanol concentration in the mixture, the more hydrophobic the silica is.*

***AEROSIL® R 816** is missing in the graph because of its unique characteristic. **AEROSIL® R 816** is surface treated with a long chain (hexadecyl) silane. This leads to an incomplete hydrophobic surface treatment of the hydrophilic silica surface (steric hindrance), but this is exactly how a product with very extraordinary properties is created. **AEROSIL® R 816** can be easily wet by water and no methanol is needed.*

*For more information about **AEROSIL®** fumed silica please use our Technical Overview 11*
https://products.evonik.com/assets/45/92/244592.pdf

SIPERNAT®, SPHERILEX® and ZEOFREE®
(INCI: hydrated silica and calcium silicate)

Evonik is specialized in the manufacturing of synthetic amorphous silica and silicate in a wet (precipitated) process.

Pure loose white powder with high internal porosity is produced. These products are characterized by a defined pore structure.

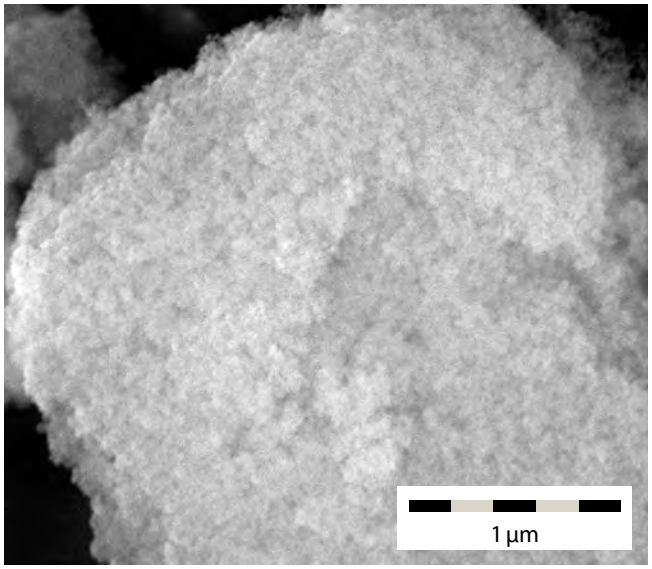


Figure 3 *SIPERNAT® particles*

Precipitated hydrated silica and silicates have unique properties due to their tremendous porosity and absorption capacity.

SPHERILEX ® 10 PC
(INCI: hydrated silica)

The **SPHERILEX®** technology offers a unique and patented method to manufacture precipitated silica. This new process enables a spherical particle shape, a controlled pore size, and a narrow particle size distribution.

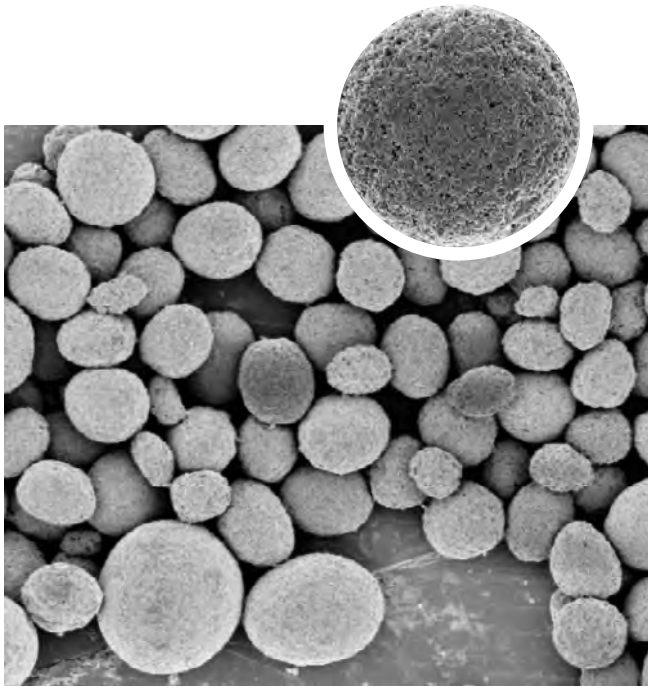
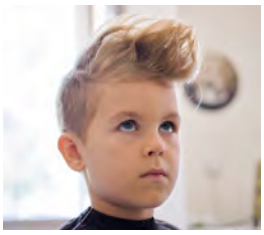


Figure 4 *SPHERILEX® 10 PC spheroidal particles*

EVONIK HAS A WIDE RANGE OF EFFECTIVE, MULTI-PURPOSE AND ENVIRONMENTALLY FRIENDLY SPECIAL SILICA IN ITS PORTFOLIO, FOR THE PROCESSING OF LEAVE-ON AND RINSE-OFF COSMETIC PRODUCTS.

2. EFFECTS OF SILICA AT A GLANCE

	EFFECT	APPLICATION		BENEFIT
	• Rheology - Rheology modifier - Suspension aid - Thermal stability - Emulsion stability - SPF booster	**Leave-on formulations** • Such as decorative cosmetics, creams and oil gels	▶	**One multifunctional ingredient only** • Prevents anti-settling of solid particles • Improved thermal stability • Improved handling and self-life • Means prevention of waste • Higher Sun Protection Factor (SPF)
	• Peeling effect	**Rinse-off formulations** • Such as peeling products	▶	• Alternative to microplastic • High compatibility with other ingredients
	• Carrier • Dry Water effect - To enable powder formulations	**Rinse-off formulations** • Water-free cleaning formulations **Leave-on formulations** • Face powder • Dry binder technology • Hair styling powder	▶	• Water-free formulations – less product weight means less cargo weight • Environmental impact – less pollution and emission • Controlled release of actives • Surprising variety of formulations
	• Hair styling • Sensory, matt, sebum control, effects…	**Leave-on formulations** • Decorative cosmetics (powder, lipstick, etc.) • Emulsions • Hair styling products	▶	• Alternative to microplastic • High compatibility with other ingredients • All kind of hair styling is feasible
	• Soft focus effect	**Leave-on formulations** • Decorative cosmetic products such as face powder • Emulsions	▶	• Immediate effect • Low application concentration • Easy processing

ALL EFFECTS CAN BE ACHIEVED WITH JUST ONE RAW MATERIAL.
SILICA MADE BY EVONIK.

3. RHEOLOGY

3.1 RHEOLOGY MODIFIER

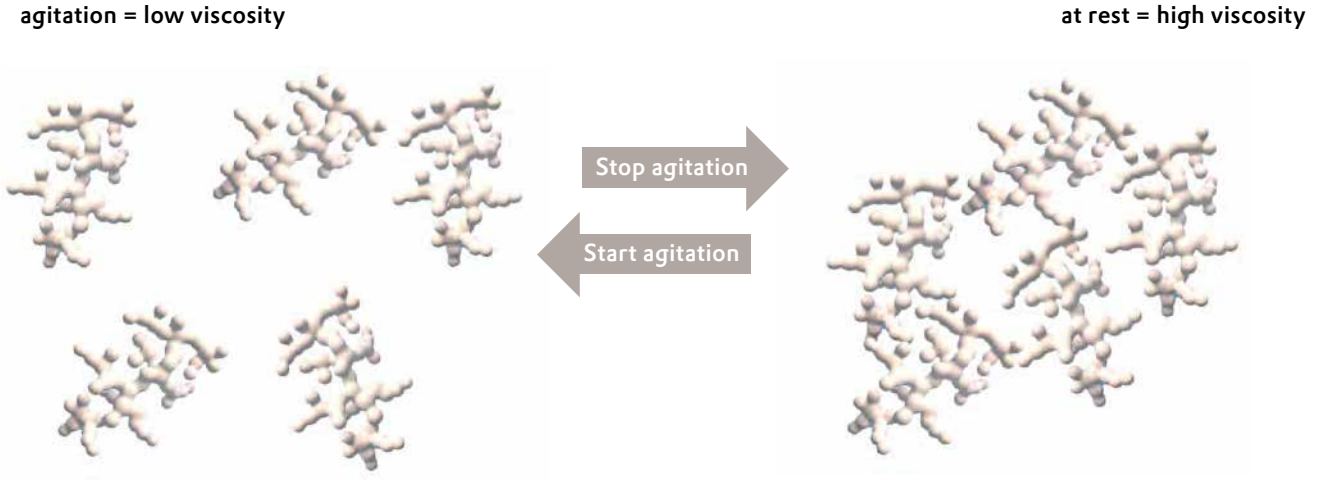


Figure 5 Mechanism of thickening of AEROSIL® fumed silica

AEROSIL® fumed silica and **SIPERNAT®** precipitated silica can be used as reliable rheology aid. **AEROSIL®** is more efficient and therefore its use is preferably recommended. In a cosmetic formulation, **AEROSIL®** will create a three-dimensional network. Since this network can easily be broken down if external shear forces are applied, the resulting mixtures exhibit a thixotropic (non-Newtonian) behavior. The shear-thinning effect renders a gel that is easily spreadable during application to the skin without any dripping.

The most efficient **AEROSIL®** type to use is dependent on the matrix as well as the viscosity that needs to be achieved. As a general rule of thumb, hydrophilic **AEROSIL®** grades perform better in non-polar oils (e. g. mineral oil). For more polar synthetic oils and vegetable oils, hydrophobic **AEROSIL®** types are often the better choice. A prerequisite for taking full advantage of **AEROSIL®**'s thickening effect is to properly disperse the silica in the matrix. As delivered, the products consist of agglomerates that need to be broken up so that the aggregate network can form in the oil. The **AEROSIL®** concentration required for thickening is dependent on the desired viscosity as well as the matrix composition. Usually, concentrations of 0.5 to 6 wt.-% are sufficient in the formulation.

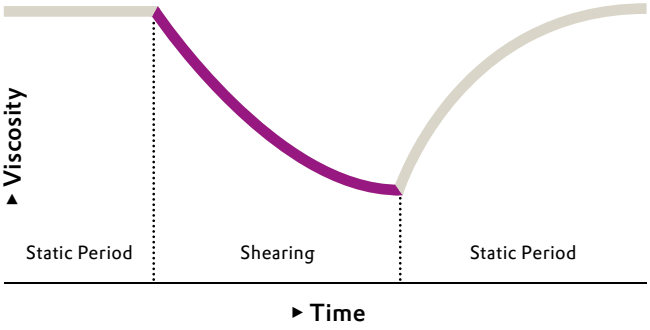


Figure 6 Shear thinning effect of AEROSIL® fumed silica

When looking at a cosmetic formulation it is necessary to consider the formulation as a whole since active ingredients, emollients, etc. may completely alter the thickening efficiency of **AEROSIL®**. The optimum product needs to be determined experimentally, taking other parameters like transparency into account.

Link to the video "Rheology"
http://evonik.com/silica-rheology

3.2 SUSPENSION AID

Many cosmetic products rely on the homogeneous dispersion and stabilization of pigments or other insoluble substances in their formulation. Decorative cosmetics products such as nail polish and lip gloss are typical examples where pigments need stabilization in an organic matrix.

AEROSIL® fumed silica can help to improve and stabilize such suspensions. The **AEROSIL®** network will incorporate the particles and stabilize them against settling.

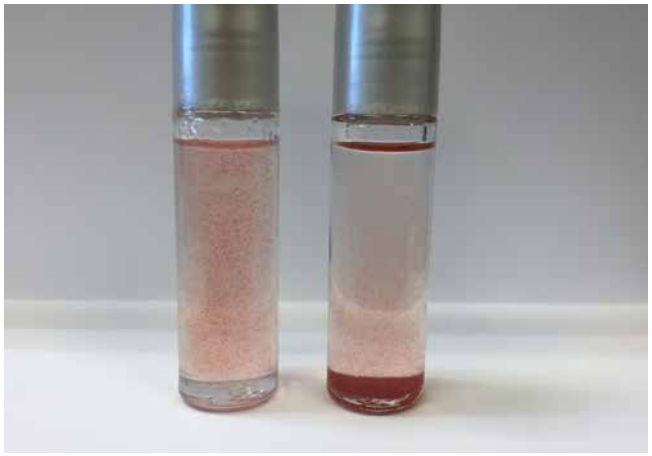


Figure 7 *A lip gloss formulation showing suspension of glitter using 5 wt. % **AEROSIL® R 812** (left) and the control without silica (right)*

AEROSIL® fumed silica as viscosity and stabilizing booster for aqueous mixtures

AEROSIL® fumed silica is not recommended as an effective thickener for water-based systems, but in combination with hydrocolloids it boosts the viscosity and solid stabilization effect. Hydrocolloid gels are composed of a three-dimensional, disordered network of linked hydrocolloids in which the solvent is enclosed. The extent of gel formation and gel properties depend, among other things, on the hydrocolloid and the silica concentration.

AEROSIL® fumed silica in combination with polysaccharide (e. g. xanthan gum) or acrylic polymers such as carbomer thickeners leads to an increase in viscosity. Processing is very simple and does not require any additional steps to what is needed for the respective hydrocolloid anyway. Evonik silica does not need additional activators or special processing parameters (such as an increased temperature) to provide its full thickening performance.

As an example, in a surfactant-containing aqueous formulation, solid particles were to be stabilized with the help of a hydrocolloid and silica. The respective formulations with xanthan gum and silica alone showed a rapid phase separation and a fast-settling behavior of the particles. Only the combination of the two ingredients resulted in a stable formulation.

3.3 THERMAL STABILITY

AEROSIL® fumed silica and SIPERNAT® precipitated silica

In liquid wax/oil mixtures where solid, insoluble particles, such as pigments or actives, have to be stabilized, our silica acts as a structuring and stabilizing agent that limits exudation or syneresis. It also enhances storage and temperature stability without worsening the excellent pay-off to the skin. This was tested on lipsticks as an example.



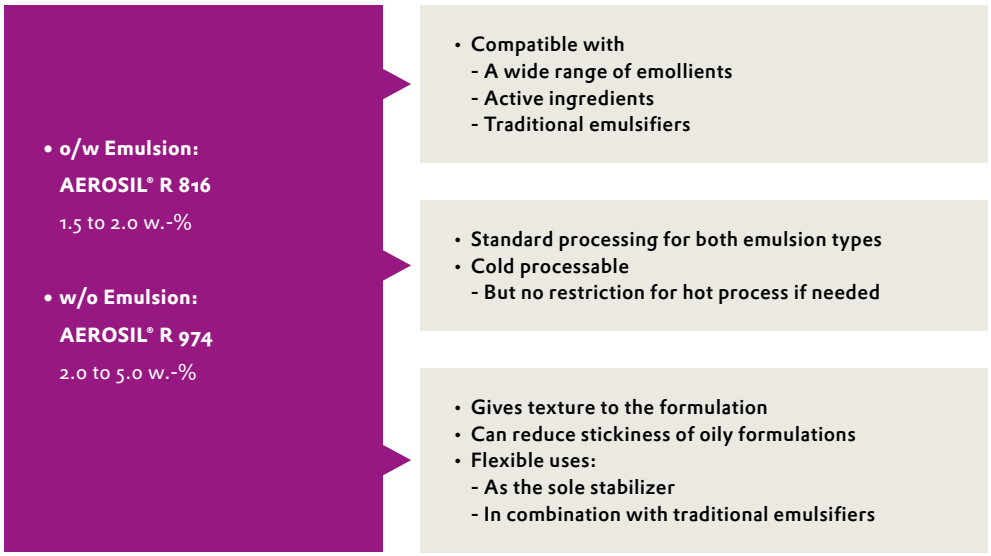
Figure 8 *Heat stabilization of a lipstick by adding **AEROSIL®**. The lipsticks have the same composition. Left: Lipstick after storage at 50 °C for 24 h. Right: lipstick containing 4 wt% **AEROSIL® 200***

3.4 EMULSION STABILITY

Emulsions, with their variety of applications, are probably one of the most popular personal care formulations. An emulsion is a dispersion of minute droplets finely dispersed in another liquid in which they are insoluble, or un-miscible, and usually stabilized with organic emulsifiers. As an alternative, some of our moderately hydrophobic fumed silica such as **AEROSIL® R 816** and **AEROSIL® R 974** can be used to stabilize emulsions also. These stabilizing silica grades have a preference for their respective continuous phases, and they can structure them. The silica enriches at the phase boundaries to prevent droplet coalescence. The grade and concentration of silica is chosen based on the type of emulsion required (o/w (oil-in-water) or w/o (water-in-oil)), the total oil content in the formulation, and the desired viscosity of the final product.

Emulsions stabilized using particles in this manner are called 'Pickering' emulsions. They are named after S.U. Pickering, who described the phenomenon in 1907.

The advantages of using silica are the following:



AEROSIL® can be used at room temperature. This way, time- and energy-intensive heating and cooling of phases is not needed. Pickering emulsions with **AEROSIL®** can be produced with the help of common equipment used in the production of emulsions. Silica can also be used along with traditional emulsifiers in an emulsion as co-stabilizer and to reduce stickiness of the entire formulation.

3.5 AEROSIL® FUMED SILICA AS FILM FORMER AND SPF (SUN PROTECTIVE FACTOR) BOOSTER

For a long time, consumers have recognized the importance of protection from ultraviolet rays and as a result highly effective sun protection products are more in demand than ever. This has led formulators to explore more ways to improve their sunscreen formulations.

AEROSIL® fumed silica has unique properties that offer multiple benefits to oil-in-water, water-in-oil and anhydrous formulations at low loading levels. Silica can reduce greasiness, stickiness and improve spreadability. The film forming properties of **AEROSIL®** fumed silica lead to greater UV filter performance efficiency in anhydrous sunscreen formulations. Since our products are based on silicon dioxide, they are non-plastic and nonpetroleum.

Tests from BASF's global technical center sun care demonstrates the high efficiency of **AEROSIL®** fumed silica as SPF booster for example in anhydrous sun care products.

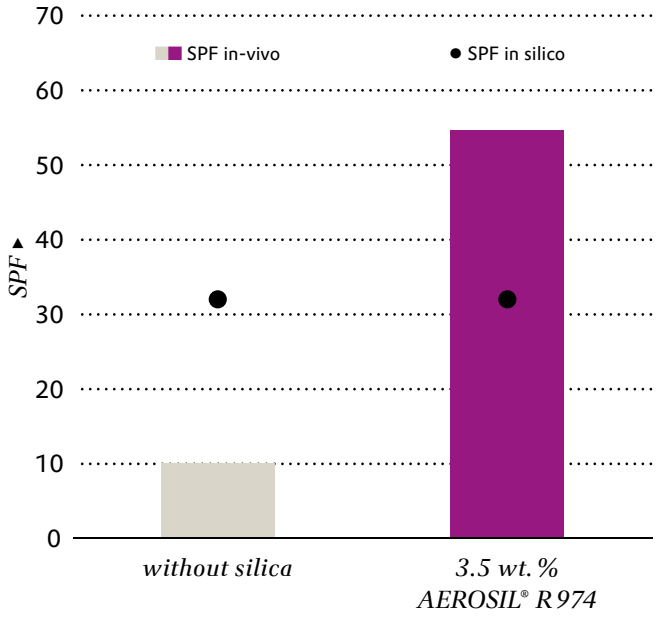
Sun care oil SPF 20 - 30 Anhydrous Testformulation created by BASF*

Phase	Trade name	INCI	2-1 wt.%	2-2 wt.%
A	Myritol 318	Caprylic/Capric Triglyceride	10.50	10.50
	Cetiol® CC (BASF)	Dicaprylyl Carbonate	21.70	18.20
	Cetiol® 4 all (BASF)	Dipropylheptyl Carbonate	10.30	10.30
	Cetiol® C5 (BASF)	Coco-Caprylate	10.00	10.00
	Cetiol® B (BASF)	Dibutyl Adipate	20.00	20.00
	Tinosorb® S (BASF)	Bis-Ethylhexyloxyphenol Methoxyphenyl Triazone	4.50	4.50
	Uvinul® T 150 (BASF)	Ethylhexyl Triazone	4.50	4.50
	Uvinul® A Plus (BASF)	Diethylamino Hydroxybenzoyl Hexyl Benzoate	3.00	3.00
B	Vitamin E acetate	Tocoperyl Acetate	0.50	0.50
	Cetiol® Ultimate (BASF)	Undecane, Tridecane	15.00	15.00
C	AEROSIL® R 974 (Evonik)	Silica Dimethyl Silylate	-	3.50

*The formulation has been developed in order to give general guidance only. It does not constitute any guarantee or warranty.

The calculated SPF value determined with their in-house equipment (BASF Sunscreen Simulator - in silico determination of the sun protection factor) was about a SPF of 30. The actual values obtained with in- vivo tests were about 10 for the formulation without silica. The formulation containing **AEROSIL® R 974** (silica dimethyl silylate) exceeds expectations by reaching a SPF of approximately 50.

Sun care oil SPF 20 - 30 created by BASF



- The calculated SPF value* was about **30**
- in-vivo:
  - Formulation without silica: SPF of about **10**
  - Formulation with AEROSIL® fumed silica: SPF of about **50**

*(BASF Sunscreen Simulator – in silico determination of the sun protection factor)

4. PEELING EFFECT

SIPERNAT® PC exfoliating particles can turn a conventional peeling ritual into a surprising skin care experience

Exfoliating body and facial cleansers are frequently used in formulations to clean by removing dead skin and revitalizing its appearance. Soft and smooth skin is instantly revealed, with a perfectly refined texture. **SIPERNAT® PC** Hydrated Silica exfoliating particles are tailored to cover the full range of scrub formulations, enabling different desquamation and sensory properties. The **SIPERNAT® PC** portfolio offers particles in different sizes, morphology, and hardness that enables formulations for skin areas of different sensitivity (e. g. face, body, feet). Due to its close relation to natural occurring silica, **SIPERNAT® PC** Hydrated Silica is recognized as nature identical by major certification organizations, e. g. **COSMOS**. The hydrophilic surface of **SIPERNAT® PC** particles make them easy to incorporate into any type of scrub formulations but also ensures removal in wastewater treatment plants after application. This makes **SIPERNAT® PC** an eco-friendly alternative for microplastic.

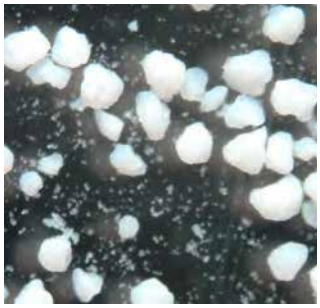


Figure 9 **SIPERNAT® 250 PC**

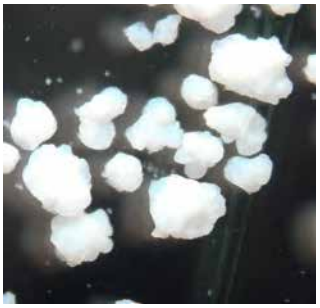


Figure 10 **SIPERNAT® 9000 PC**

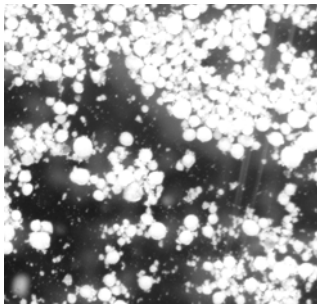


Figure 11 **SIPERNAT® 22 PC**



Figure 12 **SIPERNAT® 2200 PC**

*Microscope pictures of **SIPERNAT® PC** Hydrated Silica particles.*

SIPERNAT® PC product overview[1]

	Particle Size[2] (d_{50}, µm)	pH (5 % in water)	preferred application (examples)
SIPERNAT® 22 PC	100–140	5.5–7.5	Sensitive skin formulations Face wash
SIPERNAT® 250 PC	180–480	6.0–7.5	General scrub formulations Body wash
SIPERNAT® 2200 PC	260–380	5.0–7.0	Sensitive skin formulations Body wash
SIPERNAT® 9000 PC	550–850	6.0–7.5	Strong particle sensation Foot scrubs / Heavy dirt hand wash

1 Typical data for technical evaluation-values do not represent a specification. 2 Measured by laser diffraction following ISO 13320.

PROCESSING OF **SIPERNAT® PC** HYDRATED SILICA PARTICLES: INCORPORATE **SIPERNAT® PC** PARTICLES AT LOW TO MODERATE SHEAR TO PREVENT THE DESTRUCTION OF THE PARTICLES AT ANY TIME DURING PROCESSING. TYPICAL USE CONCENTRATION IS 2 TO 15 WT. %.

5. SOFT FOCUS EFFECT

Optical blurring of skin wrinkles or so-called soft focus effect

There is great interest from consumers to maintain youthful appearance. To achieve this, there are many different ways and the optical blurring of fine lines and wrinkles is only one possibility.

What are the guidelines for an effective soft focus material?

A visible soft-focus effect is reached by high values in total transmission and diffuse transmission. The total transmittance indicates the natural look of formulations such as for example make-up. It is measured by the ratio of light which passes through the formulation. An undesired "cake-on" effect is created if the formulation is not permeable to light. Diffuse transmittance indicates how strongly the light is distributed in all directions after reflection on the skin. Scattering of light makes fine lines and wrinkles appear less visible.

The refractive index of ZEOFREE® 600 LA and the high absorption capacity of this fine white loose powder fulfills the requirements on an outstanding soft focus and matting agent.

Benefits of ZEOFREE® 600 LA as natural derived mineral ingredient:

- Flexible use in leave-on cosmetic products such as emulsions or powder
- Easy processing

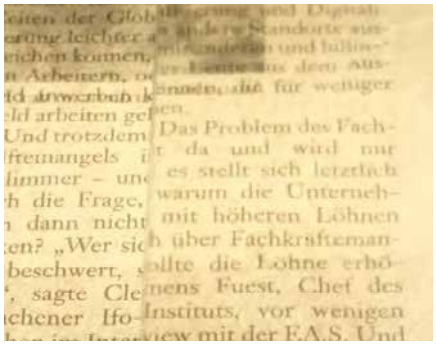


Figure 13 *o/w emulsion without particles*

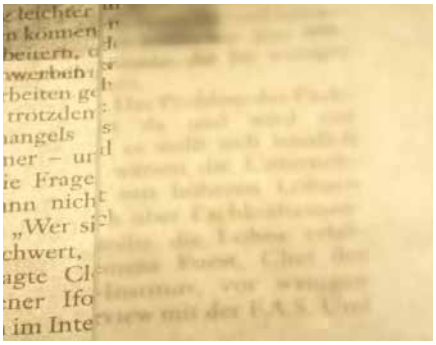


Figure 14 *2 wt.% ZEOFREE® 600 LA in o/w emulsion*

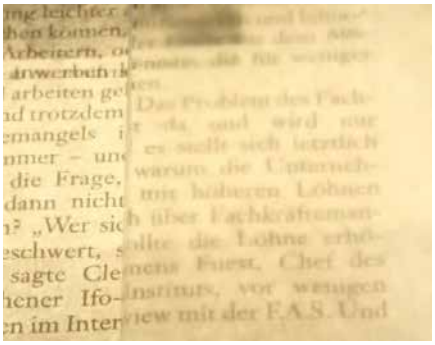


Figure 15 *Reference, 2 wt.% Nylon 12 in o/w emulsion*

6. CARRIERS

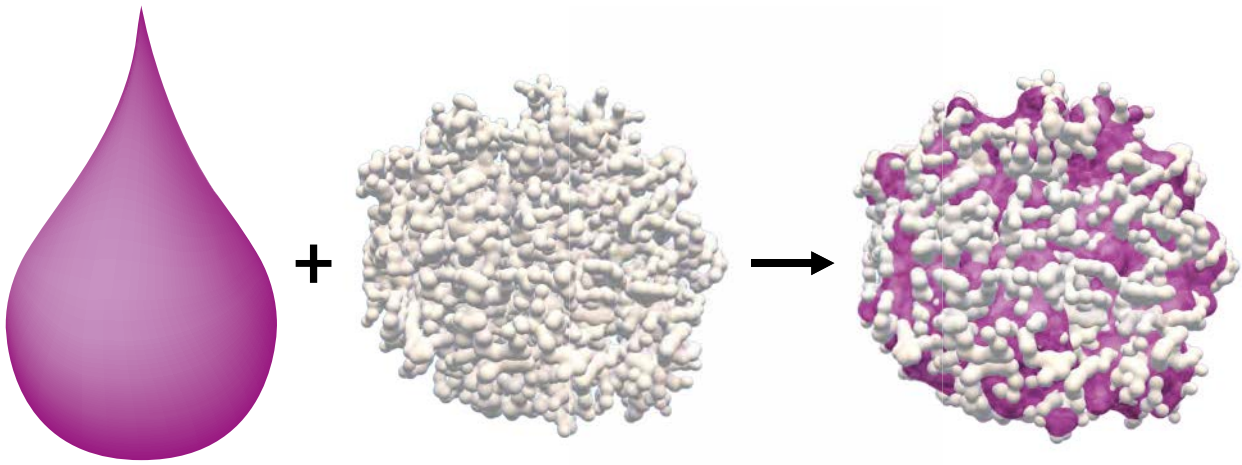


Figure 16 *Schematic depiction of the absorption process*

SIPERNAT® precipitated silica has high internal porosities and can be used to convert liquid formulations or ingredients into powder. This concept can be used for liquids such as fragrances, surfactants, etc. that need to be mixed with other powder ingredients in a formula. The absorption capacity of silica depends on the size of the particle, pore structure, and volume which is specified using the DOA test (ISO 19246).

Successful processing of carriers

Low-shear mixing is key to successfully processing a carrier formulation. The silica bed needs to be in continuous motion during the production phase. Liquids should be uniformly dosed by either spray addition or atomization.

Our **SIPERNAT®** carriers convert liquids into free-flowing powders. These so-called absorbates are used as dry binders for direct compaction or as a carrier for surfactants or actives.

http://evonik.com/silica-carrier

Benefits:

- Absorbate can be mixed easily into any powder formulation
- Liquids absorbed in the powder can be released again with the help of suitable solvents
- Liquids are released under pressure in a compacting process such as for eye shadow, face powder or compacted dry shampoo

Most recommended SIPERNAT® silica for carriers

	DOA Absorption (ml / 100 g) following ISO 19246
SIPERNAT® 50 S	260–300
SIPERNAT® 500 LS	250–290
SIPERNAT® 22 S	215–255

7. THE SO-CALLED "DRY LIQUID CONCEPT"

"Dry Liquid" is created by producing fine water and / or glycerin, sorbitol (70 wt.%) droplets in the presence of a hydrophobic **AEROSIL®** during a fast, high shear mixing process. While mixing, the fine droplets are coated by the hydrophobic silica, which prevents them from coalescence. The result is a powdered substance containing a very high percentage of liquids, typically referred to as "Dry Water / Dry Glycerin". For the sake of simplicity, the term Dry Liquid will be used to describe such kind of formulations.

The Dry Liquid concept relies on the high surface tensions of the liquid phase. The extremely hydrophobic **AEROSIL®** fumed silica will not be wetted by polar liquid droplets and instead form a thin coating on their surface. However, additives (such as surfactants or alcohol) added to the aqueous phase can lower the surface tension or wet the silica, allowing it to mix with the liquid phase. This will cause a rapidly formed cream instead of the desired powder.

Depending on the surface tension, the basic Dry Liquid concept allows for the incorporation of up to several percent of additives by weight before the formulation becomes unstable. This formulation type can be broken down with very low shear. Possible applications for Dry Liquid are moisturizing face and body powder or mattifying hair styling products.
The Dry Liquid concept is attractive to consumers and manufacturers since it offers an unexpected performance:

Benefits:

- Powder, which is mainly based on water and hydrophobic silica, easily transforms into its basic components when applied to the skin
- Powder, which is mainly based on glycerin or sorbitol and hydrophobic silica, easily transforms into a cream

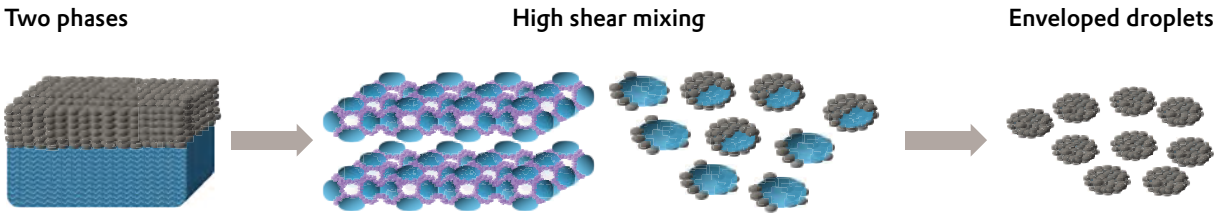


Figure 17 *Dry Liquid Processing: A high shear mixing is used to break water into droplets and coat them with a highly hydrophobic silica resulting in discrete particles.*

Mixing equipment needs sufficient shear force

- To disintegrate the liquid in small droplets
- High shear kitchen blender (laboratory)
- Toothed blade mixers or rotor stator (production)

8. HAIR STYLING EFFECTS

General effect

Human hair strands were treated with a very simple test formulation containing 10 wt. % of the respective silica grade, kaolin, CORN PO4 PH "B" (Agrana) and glycerin. In addition to products based on the dry liquid concept, this is another example of how effectively **AEROSIL®** can be used for extreme hair styling. In contrast, **SPHERILEX® 10 PC** achieves all-natural volume effects.

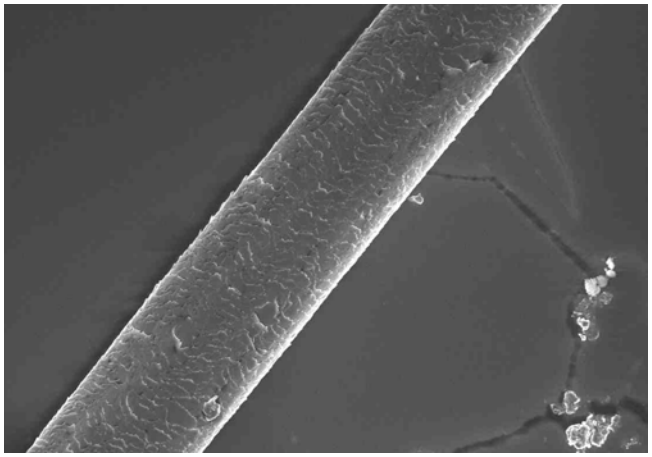


Figure 18 *SEM images: Human hair*

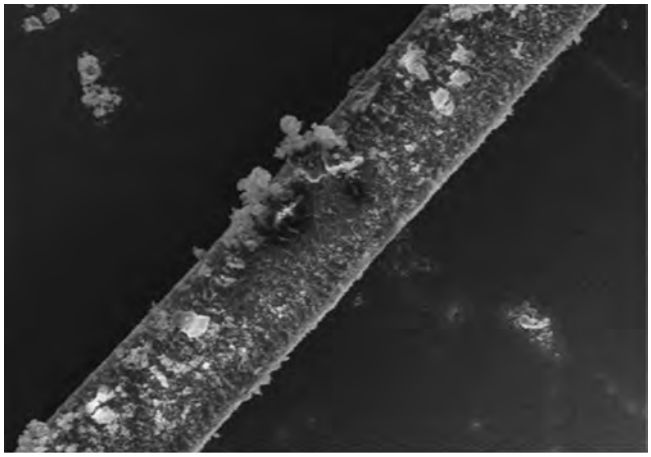


Figure 19 *Human hair with silica*



Figure 20 *Hair strands with 10 wt.% **AEROSIL® 200***



Figure 21 *Hair strands with 10 wt.% **SPHERILEX® 10 PC***

EVONIK SILICA HAS MANY APPLICATIONS IN HAIR CARE PRODUCTS. THE CHOICE OF SILICA MAKES THE STYLING EFFECT.

9. MATTIFYING, SENSORY MODIFICATION, SEBUM CONTROL

Evonik offers **SPHERILEX® 10 PC** as a natural derived mineral that has a spherical particle shape, a controlled pore size, and a narrow particle distribution through a patented manufacturing process. This combination of properties exhibits numerous benefits in cosmetics applications, such as a variety of skincare products, decorative cosmetics, and hair styling formulations. **SPHERILEX®** provides many of the critical performance benefits that formulators are looking for.
Its unique ability to work with a wide range of ingredients makes this the go-to ingredient for sustainable formulations.
The benefits of **SPHERILEX®** in skincare are attributed to the spherical shape which provides a unique, silky-smooth skin feel. Also, **SPHERILEX® 10 PC** helps reduce and eliminate tackiness in formulations. **SPHERILEX® 10 PC**, in a pressed powder formulation, contributes to binder oil efficiency, improves compressibility, and stabilizes the cake while maintaining an excellent pay-off. Used in hair care formulations, the low absorption capacity is effective enough to absorb excess sebum from hair and scalp by leaving a non-drying skin feeling and providing a natural-looking styling effect.

SPHERILEX® 10 PC added to an o/w emulsion improves the consumer experience by:

- Making it easier to spread on the skin
- Leaving a stronger moisturized sensation after application
- Reducing tackiness
- Producing a matte finish
- Not leaving any visible whiteness

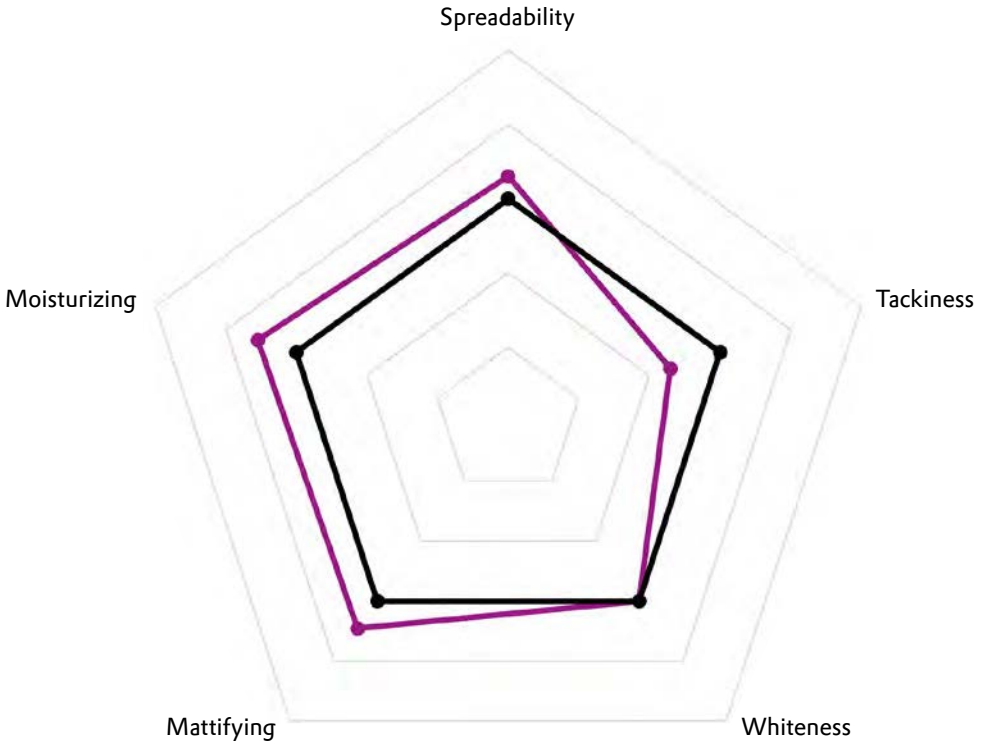


Figure 22** Diagram on performance benefits with **SPHERILEX® 10 PC

10. RECOMMENDED PRODUCTS

The following table summarizes some of the most important cosmetic standard and recommended **SIPERNAT®**, **SPHERILEX®**, **ZEOFREE®** and **AEROSIL®** products. We are happy to advise you on questions on how to incorporate and handle Evonik silica. Please contact us.

	INCI name	appearance	Thickening (Rheology modifier)/ Suspension aid	Thermal stability
AEROSIL® 380	Silica	white powder	++	++
AEROSIL® 300	Silica	white powder	++	++
AEROPERL® 300/30	Silica	white powder		
AEROSIL® 200	Silica	white powder	++	++
AEROSIL® 200 V	Silica	white powder	+	+
AEROSIL® R 202	Silica Dimethicone Silylate	white powder	++	++
AEROSIL® R 805	Silica Caprylyl Silylate	white powder	++	++
AEROSIL® R 812 (S)	Silica Silylate	white powder	++	++
AEROSIL® R 816	Silica Cetyl Silylate	white powder	++	++
AEROSIL® R 8200	Silica Silylate	white powder	+	+
AEROSIL® R 972	Silica Dimethyl Silylate	white powder	++	++
AEROSIL® R 974	Silica Dimethyl Silylate	white powder	++	++
SIPERNAT® 22 LS	Hydrated Silica	white powder		
SIPERNAT® 22 PC	Hydrated Silica	spherical shape		
SIPERNAT® 22 S	Hydrated Silica	white powder		
SIPERNAT® 2200 PC	Hydrated Silica	spherical shape		
SIPERNAT® 250 PC	Hydrated Silica	round-edged shape		
SIPERNAT® 28	Hydrated Silica	white powder	+	+
SIPERNAT® 50	Hydrated Silica	white powder		
SIPERNAT® 50 S	Hydrated Silica	white powder		
SIPERNAT® 500 LS	Hydrated Silica	white powder	+	++
SIPERNAT® 9000 PC	Hydrated Silica	round-edged shape		
SPHERILEX® 10 PC	Hydrated Silica	spherical shape		
ZEOFREE® 600 LA	Calcium Silicate	white powder		

+ Recommended ++ Especially recommended +++ Subject to reservation

Emulsion stability	SPF booster	Exfoliating effect	Sensory, matte, sebum control, soft focus,....	Powder formulations		Hair styling
				Carrier	Dry liquid	
	+					++
	+					++
	++					++
						++
					++	++
						++
					++	++
++						++
					++	++
	+					++
++	++					++
				++		++
				+		
				++		++
		++		+		
		++		+		
				++		++
				++		++
				++		++
				++		++
		++		+		
			++			++
			++	++		

11. HANDLING, PACKAGING AND STORAGE

Customers can easily handle these products without creating dust, and process (i. e., convey, measure out, blend, etc.) them within solid or liquid systems. Silica and silicate products are largely chemically inert and their composition does not change, even over long periods of time. However, the relatively large surface area of these products can lead them to adsorb volatile substances. In the case of moisture, this adsorption process is reversible. For this reason, we recommend storing all Evonik silica and silicate products in a dry location where they are protected from moisture or other organic vapors. For more detailed information on product handling, packaging and storage please contact your local sales organization.

12. REGULATORY AND MANAGEMENT SYSTEMS

All products are manufactured at facilities certified according to the current standards ISO 9001 and ISO 14001.
We are happy to support you with product safety information for each product upon request. In these documents you will find useful information on for example registration, microbiology, animal testing, REACH.



COSMOS*

All hydrophilic **SIPERNAT®**, **SPHERILEX®** precipitated silica with the INCI name "Hydrated Silica" and hydrophilic **AEROSIL®** fumed silica with the INCI name "Silica", were evaluated as non-organic raw materials compliant with the **COSMOS** standard.

NATRUE*

All hydrophilic **SIPERNAT®**, **SPHERILEX®** precipitated silica with the INCI name "Hydrated Silica" and hydrophilic **AEROSIL®** fumed silica are regarded nature identical according to **NATRUE** (www.natrue.com, annexes under Manufacturers - NATRUE Criteria).

ISO 16128*

Conformity of silica according to ISO 16128 - Guidelines on technical definitions, a criterion for natural and organic cosmetic ingredients and products	
• Hydrophilic **SIPERNAT®** and **SPHERILEX®** precipitated silica; INCI name **"Hydrated silica"** • Hydrophilic **ZEOFREE®** 600 LA, INCI name **"Calcium silicate"** • Hydrophilic **AEROSIL®** fumed silica, INCI name **"Silica"** • are **classified as derived mineral ingredient**	• hydrophobic **AEROSIL® R** fumed silica, INCI name **"Silica…silylate"** • are **classified as non-natural ingredients** due to their intentional chemical modification
Based on the table 1 in ISO 16128-2 the following indices apply:	
Natural Index 0 **Natural origin Index 1** Organic Index 0 Organic origin index 0	Natural Index 0 **Natural origin Index 0** Organic Index 0 Organic origin index 0

*Statement available on request

In case your desired standard is not mentioned, please do not hesitate to contact us.

13. CONTACT

Contact Evonik today for more information and to order a sample of our high performing specialty silica products:

http://evonik.com/silica-personal-care
ask-si@evonik.com

LinkedIn channel
https://www.linkedin.com/showcase/evoniksilicacare

EUROPE / MIDDLE-EAST / AFRICA / LATIN AMERICA

Evonik Operations GmbH
Silica business line
Rodenbacher Chaussee 4
63457 Hanau-Wolfgang
Germany

Phone +49 6181 59-12532
Fax +49 6181 59-712532
ask-si@evonik.com

www.evonik.com
www.silica-specialists.com

NORTH AMERICA

Evonik Corporation
Silica business line
299 Jefferson Road
Parsippany, NJ 07054-0677
USA

Phone +1 800 233-8052
Fax +1 973 929-8502
ask-si-americas@evonik.com

ASIA / PACIFIC

Evonik (SEA) Pte. Ltd.
Silica business line
3 International Business Park
#07 – 18, Nordic European Centre
Singapore 609927

Phone +65 6809-6877
Fax +65 6809-6677
ask-si-asia@evonik.com

This information and all further technical advice are based on our present knowledge and experience. However, it implies no liability or other legal responsibility on our part, including with regard to existing third party intellectual property rights, especially patent rights. In particular, no warranty, whether express or implied, or guarantee of product properties in the legal sense is intended or implied. We reserve the right to make any changes according to technological progress or further developments. The customer is not released from the obligation to conduct careful inspection and testing of incoming goods. Performance of the product described herein should be verified by testing, which should be carried out only by qualified experts in the sole responsibility of a customer. Reference to trade names used by other companies is neither a recommodation, nor does it imply that similar products could not be used.

AEROSIL®, **SIPERNAT®**, **SPHERILEX®**, and **ZEOFREE®** are registered trademarks of Evonik Industries AG or one of its subsidiaries.

TI 1251-EN-02-2022/04-auw

The Silica specialists at Evonik – Inside to get it right.

EVONIK
Leading Beyond Chemistry