Another newsletter?

Manufacturers of personal care products have thousands of different raw materials to choose from. New raw materials are constantly being developed that offer new and unique properties for the cosmetics of today and tomorrow. AEROSIL® fumed silica and SIPERNAT® precipitated silica have been used in personal care products for many years and therefore might be considered as “traditional” ingredients that, although very useful and of high quality, don’t have much new to offer. But is this really true?

We at Evonik strongly believe that AEROSIL® and SIPERNAT® silica enable new and exciting formulation opportunities. Innovations don’t always have to be the result of new products, but can be the reimagining of existing ones. This newsletter is to inform personal care formulators and other interested persons of novel concepts and new developments relating to the use of silica in cosmetic formulations.

If you do not focus on new product formulation yourself, please feel free to distribute this newsletter to your R&D colleagues or whoever else in your organization might be interested.

SIPERNAT® 11 PC: Eco-friendly replacement for microplastics in leave-on applications

For leave-on and decorative applications, Evonik is now introducing a new grade to the market: SIPERNAT® 11 PC. The new product will be a member of the eco-friendly SIPERNAT® PC family. This grade is an eco-friendly, hydrated silica for modified skin feel and is good for use in skin care formulations such as wrinkle fillers.
**Regulatory Background**

Open up any trade magazine, newspaper, or news site on the internet and you are bound to see an item or article regarding the elimination of polyethylene beads from personal care formulations. Timelines vary across the globe, but let there be no doubt, polyethylene beads used as a means of exfoliating will soon be a thing of the past—at least on store shelves. Recent reports on plastic waste accumulating in the oceans and finding their way into the food chain have raised concerns about the use of microscopic polyethylene particles in a variety of applications.

Why the concern? Because of the size of most microbeads (< 0.5 mm), they are not easily removed in waste treatment systems and make their way into our waterways and eventually into the ocean. According to research by the United Nations Environment Program (UNEP), these particles “may take hundreds of years to completely degrade.” These plastic particles can attract other pollutants such as pesticides and oils and eventually end up in the food chain as well. That is why the concern and all of the recent legislation to remove these products from our shelves. Legislation was recently signed into law in the United States and SIPERNAT® hydrated silica offers an ecological and economical way to replace polymer beads.

**SIPERNAT® 2200 PC and SIPERNAT® 22 PC: Eco-friendly replacement for polyethylene beads in exfoliants**

SIPERNAT® hydrated silica particles have proven to offer good performance, are available in consistent quality and at advantageous costs and therefore are very attractive alternatives to polyethylene microspheres. SIPERNAT® 22 PC and SIPERNAT® 2200 PC are excellent choices to replace polyethylene microspheres in rinse-off applications as they are available in different particle sizes. Please see our newsletter—Beauty Bulletin Exfoliant, issue 4-2013. Evonik now has eco-friendly solutions for leave-on applications as well. Evonik is introducing SIPERNAT® 11 PC. With its chemical composition, SIPERNAT® hydrated silica is a close relative to the abundance of silicates that form the earth’s crust. This close relationship is also the reason why this material is listed as a nature-identical inorganic material that can be used in natural cosmetic formulations certified by the NATRUÉ standard. SIPERNAT® 11 PC, as well as SIPERNAT® 22 PC and SIPERNAT® 2200 PC have received ECOCERT certification. It has been shown in numerous, high volume studies that hydrated silica poses no threat to humans. Amorphous hydrated silica, an inorganic material, at its most basic level begins as a natural and ends as a natural.

**SIPERNAT® 11 PC—Your choice for polymer-free skin care**

SIPERNAT® 11 PC is a functional filler that has been developed by Evonik. With a particle size of ≤ 10 µm, this new product is perfectly designed for use in skin care formulations with sensory modification such as elegant skin feel and optical effects, so-called “first touch” formulations, soft focus effects or optical blurring. This new grade of silica has the same purity and amorphous structure as SIPERNAT® 22 PC and SIPERNAT® 2200 PC, it has a hydrophilic surface and a neutral pH. Due to the smaller particles it imparts no single particle sensation. This product enables sustainable skin care formulations, is compatible with a wide range of ingredients and formulations, and is compliant with natural and organic formulations (NATRUE and ECOCERT).

Organic polymer particulates (e.g. polyethylene, PMMA) are traditionally used for a variety of functions in personal care formulations:

- **scrub**: exfoliation (particle size > 100 µm)
- **skin care**: soft focus/wrinkle filler in skin care (~ 10 µm)
- **skin care**: sensory modification (particle size < 10 µm)

Results from sensory panel tests

Sensory panel tests with w/o and o/w emulsion formulations (using a concentration of 2% - 5% wt.) provided good spreadability, no whitening effect, improved skin absorption, and dry feel after application when compared with commercially available benchmarks (oily skin formulations such as sunscreens). In cream-to-powder formulations, the small hydrated silica particles that are not absorbed but remain on the surface of the skin provide a gently matted skin effect and natural even appearance. In anti-aging formulations, the particle size of SIPERNAT® 11 PC and its refractive index of 1.46 enables the deposition of the material in wrinkles and is quite beneficial in providing optical blurring effects.

Formulation opportunities with SIPERNAT® 11 PC

O/W Guide Formulation:

**Processing Instructions:**
- Heat phase A and B separately to approximately 75 – 80 °C
- Add phase A to phase B while stirring
- Homogenize
- Cool while gently stirring to 60 °C and add phase C
- Homogenize again
- Cool with gentle stirring and add phase D and Z below 40 °C

**Additional Benefits of SIPERNAT® PC grades and SIPERNAT® 11 PC as replacement for polyethylene beads**

Let’s continue to explore some further advantages of using hydrated silica as a replacement for polyethylene beads.

**Easy to incorporate into aqueous solutions**

In contrast to hydrophobic polyethylene beads, SIPERNAT® particles have a hydrophilic surface that makes them easy to incorporate into aqueous solutions. SIPERNAT® powder can be poured directly into pure water where it will immediately mix without the need for agitation. In comparison, under the same conditions polyethylene beads float on the surface of the water and require agitation and a surfactant to be wetted and dispersed in the liquid phase. This easy incorporation leads to both time savings and energy savings.

**Waste treatment**

One of the major advantages of the hydrophilic nature of the SIPERNAT® is not only the easy incorporation into the formulation but more importantly the behavior of the particles after their intended use as an abrasive exfoliant. When rinsing the exfoliant cleanser off the skin, the particles reaching the sewage system now have a dramatically reduced surfactant concentration compared to the original formulation. This is possible because additional surfactants are not necessary to incorporate the hydrated silica into a water mixture; whereas surfactants are needed in formulations containing hydrophobic particles in order to wet them and disperse them in the formulation.

The removal rate of the hydrated silica particles was tested in a laboratory scale waste water treatment facility to confirm the observations made while diluting scrub formulations with water. The experimental set up was representative of a state-of-the-art waste water treatment plant.

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* Münzenberg, Riedemann, sofswjournal | 142 | 01/2016
When operating the model plant with waste water containing no hydrated silica, a solid content in the range of 20 mg/l is observed to discharge of biomass. No significant increase in solid content in the effluent of the lab scale waste water treatment plant is found when 100 mg/l hydrated silica containing is fed into the plant.

For further information on SIPERNAT® 11 PC or any of our SIPERNAT® or AEROSIL® range of products for Personal Care, please contact us.

www.sipernat.com
www.aerosil.com