



Your Dreams, Our Challenge

FREQUENTLY ASKED QUESTIONS

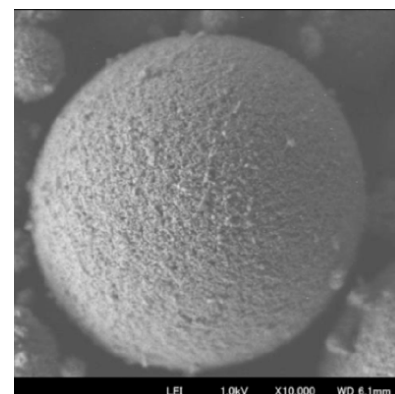
about RESIFA™ SOLESPHERE™ H-53
Silica for Sunscreen Formulations



FREQUENTLY ASKED QUESTIONS ABOUT RESIFA™ SOLESPHERE™ H-53 SILICA FOR SUNSCREEN FORMULATIONS

Q – What are the benefits of SOLESPHERE silica gels for sunscreens?

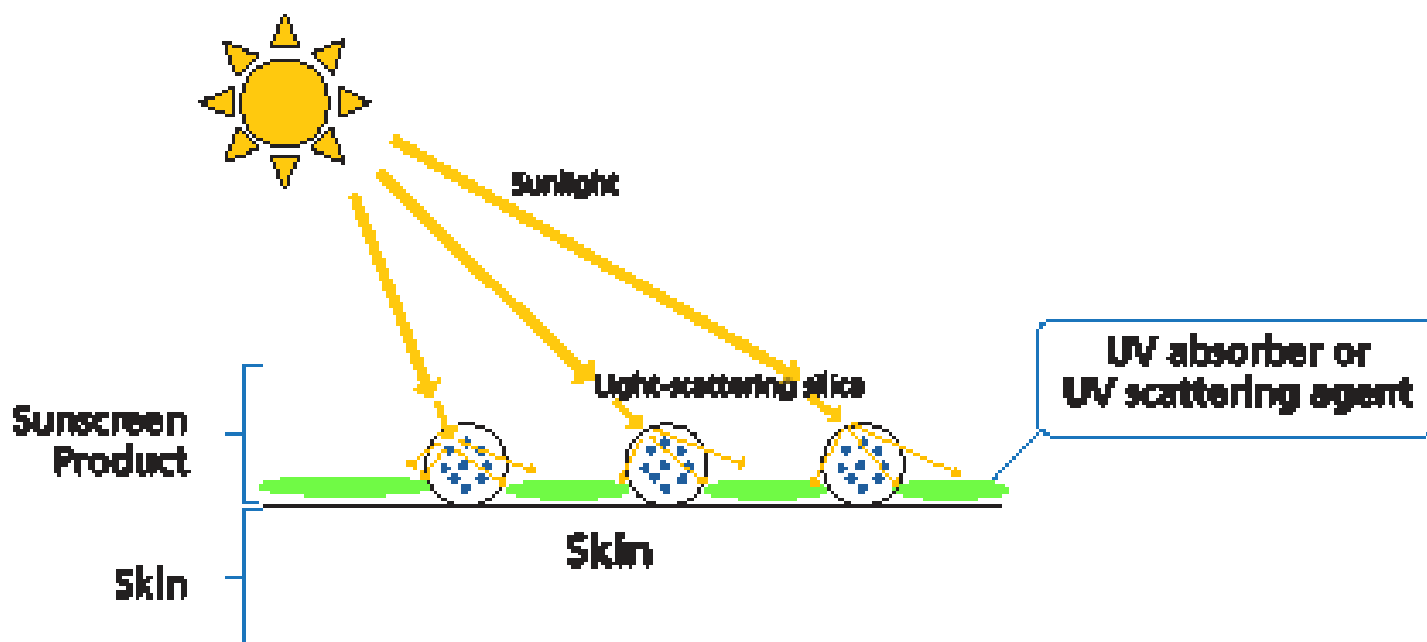
Silica gels function really well as ingredients of O/W, W/O and anhydrous formulations. They can provide SPF boost and enhance the surface smoothness and dispersibility. Made from silicon dioxide, these inert particles are environmentally safe, non-nanoparticle, non-plastic and non-petroleum. Their near-perfect spherical shape enables more consistent formulations that spread more smoothly on the skin. They have a lower coefficient of friction than titanium dioxide and other ingredients, providing superior tactile and visual aesthetics. The microspheres are strong and do not deform easily when pressed, so formulations using them glide easily.



Q – Why was SOLESPHERE H-53 developed?

The FDA and others have raised concerns about using chemicals like oxybenzone, octinoxate, avobenzone, octocrylene and homosalate as UV filters in sunscreens and cosmetics. These chemicals have harmed reef and marine life, and the FDA suggests that they might disrupt normal hormone patterns in humans. Adding SOLESPHERE gels to chemical (organic) formulations makes it possible to boost SPF to the required level or to SPF15 to be able to claim “broad spectrum” effectiveness. Adding SOLESPHERE gels to physical (non-organic) formulations with titanium dioxide and zinc oxide, boosts SPF, reduces white appearance, improves spreadability and enables them to blend better into the skin.

Q – How do they boost SPF?





The gel particles have high specific surface areas and large pores that scatter UV light. The light is scattered on the bigger multiple pores of silica first, then the scattered light goes on to the UV filter or UV scattering agent (see image below). The more UV light that is scattered when it hits the lotion, the less light that needs to be absorbed with chemicals and active pharmaceutical ingredients (APIs). That means SOLESPHERE particles can be added to organic formulations using safer UV filters to achieve the desired SPF. In addition, formulations made with SOLESPHERE gels are less likely to lose their SPF effectiveness over time because the gel particles don't change.

Q – Are silica gels harmful to humans or the environment?

No. Silica is a naturally occurring mineral. Because of this, amorphous and hydrated silicas are GRAS (generally recognized as safe) ingredients for use in personal care products like skincare, cosmetics and sunscreen. SOLESPHERE microspherical silica gel is amorphous, corrosion free, safe for the human body and Ecocert- and COSMOS-certified for safety and sustainability.

Q – What other products can formulators use to boost SPF in skincare products?

Titanium dioxide is a UVB absorber with moderate potency. However, it can't be formulated with avobenzone and also may whiten skin. Ensulizole is a potent UVB absorber, but it is water soluble, so it is not ideal for use in sunscreen formulations. Octocrylene, homosalate and octisalate are weak UVB absorbers and won't work in the higher SPF formulations that are becoming increasingly popular.

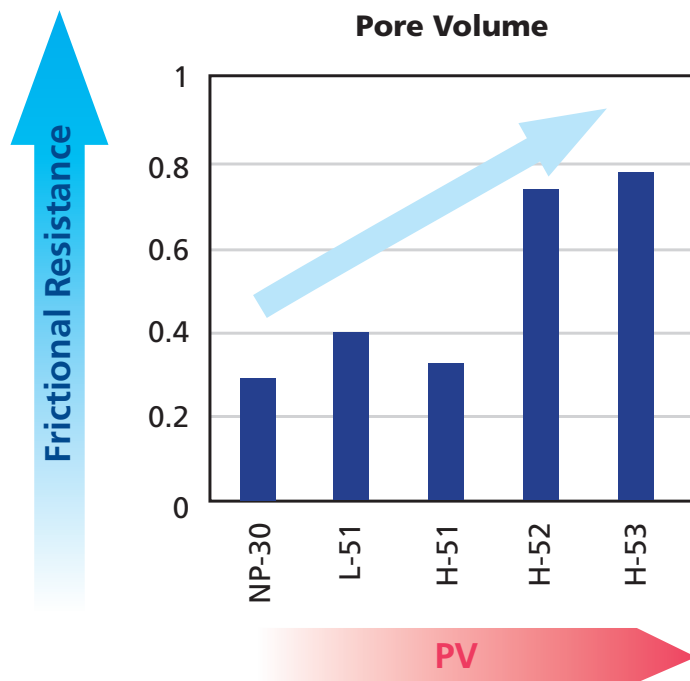
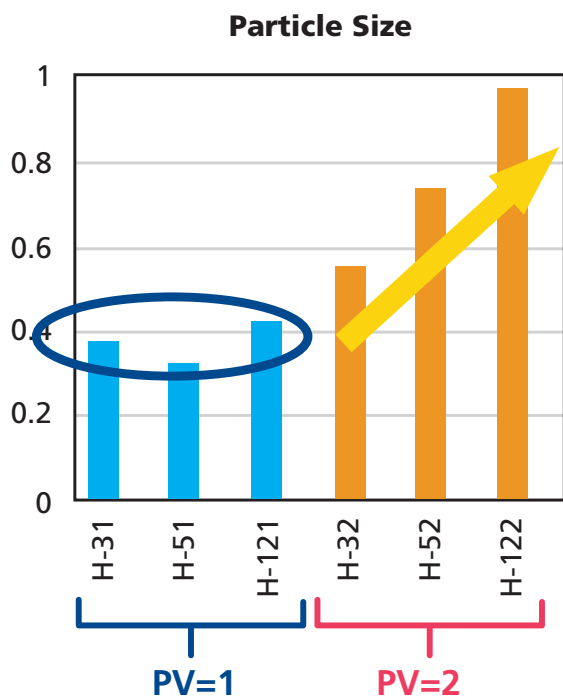


Q – How were SOLESPHERE gels tested?

AGC Si-Tech Company, Ltd. tests show that SOLESPHERE microspherical silica gels significantly increase the SPF in prototypical sunscreen formulations when measured in vitro. Formulations with silica have stable SPF and viscosity.

- Adding 2% SOLESPHERE more than doubled the SPF of formulations using inorganic UV filtering agents. These include zinc oxide (ZnO) and titanium dioxide (TiO₂).
- Adding 2% SOLESPHERE nearly tripled the SPF of formulations using a package of conventional organic UV filters. These include octocrylene, homosalate, ethylhexyl salicylate, and ethylhexyl methoxycinnamate.

In addition, friction resistance was tested as particle size and pore volume increased. Per below, tests showed that as particle size and pore volume increased, so did frictional resistance. For the test, a 0.5 mg/cm test powder was applied to artificial leather Supplare (made by Idemitsu Techno Fine), and the texture was evaluated with a KES-SE friction tester (made by Kato Tech) and sensor.



RESIVA SOLESPHERE™ microspherical silica gels enhance the surface smoothness and dispersibility of sunscreen and skincare formulations. They are manufactured by AGC Chemicals Americas, a wholly owned subsidiary of AGC Inc., a \$14.1 billion multinational corporation. Headquartered in Exton, Pennsylvania, including a state-of-the-art technology center, AGCCA maintains manufacturing operations in nearby Thorndale, Pennsylvania, a satellite sales office in São Paulo, Brazil and warehouses and distributors located throughout North America.

To learn more about fine silicas for skincare, or for help determining the right silica for your application, visit www.agcchem.com or contact an AGC product expert at 1-800-424-7833.