

Delivery Systems 2016
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The feature last month was about sun care an important aspect of which is the delivery system for the active ingredients. Products containing UV absorbers and microfine pigmentary sunscreens present their own particular challenges. A sun protection product should be pleasant to apply in an unbroken film on the skin surface; be invisible and non-oily but be water and abrasion resistant.

Most popular are emulsions so the emulsifier is important.

Sensanov WR from **Seppic** is an anionic emulsifier [INCI: C20-22 Alkyl Phosphate and C20-22 Alcohols] that is 90% bio-based and can emulsify all types of oils including esters, vegetable oils, silicone oils, mineral oils and oil-based UV absorbers. It requires neutralising by adding a base into the aqueous phase before emulsification and the final viscosity of the composition depends on the level of Sensanov WR and the product pH. It is claimed to provide a smooth film on the skin that is water-resistant and has a velvety veil sensation with a matt finish.

Compatible with inorganic sunscreens and of particular interest to those formulating with the recently approved nano~ zinc oxide is Simulgreen 18-2 [INCI: Hydroxystearyl alcohol, hydroxystearyl glucoside] from **Seppic**. It is an anionic emulsifier that promotes the formation of lamellar structures and is stable over a wide pH range. Tests by Seppic show that it forms homogenous emulsions with a wide variety of titanium dioxide and zinc oxide dispersions and that the viscosity remains stable at 45C for 3 months.

Clarithix Gellant from **Koda** has the ability to create clear structured gels with a variety of standard cosmetic esters, natural oils and silicones with only moderate heat and mixing. It can also be used with organic sunscreens to create clear firm gels, which creates some interesting formulation possibilities. For example:-

Ingredients	%w/w	Ingredients	%w/w
Ethylhexyl methoxycinnamate	10.00	2-Ethylhexyl Salicylate	5.00
Clarithix Gellant	15.00	Clarithix Gellant	15.00
Hydrogenated Polyisobutene	75.00	Hydrogenated Polyisobutene	80.00
Homosalate	15.00	Butyl Methoxydibenzoylmethane	3.00
Clarithix Gellant	15.00	Clarithix Gellant	15.00
Hydrogenated Polyisobutene	70.00	C12-15 Alkyl Benzoate	82.00

Koda maintains that clear, rigid gels are due to the unique structure of the amorphous and crystalline structures of Clarithix [INCI: Hydrogenated polyisobutene, polyamide-1, silica] and the hydrophobic nature of Clarithix and the carrier fluid will increase the water and wear resistance of sunscreen formulations.

Under its Imwitor trade name **Cremer Oleo GmbH** suggests three emulsifiers for sunscreen products. Imwitor 372 P [INCI: Glyceryl stearate citrate] and 375 [INCI: Glyceryl citrate / lactate / linoleate / oleate] are PEG free emulsifiers used in combination with glyceryl stearate and fatty alcohols as co-emulsifiers to prepare O/W emulsions. Imwitor 372 P and 375 can also be used with glyceryl cocoate to prepare sunscreen sprays and Imwitor 600 [INCI: Polyglycerin-3 polyricinoleate] is a non-ionic emulsifier for preparing W/O emulsions with a light skin feel.

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Water resistance is often claimed for sunscreen products and this can be offered by the use of w/o emulsions, however to achieve a high SPF the oil-soluble organic filters also need to be at a high level and the emulsions can feel greasy with a poor sensorial profile. Dermofeel GO [INCI: Polyglyceryl-2 sesquioleate] from Dr Straetmans is a versatile W/O emulsifier with a unique skin feel providing soft and pleasant formulations that are easily applied on the skin. Also from dr Straemans, Dermofeel PGPR [INCI: Polyglyceryl-3 polyricinoleate] is an effective emulsifier with high skin compatibility for W/O emulsions that contain up to 80% water.

Evonik Industries supplies Tego Care PBS 6 [INCI: Polyglyceryl-6 stearate, polyglyceryl-6 behenate], which is described as a versatile PEG-free O/W emulsifier especially suitable for formulating low-viscous lotions and sprays. It is said to give outstanding formulation flexibility with regard to high amounts of water soluble UV filters or other difficult to stabilise ingredients and it forms stable emulsions between pH 4.0 and 8.5.

Olisun from Kalichem Italia s.r.l. is a self-contained delivery system comprising selected organic UV absorbers in an aqueous solution of glycerin, sodium cocoyl amino acids, potassium olivoyl hydrolyzed wheat protein and alkyl polyglucosides. The lipoproteins solubilise the UV absorbers included in Olisun [8% ethylhexyl methoxycinnamate; 5% octocrylene; 2% bis-ethylhexyloxyphenol methoxyphenyl triazine and 5% butyl methoxydibenzoylmethane] in their complex structure and promotes their uniform application on skin. Olisun is a semi-finished sunscreen base just requiring the addition of technical ingredients to become a cosmetic finished product with a calculated SPF and in compliance with 1/3 UV-A/UV-B ratio protection.

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