

STRUCTURE® SOLANACE™ Starch

Rheology/aesthetics modifier and emulsion stabilizer

INCI: Potato Starch Modified

STRUCTURE SOLANACE starch is an emulsion stabilizer and rheology modifier derived from potato starch. The starch is targeted for use in low pH skin care emulsions such as dihydroxyacetone or as alpha hydroxy acid systems, but may also find applicability in a variety of other skin and hair care cosmetics. The STRUCTURE SOLANACE starch is a raw material that performs as a rheological additive, providing thickening properties and emulsion stabilization while leaving excellent, long lasting after feel.

STRUCTURE SOLANACE starch is a thickener and emulsion stabilizer notable for its soft, velvety after feel. The starch functions at low pH to provide stable viscosity and pH over time, both at ambient and accelerated aging conditions. The use of this starch may allow formulators to reduce surfactant levels, allowing for stable, mild and more natural emulsions. The starch is also widely compatible with typical cosmetic raw materials, allowing broad formulating latitude.

Recommended applications

- AHA and DHA formulations
- Liquid make-up
- Low surfactant or surfactant-free emulsions
- Shave creams
- Sunscreens

Features and benefits

Feature	Benefit
Broad compatibility	Compatibility with other ingredients offers formulation flexibility. Can be used with a wide range of other raw materials like oils, emollients as well as silicones, UV filters, vitamins, botanical extracts, dihydroxy acetone, alpha and beta hydroxy acids, and fragrances.
Shear thinning acid	Extremely shear thinning, with rapid viscosity recovery, suitable for emulsion in spray or pump delivery
Modified potato starch	Naturally-derived and biodegradable No neutralization required Effective thickener and rheology modifier Aesthetic enhancer bringing conditioning after-feel to emulsions
Interfacial activity	Emulsion stabilizer at any temperature
pH stability	Especially suitable for low pH systems, but also applicable in a broad pH range from pH 3.5 to pH 11

Suggested use levels, as supplied

The typical recommended use level is 2% to maximize performance and aesthetics. Higher levels of the starch, up to 6% can be used depending on the desired emulsion characteristics, however, at the high levels, the impact on rheology must be considered. Above 3% the starch will yield more gel-like rheological properties.

Formulation guidelines

Processing requirements

The STRUCTURE SOLANACE starch must be fully hydrated in water in order to achieve performance. Hydration is accomplished by heating the starch to 80°C in water for a minimum of 20 minutes. Upon heating in water, the starch will undergo a perceivable change from a white dispersion to a translucent appearance. The STRUCTURE SOLANACE starch can be cooked in the presence of other water phase ingredients, as long as the pH of the water phase remains above 5. Exposing the starch to heat and water at pH extremes can cause degradation of the starch.

An alternative addition method is to slurry the starch into a water soluble humectant and to add the slurry into the water phase of the emulsion; the water phase must still be heated to 80°C for at least 20 minutes.

For use in low pH emulsions

For low pH emulsions, such as alpha hydroxy acid containing systems, disperse the STRUCTURE SOLANACE starch into cold water with agitation. While agitating, heat the starch dispersion to 80°C and mix for 20 minutes, maintaining the 80°C temperature. Keep the starch-confining water phase at 80°C and continue with the procedure for making the emulsion. Adjust the pH after the emulsion is formed and <60°C. The pH adjustment must be made at lower temperatures to avoid degradation of the starch. The combination of pH extremes and high temperature (>60°C) is not recommended.

Additional Information

Soap free emulsions

Because of the starch's contribution to emulsion stabilization and stability at reduced pH, STRUCTURE SOLANACE starch can be used in soap free and in low surfactant emulsifier systems. The resulting emulsions can be milder and more water resistant (substantive). The soap free emulsions using the starch can be formulated at a lower pH, closer to skin's natural pH.

Water resistant sunscreens

With low levels of surfactant emulsifiers can be formulated using STRUCTURE SOLANACE starch. The starch helps provide not only stability, but also water resistance. Once the sunscreen film is formed on the skin, the film will not readily re-emulsify when exposed to water; the effect is similar to using polymeric emulsifiers. STRUCTURE SOLANACE starch allows the emulsion to break on the skin, rub in easily and leave a long-lasting, conditioning after feel.

Aerosol foams

The stabilizing properties of STRUCTURE SOLANACE starch can also be applied to aerosol foams. Incorporation of the starch in aerosol shave foams or skin mousses results in enhanced foam richness and stability.

Compatibility

The STRUCTURE SOLANACE starch is compatible with a wide range of commonly used cosmetic raw materials. In addition, the starch can be used with skin care actives such as sunscreens (organic and inorganic). The starch can also be used in combination with other thickeners and emulsifiers. STRUCTURE SOLANACE starch can tolerate low levels of salts, and can be used in salt containing formulations. An aqueous solution of the starch, however, may lose its thickening efficiency in a high electrolyte environment.



Performance Properties

Thickening Mechanisms

One of the important properties of the STRUCTURE SOLANACE starch is its effect on emulsion stability. The starch functions to reduce the particle size of an emulsion and increase the stability of a formulation. Figure 1a shows the particle size of a TEA/Stearate emulsion evaluated by microscopy analysis. With no starch, the formula exhibits a large particle size, about 50 microns, and poor shelf stability. As the amount of starch is increased, the particle size of the emulsion decreases and the formulation stability increases. Figure 1b shows the same emulsion containing 2% STRUCTURE SOLANACE starch. The particle size is <<10 microns, but more importantly the formula exhibits excellent stability under ambient and accelerated aging conditions.

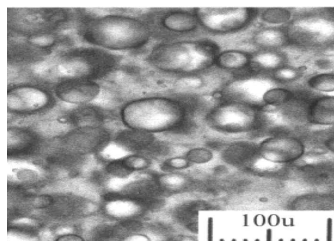


Figure 1a: TEA/Stearate emulsion containing 0% STRUCTURE SOLANACE starch (Avg. particle size = 50 microns)

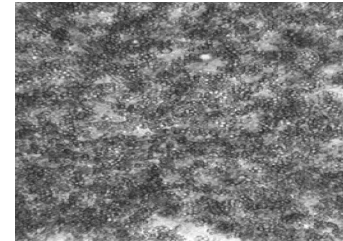


Figure 1b: TEA/Stearate emulsion containing 2% STRUCTURE SOLANACE starch (Avg. particle size <<10 microns)

Table 1: Prototype formulation for figures 1a and 1b

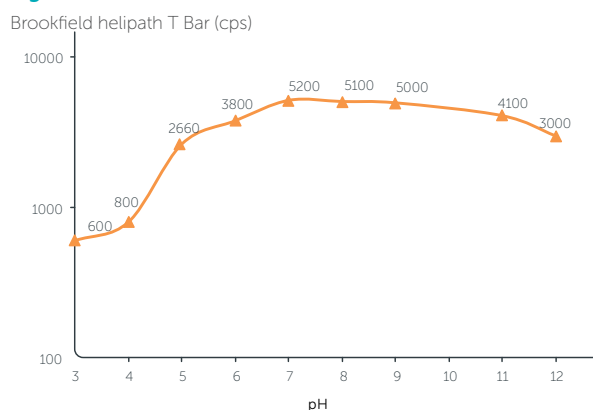
	Ingredient	w/w%
Phase A	C 12-15 Alkyl Benzoate	5.00
	Octyl Palmitate	5.00
	Cetyl Alcohol	1.00
	Stearic Acid TP	2.00
	Dimethicone Copolyol	1.00
Phase B	Deionized Water	q.s.
	Propylene Glycol	3.00
	Triethanolamine 99%	0.50
	STRUCTURE SOLANACE starch	0 to 2%
Phase C	Preservative	1.00
	Total	100.00

pH Range

STRUCTURE SOLANACE starch can be used in a broad pH range. The recommended range is from pH 3.5 to pH 11. The broad pH latitude allows the formulation of low pH emulsions, containing alpha hydroxy acid (AHA) or dihydroxyacetone (DHA), that exhibit exceptional skin feel and excellent pH and viscosity stability.

At the low pH (<5), a decrease in viscosity is observed (see Figure 2, 2 % STRUCTURE SOLANACE starch). However, stable emulsions with desirable viscosity and flow characteristics can be made. Adjustment of pH to low levels must be done after the emulsion is formed and at a temperature < 60°C. Care must be taken not to expose the starch to pH extremes and high temperature simultaneously to avoid potential degradation of the starch.

Figure 2: 2% STRUCTURE SOLANACE starch



Storage and handling

STRUCTURE SOLANACE starch is a finely divided organic particulate. When handling, avoid generation of dust. Use in a well ventilated area. Use of a dust mask is recommended. Avoid contact of the STRUCTURE SOLANACE starch powder or dust with heat, sparks or open flame.

STRUCTURE SOLANACE starch should be stored in a cool, dry location away from heat, sparks or fire. Good industrial hygiene practices should be followed when working with this starch. Please read the MSDS before working with this or any other chemical.

Health and safety

A health and safety summary for STRUCTURE SOLANACE starch is available on request. STRUCTURE SOLANACE starch is non GM (not genetically modified).

The suitability of the final formulations should be confirmed in all respect by appropriate evaluation. The marketer is advised to evaluate the final formulation with regard to performance and health safety.



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