Surfactant Thickening Systems

RAHN

How does surfactant thickening work?

It’s important to know that there isn’t just one type of thickening. We differentiate between four different systems. When we understand the available options and know when to apply each one, it facilitates targeted thickening or the correction of viscosity. For instance, if the addition of a fragrance or solubilizing agent changes the consistency.

Surfactant thickening systems:

Thickening System	Method	Example
Salt	The electrolyte increases the size of the micelles in the surfactants, so the viscosity increases. Further, the electrolytes compete with the surfactants for water, so as we add more salt, we fool the product into thinking we've increased the concentration of the surfactants, which will increase viscosity.	Sodium Chloride

Thickening System	Method	Example
Hydrophobic	The hydrophobic thickeners are incorporated into the surfactant micelles, but since their hydrophilic head group is rather small, they change the shape of the micelles. The shape changes from spherical into rod-like. At rest, the micelles are arranged randomly, which leads to a high viscosity. With increasing shear rate, the micelles get oriented parallel – and hence the viscosity decreases. This process is reversible: with decreasing shear rate, the micelles are arranged randomly again – the viscosity increases.	Cocamide DEA, Glyceryl Laurate

Thickening System	Method	Example
Hydrophilic	In case of the polymeric hydrophilic thickeners, the hydrophobic groups of the molecules are incorporated into the surfactant micelles. This leads to bridging of the spherical micelles and/or an increase of the micelle size by the PEG-chains. The micelles have now a more limited space to move which leads in an increase of viscosity.	PEG-120 Methyl Glucose Oleate

Thickening System	Method	Example
Polymers	Gelling agents like to thicken or gel the water phase. Some are electrolyte-sensitive and lead to an uncomfortable slimy appearance, which does not make them applicable as single thickener.	Xanthan Gum, Acrylates Copolymer