PERLASTAN® Surfactants Derived from Naturally-occurring Amino Acids

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Abstract

An overwhelming positive trend toward healthier lifestyles is sweeping today's personal care marketplace. More and more consumers demand all-natural ingredients to overcome their fears regarding personal health and wellness.

Environmental concerns and regulatory pressure have also built the driving force to replace petrochemical-based surfactants partly with those based on naturally occurring renewable sources. Amino acid based surfactants as ingredients in formulations for personal care end uses are good answers to meet the requirements of physiological and ecological compatibility.

The Perlastan® surfactant grades are condensation products of natural-origin amino acids and fatty acids. They contain an amino-acid part as hydrophilic head and a hydrocarbon chain as hydrophobic tail.

Several amino-acid derived surfactants have been commercially available for many years. N-acyl sarcosinates were the first amino acid surfactants applied in significant volumes in personal care products in the early 50's. The naturally occurring amino acid sarcosine (N-methyl glycine) is found in muscles and other body tissues or as an intermediate in the metabolism of choline to glycine.

The group of N-acyl glutamates is based on the proteinogenic amino acid glutamate widely known as a flavour enhancer in the food industry. Glutamic acid is produced by a fermentation process therefore sodium cocoyl glutamate is used in many formulations of «Certified Natural Cosmetics».

Nowadays many applications are related to their substantivity to the skin and hair, their foam boosting power and their mildness to skin and eyes. [1]

Structure of Perlastan® Surfactants

Like all surfactants the molecules of the amino acid based surfactants have a hydrophilic group, a hydrophobic portion, and these parts are connected to each other by a permanent linkage.

The fatty amide linkage is a very convenient permanent linkage acheived by N-acylacion of fatty acid derivatives with an amino acid by the Schotten-Bauman reaction. This linkage is chemically very stable and cannot be broken at high or low pH-values. This guarantees high quality surfactants which are certain to be chemically stable.

The typical structure of Perlastan® surfactants based on glutamic acid or sarcosine is shown in figure 1. In particular solutions of sodium lauroyl sarcosinate (Perlastan® L-30) and sodium cocoyl glutamate (Perlastan® SC) are key products for the personal care market.

The hydrophobic portion originates from fatty acids. As a consequence the hydrophobic behaviour can be controlled by the degree of saturated/unsaturated hydrocarbon chains and by the chain length distribution.

The hydrophilic group originates from naturally occurring α-amino acids. They contain at least one amino and one carboxylic group which are responsible for the polar character and provide the desire to adsorp strongly on protein containing surfaces such as skin and hair. The polar character can also be influenced by additional nitrogen, oxygen or sulphur functional groups.