

## Emulsiphos, a New PEG-Free Emulsifier for Sunscreen Formulations

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### Abstract

This article describes Emulsiphos, a new PEG-free emulsifier which is for the most part plant-based. The environmental and economic impact of this emulsifier on sun care emulsions and its influence on product performance and skin feel is discussed and application formulas are presented.

### Introduction

When selecting raw materials for a skin care product, the cosmetic chemist must bear in mind a number of factors, such as ease of use, cost-efficiency and interactions between different raw materials. In the case of sun screen formulations additional considerations come into play: the cosmetic chemist has to look for synergies between sunscreen filters and study their solubility, check the photostability of the active ingredients and evaluate the sensory characteristics of the emulsion.

Apart from the emollient system, the emulsifier plays a key role in imparting optimum sensory properties to a sunscreen formulation. This article describes Emulsiphos, a new PEG-free emulsifier for sunscreens which is for the most part plant-based.

The market significance of natural, plant-based raw materials for cosmetics has increased continuously over the past few years. We began this trend in the 1950s when we introduced Extraponex® plant extracts for use in cosmetic products. As a result both of the overall trend towards natural ingredients and of the success of botanicals, used primarily in bath products (shower gels and bubble baths) and hair-care products (shampoos), plant derived active ingredients have become the ingredients of choice in cosmetic formulations.

In recent years this trend has also expanded to the emulsifiers sector. Within this sector, PEG-based emulsifiers and solubilisers are increasingly in public discussion. It is suspected that PEGs act as penetration enhancers for potentially irritating or allergenic ingredients of cosmetic products. It is also suspected that PEGs have skin irritating properties. This information is mainly discussed and distributed in ecological magazines (e.g. "Oeko-Test" in

Germany) and ecological television programmes. The cosmetic industry searches more and more for environmentally friendly emulsifiers. Therefore PEG-free emulsifiers are of high interest. Until now several of these PEG-free emulsifiers exhibited weak emulsifying and stabilising properties and also unsatisfactory sensory characteristics (skin feel and odour). In contrast to this the new PEG-free emulsifier Emulsiphos shows good emulsifying and stabilising properties and very good sensory benefits.

### The Selection of an Emulsifier

When selecting raw materials for emulsifying aqueous and oil phases today's cosmetic chemists are interested in materials that do more than simply form emulsions. Factors influencing the selection of an emulsifier have become more complex; the following is a summary of the basic requirements.

An emulsifier should:

- be easy to process
- ensure physical stability of the finished formulation over a broad temperature range and at the desired pH
- readily form emulsions of the required consistency
- feel good on the skin following application of the emulsion
- be cost-efficient (highly effective at low concentrations)
- be dermatologically safe (neither irritating nor sensitising) and well-tolerated by the skin.

In addition to these basic demands, formulators in the cosmetics industry currently have additional expectations of emulsifiers, which can be broken down as follows:

#### 1. Economic demands

An emulsifier should:

- be available in pellet form (for easier handling) or as a liquid (no need to melt it)
- ideally have a low melting point
- be effective in as low a concentration as possible.

#### 2. Environmental demands

An emulsifier should

- be plant-based
- be PEG-free.