

Emulsifiers - looking for alternatives

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Emulsifiers stabilize emulsions. Yet, evidence that emulsifiers may cause skin irritations is mounting. While looking for alternatives it was found out that stable creams for a variety of different applications can be produced on the basis of skin-related substances.

The skin needs fatty and water soluble skin care substances. Therefore, skin care products today usually contain an oil/fat body and a water phase. Exceptions are purely water-based cosmetic products like face tonics or pure body oils. By nature, fats and oils cannot be mixed with water and water soluble substances where moisturizers and salts belong to. Hence, emulsifiers are added which are able to disperse tiny spherical oil and fat bodies in water (O/W) or conversely water droplets in oil (W/O). The emulsions developed allow a "2 in 1" skin care. They are called creams when they have a solid consistency and lotions when they are liquid. Emulsions have excellent properties. They cause that creams penetrate rather fast, together with the aqueous components of the creams they enable an increase of the skin moistness and in combination with the fat substances they quickly provide a smoothing of the skin. So, emulsifiers are typical additives which determine the acceptance and properties to a high degree. Depending on the type of emulsion (O/W or W/O) and on cream components different emulsifiers are required. The first effective emulsifiers were soaps. Since sodium stearate was used frequently, these creams were called stearate creams. Due to a considerably higher effectiveness and improved properties, a variety of synthetic emulsifiers is in the market today. Very frequently ethoxilized fatty alcohols are used, which can be recognized in the INCI by their particle "...eth".

Emulsifiers belong to the surface-active substances. When they are used for skin cleansing purposes, they are called tensides. The skin tolerance of these substances may vary. Short-chained combinations like lauryl sulphates and also lauryl ether sulphates may cause skin irritations. In creams predominantly long-chained combinations are used which are far less aggressive. The product safety specifications of these substances generally mention skin irritations when using higher doses. It depends on the experience of the

developer to find a reasonable compromise between the tolerance of the cream and the dosage of the additive.

Modifications in the horny layer

Meanwhile, the number of indications and publications with critical statements regarding the use of emulsifiers in skin care products is steadily increasing. The reason for it are findings that emulsifiers can cause modifications in the horny layer:

- They manipulate the integrity of the barrier layers which are part of the horny layers and which consist of very sensitive, so-called lipid bilayers.
- Emulsifiers will not lose their emulsifying properties in the skin. There are exceptions: low doses of soaps which are transformed into acids like palmitic and stearic acids due to the acid milieu of the skin. These acids also are naturally present in the skin.
- The lasting emulsifying capacity of the emulsifiers penetrated into the skin causes an increased transport of skin-own protective substances out of the skin especially when the skin comes in contact with water (shower).

For this reason, conventional creams frequently are not tolerated by consumers with skin problems as e.g. neurodermitics and psoriatics.

Skin-related systems

While looking for alternatives a very promising new system was found with the discovery of the liposomes. Now, combinations were possible which integrated oily and watery cream components with the help of substances which by nature were equivalent to the main components of the cell membranes and the physical bilayer structure of the horny layer, i.e. they are skin-related. Still today, they belong to the most effective systems to

transport skin caring substances into the skin. A disadvantage is the limited receptivity for oily substances. This fact led to the development of the membrane substance-containing nanoparticles, which have an oily nucleus in contrast to the watery nucleus of the liposomes.

Only in recent times it turned out that similar membrane substances which are suitable for the production of liposomes and nanoparticles, could be used for the manufacturing of stable creams which in optical and sensory respect hardly differ from conventional emulsions. The trick just was to replace the unsaturated acids combined in liposome raw materials by saturated ones and to employ high pressure technology for the cream production. This method enables creams which contain membrane fragments and skin care substances in extremely fine dispersions.

These creams were called DMS-creams (DMS = Derma Membrane Structure) since they additionally contain skin-related components. Similar to emulsions DMS-creams may have a variety of different compositions as to quality and quantity. Instead of emulsifiers these creams contain membrane components with a physical structure comparable to the barrier layers of the skin. The creams can be used for skin care and protection but also for dermatological preparations.

A further alternative to emulsions are new oleogels which also contain membrane components that now allow for the first time a processing of water soluble substances e.g. urea. These products will probably be available for beauty institutes by end of 2000 or early 2001.

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