

# Oleogels – what non-aqueous products can accomplish

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Today's skin care products mainly are emulsion-based which means that they contain water and an oil respectively lipid phase. In addition there are still products with only an oil phase. Oils but also oleogels belong to this group. They are primarily recommended for problem skins and therefore used in the dermatological cosmetics.

Oils belong to the oldest known skin care products. The production of vegetable and animal oils for nutritional purposes was soon followed by their application as skin care products. From the physiological standpoint the application of oils still today is the optimum skin care, seen in terms of applicability however it is somewhat old-fashioned, as the resulting oily skin surface is inconvenient and leaves an unpleasant feeling. With the development of emulsions these problems have been solved as the concentration of oils and lipids in the products could be drastically reduced and the emulsifiers applied considerably increased the penetration of lipids into the skin. This however involved a new set of problems: It became necessary to preserve the aqueous phase of the emulsions, some ingredients were sensitive to water and it was indispensable to stabilize the emulsions against long-term influences of temperature and storage. These problems were successfully resolved with the use of indifferent ingredients as e.g. mineral oils and waxes and additional additives with the consequence that the number of additives listed for emulsions in the INCI sometimes exceeds the number of the substances for the care of the skin. Today we know that many of these additives are not tolerated by sensitive skin. Individuals with neurodermitic skin e.g. will not tolerate the long-term use of ethoxilated alcohols which belong to the most widely used emulsifiers. Allergy sufferers have problems with appropriate preservatives etc.

## Physiological lipids

As particularly individuals with skin barrier disorders depend on physiological lipids in high dosage problem solutions for this specific group gain more and more importance. These still are based on the application of appropriate oils, a minimum content of additives and convenient application features. In this case

oleogels are recommended which are also known as lipogels. In contrast to the liquid oils oleogels have a gel-like and semi-solid consistency just like cream emulsions. This consistency will be achieved with additives which build-up a sponge-like structure thus enabling them to assimilate large amounts of lipids.

One of the longest known thickening agents is highly dispersive silica (aerosil) which however is more frequently used in the pharmaceutical field in connection with mineral oils and occlusive systems. For the skin care, mono-glycerides and diglycerides have proved successful which in physiological respect are completely safe as well as salts of the stearic and the palmitic acid. Both are safe too as long as their concentration is low and they are combined with free stearic and also palmitic acid which both are natural components of the skin barrier layer. Besides the thickening of the product the content of mono and diglycerides also has the effect that the oleogels easier penetrate into the skin. Membrane-forming components like phosphatidylcholine, which is a component of all vegetable and animal membranes even may increase this effect.

## Without water

The applicability features of today's oleogels are very close to those of water in oil emulsions (W/O). As they are either non-aqueous or contain only a very small amount they will neither require any preservatives, emulsifiers nor their neutralizers. When appropriate vegetable oils are used as e.g. coconut oil, olive oil, avocado oil etc. they provide excellent skin caring results. A moderate application will largely avoid occlusive conditions which might affect the natural regeneration of the skin.

The wash-out effect of emulsifiers which appears when the skin comes in contact with water is impossible with these products. Hence an important field of application is the

treatment of dry skin with a tendency to neurodermatitis, ichthyosis and similar skin barrier disorders which are observed on the skin with a deficiency of natural skin protection substances.

### Skin hydration

Unlike emulsions the skin hydration increases only gradually when using oleogels. Also in contrast to emulsions there will be no external supply of water which means that hydration can only be provided from internal processes of the skin. The lipids of the oleogels support this process by reducing the transepidermal water loss (TEWL). In addition to that, natural water-retaining substances like e.g. urea which also has antipruritic effects can be integrated in oleogels. Unlike the water containing emulsions there will be no problem here with the long-term stability of urea.

The high lipid content of the products causes an optimal reduction of any skin roughness. Hence, oleogels are recommended for hand care products and for general skin protection purposes.

### Additional active agents

Oleogels may be provided with fat-soluble substances. Mainly phytosterols which can be used in form of shea butter as well as fat-soluble vitamins belong to this group. Due to the lipid matrix vitamins are perfectly protected against atmospheric oxygen and thus have an extended shelf-life. This also applies for specific pharmaceutical active agents in the dermatological field as well as in the skin care area for essential fatty acids as e.g. linoleic acid which is required for the formation of the barrier active ceramide I. Besides, the increase of phosphatidylcholine concentration can be used to accelerate the penetration of active agents. Selecting appropriate lipid substances may cause a liquefying effect at body temperature which facilitates the dispersion of the products.

### Fields of application

Oleogels are above all recommended for the care of the lips, for cold protection products as well as for the care around the eye where spreading formulations as well as such containing emulsifiers should be avoided. Dry and cracked foot skin will become soft and smooth. They are also recommended for the supportive care of diabetic skin, perianal skin disorders and decubitus.

Typical intolerances which may be caused by the use of emulsifiers as e.g. Majorca acne which is characteristic for ethoxylated alcohols or PEGs are excluded when using oleogels. Hence oleogels can also be applied as sun protection product provided that appropriate sun protection filters are included. A major advantage here is the fact that they are resistant against water and perspiration. Mineral oils and silicones are not required. Unlike other products which are free of preservatives oleogels may even be filled in jars as a contamination with germs can be excluded due to the fact that they are not containing any water or only very small amounts.

Just like oils, oleogels can also be applied for massages whereas their applicability is considerably increased because of their semisolid consistency. By including pigments it is also possible to prepare products for decorative cosmetics like makeup, mascara and eye shadows.

### Corneotherapy

Oleogels meet the major preconditions for corneotherapy which was coined by Albert M. Kligman in the late nineties. Corneotherapy means that an appropriate skin care regarding the prevention and treatment of skin disorders may produce the same results as the application of dermatological active agents. The "outside-in-therapy" requires that the composition of a product is **physiologically adapted to the skin** and that counter-productive effects by non-physiological additives will be avoided. Both the requirements apply for oleogels.

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