

Humectants & Moisturization



Moisturizing lotion



Moisturization helps inhibit transepidermal water loss

Moisturization is a key factor in skin care as it is believed to inhibit transepidermal water loss by occlusion. Water originates in the deeper epidermal layers and moves upward to hydrate cells in the upper layer of the skin (stratum corneum), where it is eventually lost to evaporation. This can be where dry skin is noted, when moisture content is less than 10% and there is a loss of continuity of the stratum corneum. Research suggests that the stratum corneum acts as an active membrane consisting of intercellular lipids (i.e. ceramides, cholesterol, and fatty acids), and also contains a natural mixture of amino acids, lactates, urea, and electrolytes to form an effective water-barrier function.

Scientifically, the moisturizing treatment involves a 4-step process:

- Repairing the skin barrier
- Increasing water content
- Reducing transepidermal water loss
- Restoring the lipid's water barrier function

Occlusive Moisturization

Occlusives are substances that physically block transepidermal water loss in the stratum corneum. Petrolatum (in a minimum concentration of 5%) is the most effective occlusive, and is widely used as a classic moisturizer. Lanolin is also widely used and quite effective, but can be shown to induce contact dermatitis in some cases. Other occlusives include mineral oil, and silicones (such as dimethicone).

Humectant Moisturization

Humectants attract transepidermal water when applied to the skin and thus theoretically improve hydration of the stratum corneum. This is due to the one thing they all have in common chemically: hydroxyl groups. These groups allow them to partake in the association process known as hydrogen binding (attracting water). The word humectant comes from Latin (*humectare* = moisten). However, because the water drawn to the skin is transepidermal water and not atmospheric water, continued evaporation from the skin can eventually exacerbate dryness.

Humectants include glycerin, sorbitol, propylene glycol, hexylene and butylene glycol, MP Diol, urea, alpha hydroxy acids (i.e. lactic acid), and other sugars.

Examples of Humectants

Glycerin: glycerin is by far the most popular of all humectants used in personal care products. It is a very good compound and an excellent natural choice for moisturization. However, when used at concentrations above 5% it can leave the skin with a sticky, unpleasant feel.

Moisturizing Compounds & Their Modes of Action

- Occlusives:
 - Physically block transepidermal water loss
 - Examples: petrolatum, lanolin, mineral oil, silicones, zinc oxide
- Humectants:
 - Attract water to stratum corneum
 - Examples: glycerin, propylene glycol, sorbitol, hexylene glycol, butylene glycol, urea, alpha-hydroxy acids (AHAs)
- Emollients:
 - Smooth skin by filling spaces between skin flakes with droplets of oil
 - Examples: Plant oils, polyisobutene, squalene, fatty acids, ceramide (e.g. lacto-ceramide)
- Proteins:
 - Replenish proteins in stratum corneum
 - Examples: collagen, keratin, elastin, protein mixtures (e.g. wheat protein)

Sorbitol: Sorbitol, available as a powder or a 70% aqueous solution, is typically used in toothpastes and many other personal care products.

Propylene Glycol: propylene glycol is less commonly seen in personal care products, despite being less sticky than glycerin. There have been some concerns regarding its safety when used in high concentrations (above 7.5%)

Hexylene and Butylene Glycol: both compounds are often used in emulsions designed for facial applications due to their non-sticky skin feel and reduction of streaking during product application. Their use is somewhat limited however, due to their relatively high cost.

MP Diol: MP Diol has properties similar to hexylene and butylene glycol but is less expensive (similar to propylene glycol).

It is of note that all glycol-type humectants can additionally improve the effect of preservatives (e.g. paraben) since they take away the water from the bacteria (needed for growth) as well as improve the solubility of parabens.

Urea & Alpha Hydroxy Acids (AHAs): Urea is a humectant in lower concentrations (10%), but in higher concentrations (20-30%) it is mildly keratolytic, by disrupting hydrogen bonds or epidermal proteins.

AHAs, such as lactic acid or glycolic acid, appear to increase cohesion of the stratum corneum cells, which helps to reduce roughness and scaling.

Emollients & Proteins

Emollients smooth skin by filling spaces between skin flakes with droplets of oil; they are not usually occlusive unless heavily applied. When combined with an emulsifier, they can help hold oil and water in the stratum corneum. Examples of emollients include mineral oil, lanolin, fatty acids, cholesterol, squalene, and structural lipids.

Fatty Acids: fatty acids and fatty alcohols exert their benefits through effects on the skin barrier. Examples include stearic, linoleic, linolenic, oleic, and lauric acids (can be found in palm oil, coconut oil, and grapeseed oil, etc.).

Ceramides: structural lipids as ceramides (located between skin cells), also play a considerable role in the water-holding potential of the stratum corneum. Ceramide is a major skin cell component and plays a key role in generating multilamellar architecture. Natural ceramides themselves are at present too expensive to make commercially available, however synthetic ceramides (e.g. lacto-ceramide encapsulated in liposomes) are now available and have been clinically shown to be effective in preventing and improving dry skin.

Proteins: like emollients, proteins shrink on the skin leaving a film that smooths the skin, stretches out some of the fine wrinkles, and avoids water loss.