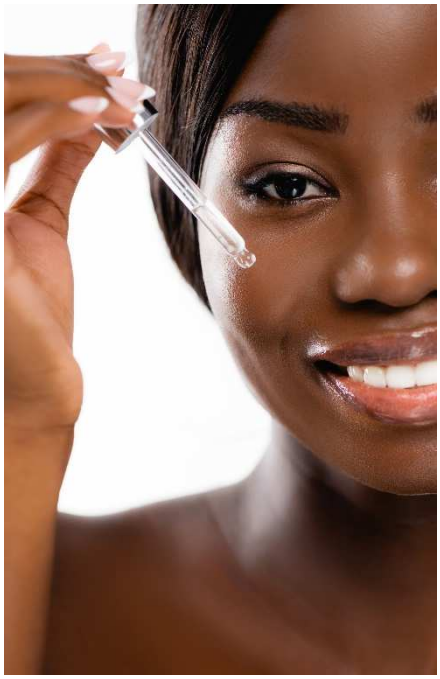
Emollients



Unsaturated oils absorb into the skin easier than saturated oils

Saturated & Unsaturated Oils

- Saturated
  - Oils with a high degree of saturated fatty acids (i.e. lauric, myristic, palmitic, and stearic acid) include coconut oil, cottonseed oil, and palm oil.
- Unsaturated
  - Oils with a high degree of unsaturated fatty acids (i.e. oleic, arachidonic, and linoleic acid) include canola oil, olive oil, corn oil, almond oil, safflower oil, castor oil, and avocado oil

Emollients include a large variety of compounds with softening and smoothing properties. Typically, they are non-comedogenic, non-allergenic, and non-irritating. Different types of emollients include oils (natural & synthetic), fats/butters, and waxes (natural & synthetic). Each offers different additional properties due to their differing chemical structures.

Oils – Natural

Oils are glycerol esters composed of glycerol and fatty acids and are called triglycerides. Fatty acids can be either *saturated* (no double bonds between the carbon atoms) or *unsaturated* (one or more double bonds), which thereby determines the stability and property of the oil.

Saturated oils are more stable and do not become rancid as quickly as unsaturated oils, however they are not as easily absorbed by the skin, and can have a greasier feel during application. Unsaturated oils are smoother, more precious, less greasy, and better absorbed by the skin, but they can become rancid quicker than saturated oils.

When compared to synthetic oils, natural oils have the disadvantage; they are greasier, comedogenic, and do not spread as easily on the skin. They are also more difficult to build into emulsions, are insoluble in alcohol (except for castor oil), and require antioxidants (such as Vitamin E or C) to prevent rancidity.

Oils – Synthetic

Synthetic oils are esters obtained by direct reaction of fatty acids with alcohols. As compared to the natural oils which have 3 chains of fatty acids, synthetic oils usually have only one fatty acid chain. Based on the variety of fatty acids (see above) and alcohols (e.g. butyl, isopropyl, ethylhexyl, myristyl, and oleyl alcohols), a wide range of synthetic oils with very different properties is available:

White oils: *Mineral oil (liquid), Petrolatum/Vaseline (semisolid)*. Colorless, odorless, tasteless oils consisting of saturated paraffinic & naphthenic fatty acids; no skin penetration; forms a film on the skin; good skin compatibility; not comedogenic; may be considered natural since it is made of natural occurring petroleum (crude oil).
Isopropyl Esters: *Isopropyl Myristate, Isopropyl Palmitate*. Universal oil for spreadability & soft skin feel; dry emollience; miscible with other oils; substitute for mineral oil (due to its similar viscosity); excellent solvent for lipophilic active ingredients.
Ethylhexyl Esters: *Ethylhexyl Stearate, Ethylhexyl Palmitate, Cetearyl Ethylhexanoate*. Universal, medium viscosity oil with excellent spreadability & low skin occlusivity; oxidation stable; good conditioning properties; cetearyl ethylhexanoate is very similar to natural purcellin oil.
Stearyl/Isocetyl Esters: *Stearyl Stearate, Isocetyl Stearate*. Universal oil with good emollient properties; often used as opacifier & pearlizer; miscible with other oils; low occlusivity effect.

Shea butter is technically a natural *fat*
not a natural *butter*

Oil or Wax?

Chemically, oils are glycerol esters composed of glycerol and fatty acids. Waxes on the other hand, are esters of a fatty acid and a fatty alcohol.

Interestingly, this makes Jojoba Oil a wax and not an oil!

Beeswax – the most used natural wax

Propoxylated Alcohols: *PPG-3 Myristyl Ether, PPG-11 Stearyl Ether*. High polarity oil with solubilizing properties for lipophilic active ingredients & perfume oils; especially suitable for deodorants & antiperspirants; gives very soft & elegant skin feel.
Caprylic/Capric Esters: *Triglyceride, Propylene Glycol Diester, Glycerine Tri-Isostearate*. High polarity oil with similar properties to natural oils; gives very pleasant non-greasy skin feel; vegetable based; oxidation stable; good solvent for UV filters.
Oleic Acid Esters: *Decyl oleate, Decyl Cocoate, Oleyl Oleate*. Very light low-viscosity oil with low spreadability; often based on natural oil fatty acids; especially suitable for eye care and makeup products and oil-in-water emulsions.
Polymer Oils: *Polyisobutene*. Non-polar polymer of isobutene; substitute for mineral oil; easily emulsifiable; shine enhancer in lipcare products; non-comedogenic; non-greasy feel; moisturizer.
Silicones: *Stearoxy Dimethicone, Cetyl Dimethicone*. High-molecular weight polymer oil consisting of silicone & oxygen (polysiloxanes); very high spreading; non-greasy velvety feel; moisture barrier for skin protection; improves hair conditioning.

Fats/Butters

Fats are similar to oils in that they are also esters composed of glycerol and fatty acids. Fats, however, are generally solid at room temperature. Natural butters, like shea butter, avocado butter, or cocoa butter are not actually butters (which are emulsions of water and fats), but rather they are natural fats. Shea butter consists mainly of stearic acid (which gives it its solidness) and oleic fatty acids, and is thus a half-saturated, half-unsaturated fat.

In general, natural butters are excellent emollients and thickeners, and dependent on the type, may have various additional properties. For example, shea and avocado butters both have antioxidant and soothing properties due to their phenolic compounds.

Waxes - Natural

Chemically, waxes are esters of a fatty acid and a fatty alcohol. Physically, they are characterized by a high melting point (50-100°C). The most used wax is beeswax, which is a good emollient and thickener. Together with borax, beeswax also has emulsifying properties (used in classic cold-creams). Two other natural waxes often used in cosmetics are carnauba and candelilla wax. Both are harder and have a higher melting point, making them more stable and suitable for dry products (e.g. lipsticks).

Waxes - Synthetic

Synthetic waxes do not form a chemical entity but are more the result of empirical research. Beeswax, for example, can be replaced by hydroxyoctacosanyl hydroxystearate, which has very similar properties to beeswax but is a better emulsifier. Another example is spermaceti, a natural wax originally obtained from whales, which is now replaced by cetyl palmitate or cetyl ester wax. Emulsifying waxes are a special group of synthetic waxes that are used primarily as emulsifiers and not as emollients.