

Waxes Used in Cosmetics

Waxes form an important group of ingredients for the manufacture of personal care products and decorative cosmetics. Chemically, waxes are complex mixtures of heavy hydrocarbons and fatty acids combined with esters. The modern scientific requirement of a wax is that it is not a glyceride. Glycerides are fats which are still close relatives of waxes. Waxes are harder, less greasy and more brittle than fats, and are very resistant to moisture, oxidization and microbial attack. Waxes are classified as follows:

Classification of Waxes

- **Animal Waxes:**

Beeswax, lanolin, spermaceti

- **Plant Waxes:**

Carnauba, candelilla, jojoba

- **Mineral Waxes:**

Ozokerite, paraffin, microcrystalline, ceresin, petrolatum (vaseline)

- **Synthetic Waxes:**

Polyethylene, carbowax, acrawax, stearone

Beeswax

Beeswax is the purified wax from the honeycomb of the bee *Apis Mellifera*. For each eight pounds of honey made by the bee, one pound of wax is produced. There are two grades available, yellow (natural) and bleached beeswax. The primary component of beeswax are esters (more than 70%) of which myricyl palmitate forms the main part. The remaining 30 % are free wax acids and hydrocarbons. Beeswax comes usually as white flakes with a faint honey odor. It is soluble in oils and warm alcohol, but insoluble in water or cold alcohol. Beeswax is used primarily as thickener and emollient, but has also emulsifying properties. It is used in a large variety of cosmetic products such as creams, lotions, pomades, balms, ointments, lipsticks, mascara, foundations, or eye shadows.

Lanolin & Spermaceti

Spermaceti is no longer used in cosmetics after the ban on sperm whales. Lanolin is discussed later.

Carnauba Wax

Carnauba wax comes from the leaves of the Brazilian palm *Copernicia Cerifera*. It is the hardest natural wax known, with a melting point above 80°C (176°F). These properties make carnauba wax very unique and often carnauba wax is used mainly for its hardness and high melting point. Carnauba wax contains more esters (about 85%) but less wax acids (2-3%) compared to beeswax.

As other natural waxes, carnauba wax blends well with oils, fats and other waxes, thereby raising their melting point and their hardness. Carnauba wax is therefore an important ingredient for solid sticks (e.g. lipsticks) to prevent them from melting at higher temperatures (e.g. upon sun exposure).

Candelilla Wax

Candelilla wax is produced from the stems of the Mexican weed *Euphorbia Cerifera*. Candelilla wax consists of only 35% esters, but of more than 50% hydrocarbons. It is therefore less hard and softer than carnauba wax, but can still raise the melting point of stick cosmetics. Candelilla wax also gives a nice gloss to lipsticks.

Jojoba Wax

Often jojoba wax is called jojoba oil because it is liquid. It is extracted from the desert shrub *Buxus Chinensis* found in the southwestern USA. Jojoba oil can be hydrogenated to make a hard, white wax with a melting point above 70°C. However, the liquid wax form is used much more often in cosmetics. Jojoba wax is an excellent moisturizer (prevents transdermal water loss) and emollient. Since it does not form a film on the skin but penetrates into the skin, it is also used as anti-wrinkle agent. Jojoba wax also protects partly from UV rays (SPF about 4). Liquid jojoba wax is used in a large variety of personal care products.

Solubility & Melting Points of Waxes

	Mlt. Point	Alc. Solubility
Beeswax	63°C	Hot alcohol
Carnauba Wax	87°C	Hot alcohol
Candelilla Wax	67°C	Hot alcohol
Ozokerite	60-100°C	Insoluble in alc.
Ceresin	50-90°C	Insoluble in alc.

Mineral Waxes

Mineral waxes used in cosmetics are ozokerite, paraffin, microcrystalline wax, ceresin, and petrolatum. All waxes are derived from various processes of crude oil refining and are purified extensively to allow safe use. Mineral waxes have been widely criticized and avoided in the last few years, mainly because they didn't fit into the new trend of natural cosmetics. However, mineral waxes are a natural product and one of the best characterized and clinically tested compounds!

Ozokerite

Ozokerite is a naturally occurring mineral wax originally mined in Eastern Europe. Today it is

produced as a mixture of microcrystalline wax, paraffin wax and other natural waxes that match the properties of the original Ozokerite. It is insoluble in alcohol and has a relatively high melting point depending on the composition of the wax. Similar to carnauba wax, ozokerite is often used in stick products to prevent softening and melting. Ozokerite is also very useful in creams due to its thickening and emulsifying properties.

Paraffin Wax

Paraffin is a refined mixture of solid crystalline hydrocarbons. Paraffins used in cosmetics usually melt between 50-60°C. Although paraffin adds gloss to lipsticks it is not so often used as it is poorly compatible with castor oil. In addition, paraffin wax can crystallize and is much more brittle in texture as compared to ozokerite.

Microcrystalline Wax

Microcrystalline wax consists of mixed refined hydrocarbons. It is less brittle and more malleable than paraffin. Microcrystalline wax has also a greater affinity to oils than paraffin and often contains 1-4% mineral oil. Because of its ability to hold high amounts of oil (more than other waxes), microcrystalline wax finds use in practically all types of cosmetics. Microcrystalline wax is particularly useful in lip balms and lipsticks to prevent "sweating".

Ceresin Wax

Ceresin wax was originally a refined and bleached natural ozokerite wax. Today, it is often a paraffin wax type or made from a blend of petroleum waxes. Like ozokerite, ceresin is insoluble in alcohol and its melting point varies dependent on the composition of the wax. Ceresin wax is often used as substitute of ozokerite wax due to its similar properties.

Petrolatum (Vaseline)

Petrolatum is a semi-solid wax consisting of purified hydrocarbons obtained from petroleum. Better known as Vaseline, petrolatum has been on the market for several decades already. The melting point of Vaseline is only about 35-50°C and thus lower than other waxes. It comes as translucent paste and is odorless, well dispersible in oils, and soluble in hot alcohol. Vaseline is an excellent emollient and lubricant but is also used as bodifying agent to add viscosity to cosmetic products.

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References:

D.F. Williams. Chemistry & Manufacture of Cosmetics. Volume III, Book 2, Pages 1089f