

Waxes Used in Cosmetics



Classification of Waxes (and Examples)

- Animal Waxes
 - Beeswax, lanolin, spermaceti
- Plant Waxes
 - Carnauba, candelilla, jojoba
- Mineral Waxes
 - Ozokerite, paraffin, microcrystalline, ceresin, petrolatum (Vaseline)
- Synthetic Waxes
 - Polyethylene, carbowax, acrawax, stearone

Waxes form an important group of ingredients for the manufacture of personal care products and decorative cosmetics. They are very useful cosmetic ingredients based on their various advantageous properties: Generally, waxes have protecting, film-forming, emollient and thickening effects. They are also very resistant to moisture, oxidation, and microbial degradation. They provide stability of cosmetic products and enhance their viscosity and consistency.

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 (a fat that is a close relative of waxes). Waxes are harder, less greasy, and more brittle than fats.

Animal Waxes

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.

Beeswax is primarily composed of esters (more than 70% - of which myricyl palmitate forms the main part). The remaining 30% is made up of 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 a thickener and an emollient, but also has 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 - Lanolin is an ointment-like material isolated from wool that is sheared from sheep. It helps to form emulsions and blends well with nearly all other substances used in cosmetics and personal care products. Lanolin and its related ingredients moisturize the skin, hair and nails. These ingredients act as a lubricant on the skin surface, which gives the skin a soft, smooth appearance.

Spermaceti: Spermaceti is no longer used in cosmetics after the ban on sperm whales. It is now replaced by cetyl palmitate or cetyl ester wax

Plant Waxes

Carnauba Wax: Carnauba wax is the hardest natural wax known, with a melting point above 80°C (176°F). Coming from the leaves of the Brazilian palm *Copernicia Cerifera*, it is a very unique wax and is used mainly for its hardness and high melting point. Compared to Beeswax, it contains more esters (about 85%) but less wax acids (2-3%).

Carnauba wax (like other natural waxes) blends well with oils, fats, and other waxes, thereby raising their melting point and their hardness. This makes it an important ingredient for solid sticks (e.g. lipsticks) to prevent them from melting at high temperatures, such as sun exposure.

Candelilla Wax: Candelilla wax is produced from the stems of the Mexican weed *Euphorbia Cerifera*. Consisting of only 35% esters (but more than 50% hydrocarbons), it is softer than carnauba wax, but can still raise the melting point of stick cosmetics. Candelilla wax also gives a nice gloss to lipsticks.



Petroleum (aka: Vaseline) has a very low melting point of about 35-50°C. It works as an excellent emollient and lubricant in formulations.



Useful waxes in lipsticks:

- Candelilla wax adds a nice gloss to the stick.
- Carnauba wax can help prevent melting.
- Microcrystalline wax prevents “sweating”.

Solubility & Melting Point of Waxes

- Beeswax
 - Insoluble in water; slightly soluble in cold alcohol; completely soluble in fixed or volatile oils, chloroform, ether, benzene, and carbon disulfide
 - Melting range: 62 to 64 °C (144 to 147 °F)
- Carnauba Wax
 - Practically insoluble in water; soluble by heating in ethyl acetate and in xylene; practically insoluble in ethyl alcohol
 - Melting range: 82°C (179.6°F)
- Candelilla Wax
 - Insoluble in water; soluble in many organic solvents (e.g. acetone, chloroform, benzene, and turpentine)
 - Melting range: 68.5–72.5 °C
- Ozokerite Wax
 - Soluble in mineral, vegetable, hydrocarbon, and most synthetic waxes; insoluble in water and alcohols
 - Melting range: 58 to 100 °C (136 to 212 °F)
- Ceresin
 - Soluble in benzene, chloroform, naphtha, hot oils, petroleum ether, 30 parts absolute ethanol, turpentine, carbon disulfide, and most organic solvents; insoluble in water
 - Melting range: 61-78°C

Jojoba Wax: Jojoba wax is extracted from the desert shrub *Buxus Chinensis* found in the southwestern USA, and is often called jojoba oil because it is a liquid. This oil can be hydrogenated to make a hard, white wax with a melting point of 70°C; however, the liquid wax form is used much more often in cosmetics. Jojoba wax is an excellent moisturizer and emollient. It is also used as an effective anti-wrinkle agent, because it penetrates into the skin rather than forming a film on it. Liquid jojoba wax is used in a large variety of personal care products, and can even protect partly from UV rays (SPF about 4).

Mineral Waxes

Mineral waxes are derived from various processes of crude oil refining and are purified extensively to allow for safe use. They are some of the best characterized and clinically tested compounds! Mineral waxes used in cosmetics are ozokerite, paraffin, microcrystalline wax, ceresin, and petrolatum.

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. It 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 poorly compatible with castor oil, and thus is used less often. 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, and often contains 1-4% mineral oil. It is less brittle and more malleable than paraffin, and also has a greater affinity to oils. Microcrystalline wax finds use in practically all types of cosmetics due to its ability to hold higher amounts of oil than other waxes, and it 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 type of paraffin wax 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.

Petroleum (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 lower than other waxes (only about 35-50°C). 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 can also be used as bodifying agent to add viscosity to cosmetic products.

Synthetic Waxes

Synthetic wax is a complex combination of hydrocarbons obtained from petroleum fractions by solvent crystallization or from the catalytic hydrogenation of carbon monoxide. Synthetic ingredients are great alternatives for vegan formulations! Some examples of synthetic waxes include: Polyethylene, Carbowax, Acrawax, and Stearone.

References:

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