The polarity of an oil determines how strongly it will be attracted or repelled by another molecule or compound. In a similar way that polarity plays a major role when oil (non-polar) and water (highly polar) separate when mixed, the polarity in different types of oil also differ and could have an adverse effect on your emulsion.

The polarity of an oil can has a huge effect on the final product such as the viscosity, texture, sensorial properties, stability and even price. It is often overlooked and has a huge impact on the stabilities and solubilities of both oil-in-water and water-in-oil emulsions.

Hydrocarbons are non-polar because of the absence of electronegative elements e.g. oxygen. Examples are mineral oil, petroleum jelly and coconut oil. These are much easier to emulsify into stable emulsions than polar oils. Non-polar oils are often used for moisturising and conditioning claims, and could contribute to a richer, more luxurious skin feel.

Polar oils contain heteroatoms with varying electronegativities which results in a dipole moment. Fatty alcohols, triglycerides and esters fall into this category. The higher the polarity of the blend (oil phase), the more difficult it is to emulsify and hence require higher HLB emulsifiers to make stable emulsions. A polymeric, polyfunctional oil-in-water or water-in-oil emulsifier could aid in enhancing stability. Very polar oils in O/W emulsions can lead to Ostwald ripening, a process that eventually leads to phase separation. A way to help stabilise the emulsion is by adding very low polarity oils to the emulsion which helps to balance the emulsion. In W/O emulsions, the instability caused by Ostwald ripening can be reduced by adding an electrolyte to the water phase.

Despite the stability issues, polar oils dissolve materials that are insoluble in nonpolar oils, and they provide unique, often improved cosmetic properties. These include easy absorption into the skin, improved skin feel, spreadability, hydration, and emolliency. They also have improved wetting and grinding properties and biodegrade more easily than non-polar oils. Highly polar emollients such as c12-15 alkyl benzoate can be used as solvents for lipophilic crystalline ingredients like sunscreen filters and skin care additives that are utilised in personal care products.

Lists of polarity indexes are available on the internet – the higher the value, the less polar the oil is. Examples of natural non-polar oils are castor oil, flaxseed oil, grapeseed oil, avocado oil, jojoba oil.

Copyright Cosmetic Ingredients (Pty)Ltd

Reference 1

Reference 2

Copyright Cosmetic Ingredients (Pty)Ltd