The refractive index between the different phases affects the appearance of emulsions.

Emulsions are formed when one phase (i.e. oil as the internal phase) is suspended in another phase (i.e. water as the external phase). The bulk of the diameter of the droplets is larger than the wavelength of light and, with most oils have higher refractive indexes than water, most of the light is scattered, hence the white appearance of most emulsions.

However, if the refractive index of the internal phase matches that of the external phase, the light travels right through the drops, and the emulsion becomes transparent – this method is used to prepare clear oils into which small quantities of water-based actives are incorporated.

Some micro-emulsions are white, however, based on the emulsifier used, very stable, sprayable milks can be formulated. Durosoft PG4L-SG, formerly known as Durosoft PG-SK, enables formulators to make a natural, cold-process, sprayable micro-emulsion.

Micro-emulsions (oil-in-water) can also be transparent or translucent because the diameter of the droplets is less than ¼ of the wavelength of light, which means the light travels through the droplets and minute quantities of light is scattered.