

## When Changing Emulsifier Changes Everything

Formula used for analysis		Emulsifier	Emulium Kappa	Glyceryl Stearate Citrate	Cetearyl Alcohol, Ceteareth 20	Emulsifying Wax Vegetable Derived
Samples were prepared using a propellar mixer so no homogenisation step but with a typical level of mixing to form a stable emulsion.		INCI	Candelilla/Jojoba/Rice Bran Polyglyceryl-3 Esters, Glyceryl Stearate, Cetearyl Alcohol, Sodium Stearoyl Lactylate	Glyceryl Stearate Citrate	Cetearyl Alcohol, Ceteareth 20	Cetearyl Alcohol, Cetearyl Glucoside
		Supplier Described Structure	Self-emulsifying blend with anionic, nonionics and thickening Silicone-like touch.	PEG free anionic emulsifier	Non-ionic, synthetic blend, cost effective and versatile	Non-ionic, vegetable derived, versatile, elegant emulsions
Water	76	Initial Cream Viscosity. Measurement day of preparation (3rpm TF96)	42810	9000	20300	34600
Glycerin	4.5	Final Cream Viscosity. Measurement after 1 month (3rpm TF96)	43750	17,810	28,440	44960
Acacia Xanthan Gum	0.5	Change between initial and 1 month viscosity	No Change	50% rise in viscosity	40% rise in viscosity	30% rise in viscosity
Safflower Oil	15	Specific Gravity of sample after 1 month	0.992	1.006	0.970	0.925
		Flow Characteristics	This forms a rich, viscous cream which is suitable for a wide range of packaging including jars, bottles and tubes. While viscous the product flows easily and rubs in fast	This formed a light, pourable cream with low viscosity. Flows quickly from container making this suitable for tubes and bottles. Rubs in quickly.	While lower in viscosity than the vegetable emulsifying wax, this cream appears more viscous than it is due to its slow flow (similar to vegetable wax). This characteristic makes this combination suitable for all packaging types including jars. The slower flow when inverted makes this less likely to drip or waste product when packed in a flip or screw top bottle.	This gave the richest and thickest cream with the slowest gravitational flow. As such this is best of the options tested for packing in a pot. and could be packaged in a
Emulsifier	3	Particle Size Observed under microscope	Small	Medium	Highly Variable	Variable
Phenoxyethanol, Ethylhexylglyceryl (10:1)	1	Other Notes from the microscope	Very high number of small particles. The oil drops are densely packed making the internal phase look very crowded. Multiple rings around oil drops are visible which could indicate there is a thick layer of emulsifier present. This is often the case with multi-component emulsifier blends as these can often get in around the oil drop closer than a single chemistry can. This cream looks like it will be very stable and that the emulsifier is not at all at capacity in this emulsion. The even particle size indicates this emulsion does not have a high need for a homogenisation step	The internal phase contains medium-sized oil droplets that are evenly spread out. The size, shape and colouration of the oil drops could indicate the emulsifier is at an optimal level rather than present in excess or stretched. The oil drops look fairly even in size when compared to the Ceteareth-20 of cetearyl glucoside. This suggests the emulsifier can form a fairly homogenous emulsion without the need for an extra homogenisation step.	Large and small oil droplets could indicate this emulsion will be less stable over the long term than the other creams with more regularly sized oil droplets. However, as the emulsifier rings look quite dark under the microscope it's likely there's more than enough emulsifier to keep this cream stable. From the microscope analysis it seems this sample would really benefit from an optimised manufacturing method. A homogenisation step would make the dispersed oil droplets more uniform in size and make the cream feel more elegant.	Similar to the ceteareth-20 emulsifier internal phase this contains oil droplets with a wide range of sizes. This again indicates this emulsifier benefits from homogenisation more so than the Emulium Kappa or Glyceryl Stearate Citrate (in this formula). The oil droplets are surrounded by lighter coloured rings than we saw with ceteareth-20 which could indicate the emulsifier is within its optimal input level rather than present in excess.
<b>TOTAL</b>	<b>100</b>					