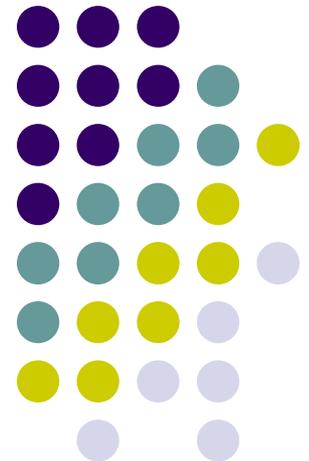


Modern Trends in Emulsifiers

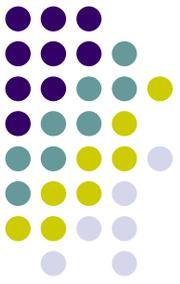
John Woodruff
Creative Developments



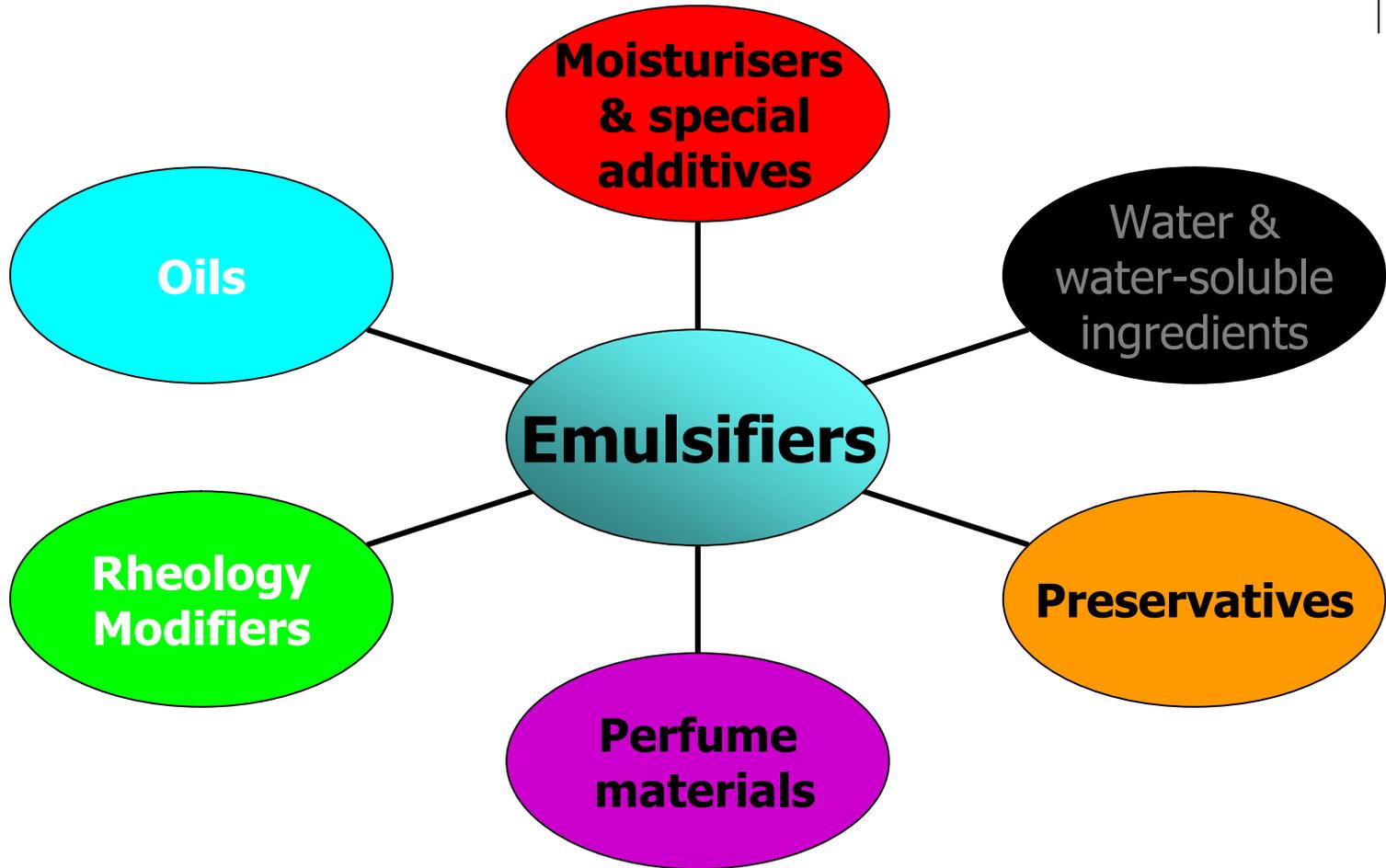


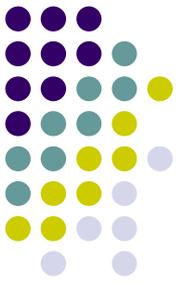
Modern trends in emulsifiers

- Emulsions are a fundamental product form for many cosmetic categories and these are made possible by careful selection of the optimum emulsifier system.
- Cosmetic science has progressed a long way from the early beeswax-borax and triethanolamine-stearate combinations and there is now a trend towards those that form liquid crystal structures and emulsifiers that are acceptable when making certified natural cosmetics.
- This presentation gives a brief introduction to emulsifier types then explores many of the more recent introductions that satisfy today's demands for stable emulsions with particular properties.



What makes an emulsion?

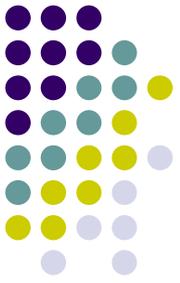




Modern trends in emulsifiers

- **Keywords:** Emulsions, emulsifiers, liquid crystals, natural cosmetics, phase inversion technology (PIT)
- **Learning outcomes:**
- Chemical classes of emulsifiers
- Liquid crystal structures
- Natural emulsifiers
- Phase inversion technology
- Emulsification of silicone compounds
- Multiple emulsions

Emulsifiers

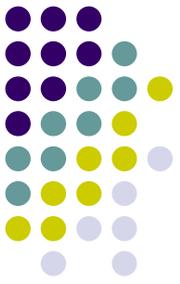


- Emulsifiers are employed in cosmetics to prepare emulsions.
- The efficacy of emulsifying agents depends on their ability to reduce surface tension, to form complex films on the surface of emulsified droplets, and to create a repulsive barrier on emulsified droplets to prevent their coalescence.



Some simple definitions

- An emulsion is a two-phase system. The principal components are an oil phase and an aqueous (water) phase.
- The aqueous phase is water plus any combination of materials which are polar and dissolve, at least to some extent, in water.
- The oil phase comprises one or more oily materials, or other ingredients which are non-polar and exhibit at least some solubility in oily materials.



Some simple definitions

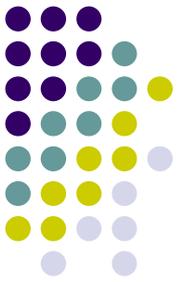
- Oil-in-water (o/w): oil droplets dispersed in water; the oil is referred to as the internal or dispersed phase and the water as the external or continuous phase.
- Water-in-oil emulsion (w/o): water droplets are dispersed in oil; the water is the internal or dispersed phase and the oil the external or continuous phase.
- Mixed emulsions are w/o/w or o/w/o

Trends in emulsifiers



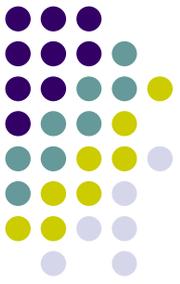
- Despite the 100s of emulsifiers available a quick look at ingredient labelling will reveal that the numbers in use are relatively small.
- However there are trends towards systems that form liquid crystals and those that have natural certification or are allowed in products claiming natural or organic certification.

Trends in emulsifiers



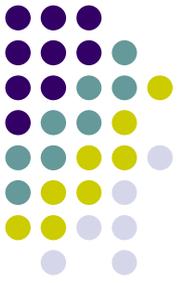
- The first cosmetic emulsion is credited to Roman times when Galen made one using beeswax, borax and rose water. By the 19th Century cosmetic creams were being produced utilising fatty acid soaps, lanolin alcohols and sodium lauryl sulphate.
- The first commercial stable w/o emulsion was Nivea cream, launched by Beiersdorf around 1910. Lanolin was the emulsifier and the formulation of Nivea cream has barely changed over the years.
- Sorbitan esters and their ethoxylated counterparts were introduced in about 1940 and the HLB system gave a scientific basis for emulsifier selection.

Trends in emulsifiers



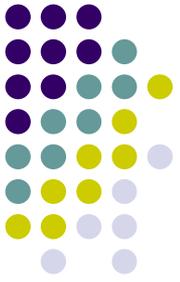
- By the beginning of the 21st century over 1800 emulsifiers were listed in the CTFA Dictionary
- These were broken down into 17 chemical classes, not all of which would be considered suitable for preparing skin care emulsions
- In fact the majority of emulsifiers belong to only 10 chemical groups

Chemical classes of emulsifiers



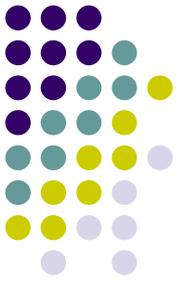
- Anionic surfactants
 - Fatty acid soaps
 - Alkyl sulphates
 - Alkoxylated carboxylic acids
 - Phosphorous compounds
- Cationic surfactants
 - Quaternary compounds
- Amphoteric
 - Betaines
- Non-ionic surfactants
 - Sorbitan esters and ethoxylated esters
 - Glucosides
- Transesters
- Glyceryl esters
 - Others

Anionic surfactants



- Fatty acid soaps
 - Triethanolamine stearate
- Alkyl sulphates
 - Sodium lauryl sulfate
- Alkoxylated carboxylic acids
 - Laureth-5 carboxylic acid
- Phosphate esters - alkyl phosphates and alkyl ether phosphates
 - Stearyl phosphate
 - Potassium cetyl phosphate
 - Lecithin is a naturally occurring phosphoric acid ester

Cationic surfactants

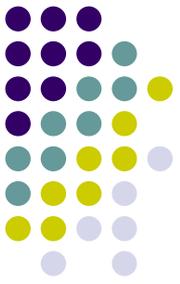


- Quaternary ammonium compounds (quats) may be used to prepare o/w emulsions. More commonly used for hair conditioning e.g.
 - Behentrimonium methosulfate
 - Distearyldimonium chloride
 - Palmitamidopropyltrimonium chloride
 - Myristamidopropyl PG-dimonium chloride phosphate
 - Cetearyl alcohol is frequently used to thicken and stabilise cationic emulsions

Amphoteric surfactants



- Alkyl betaines
- Alkylamido betaines
- Alkyl amino propionates
 - No obvious emulsifiers found



Non-ionic Surfactants

- Alkoxylated alcohols
 - Glycereth-n cocoate etc.
- Fatty acid ethoxylates and glycol esters
 - C18-36 glycol ester etc.
- Fatty alcohol ethoxylates
 - PEG-40 hydrogenated castor oil etc.
- Ethoxylated carboxylic acids
 - PEG-12 laurate / stearate etc.
- Glyceryl fatty acid esters
 - Glyceryl stearate etc.
 - Polyglyceryl-4 isostearate

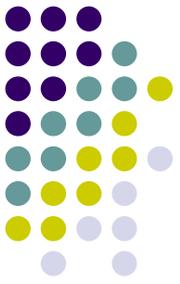


Non-ionic surfactants

Sorbitan esters and their ethoxylates

- Sorbitan derivatives are the ethers and/or esters of sorbitan. Esterification with a fatty acid derivative yields the ester
 - e.g., Sorbitan oleate
- Further acylation yields di- and other esters
 - e.g., Sorbitan sesquistearate

Sorbitan esters are water insoluble, they have a low HLB value and form w/o emulsions and are often used in conjunction with their ethoxylated equivalents



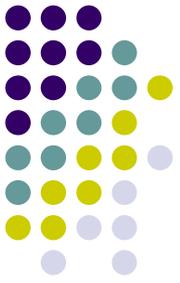
Sorbitan derivatives

Ethoxylation of sorbitan results in a polyalkoxylated derivative which still possesses four hydroxyl groups and esterification provides esters which include polysorbates

- e.g. Polysorbate 20
- e.g. PEG-5 Sorbitan isostearate

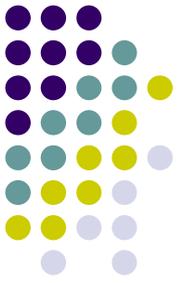
Polysorbates are water soluble. They have high HLB values and form o/w emulsions

Sorbitans and the HLB System



- The Hydrophile-Lipophile Balance or HLB system was conceived by W C Griffin in the late 1940s and was particularly applicable to sorbitan esters and their ethoxylated derivatives.
- It is based on an arbitrary scale of 0 – 20 and describes the relative simultaneous attraction of an emulsifier for water and oil.
- If the surfactant is 100% oil soluble, its value on the HLB scale will be 0. When the surfactant is 100% water soluble, its HLB value will be 20.

HLB System



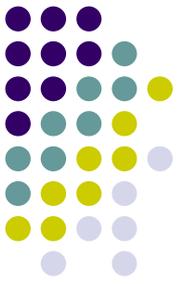
HLB number of surfactant and type of emulsion formed

- < 3 none
- 3 – 8 water-in-oil (W/O)
- 8 – 15 oil-in-water (O/W)
- > 15 solubilisation

Transesters



- Transesterification is catalysed by an acid or base, and can be carried out between a triglyceride (fats and oils) with an acid or alcohol to produce a complex equilibrium mixture of esters.
- The product can undergo further treatment such as hydrogenation or alkoxylation to produce a wide variety of ingredients e.g.
 - Almond oil PEG-6 esters
 - Hydrogenated castor oil behenyl esters
 - Sweet almond oil polyglyceryl-6 esters

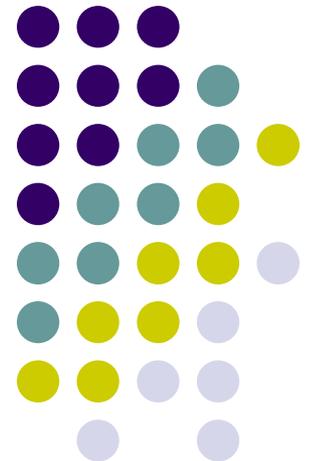


Other emulsifiers

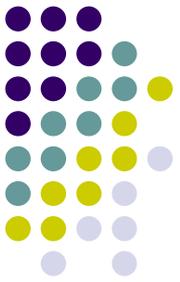
- Cetearyl glucoside
- Sucrose esters
 - Sucrose cocoate / palmitate / stearate etc.
- Polymers e.g.
 - Acrylates/C10-30 alkyl acrylate crosspolymers
 - Polyacrylates
- Alkolyated dimethicones (AKA Dimethicone copolyols)
 - PEG/PPG-20/15 Dimethicone
- Proprietary mixtures e.g. Versaflex V-150
 - Steareth-100, Steareth-2, Mannan, Xanthan Gum

Liquid crystal emulsifiers

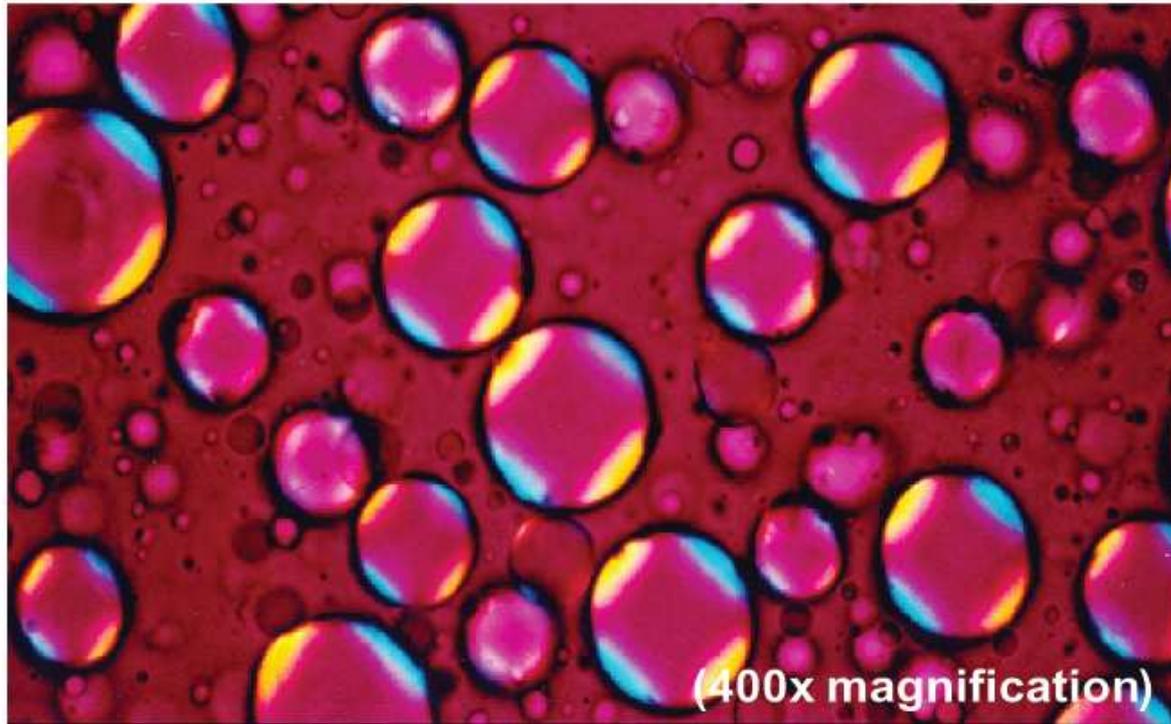
Liquid crystals combine the properties of both liquid and solid states; they have spatial orientation but remain fluid



Liquid crystal emulsion



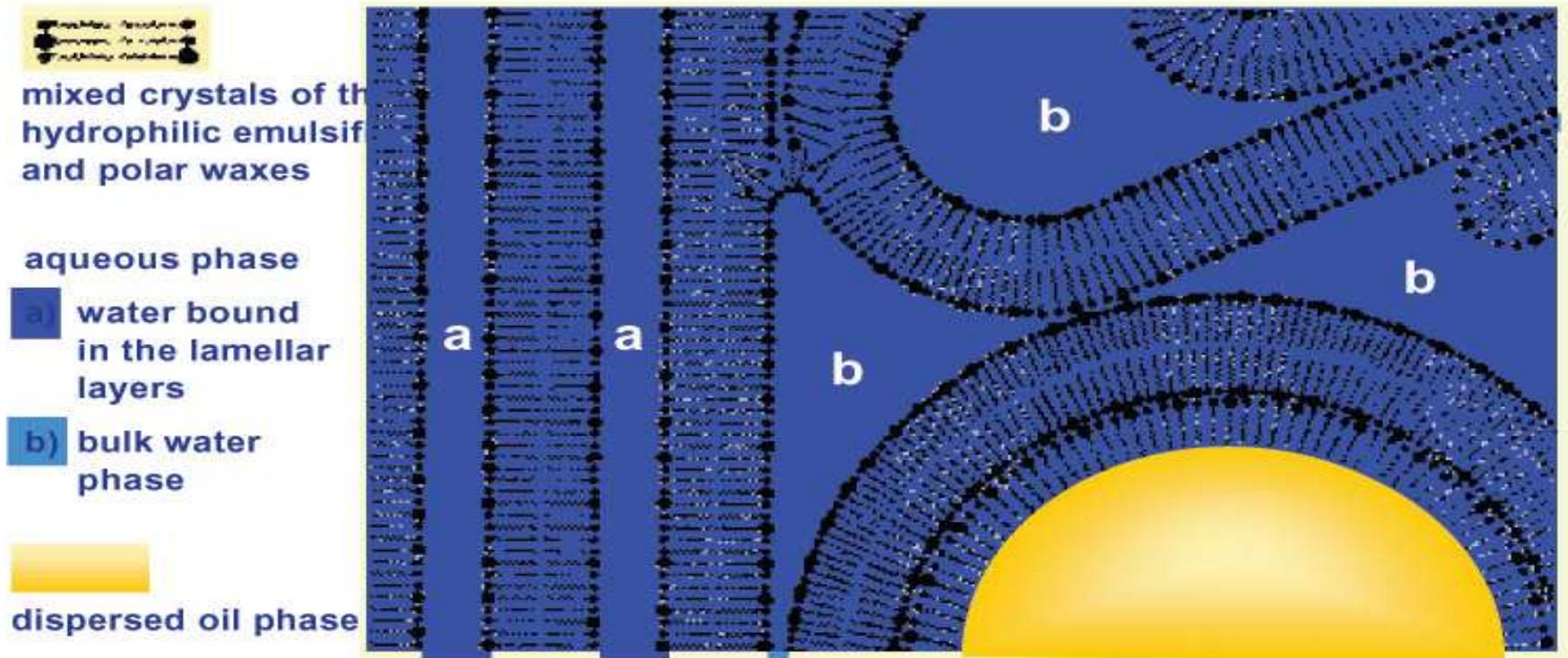
Structure o/w emulsion – lamellar





Liquid crystal emulsion

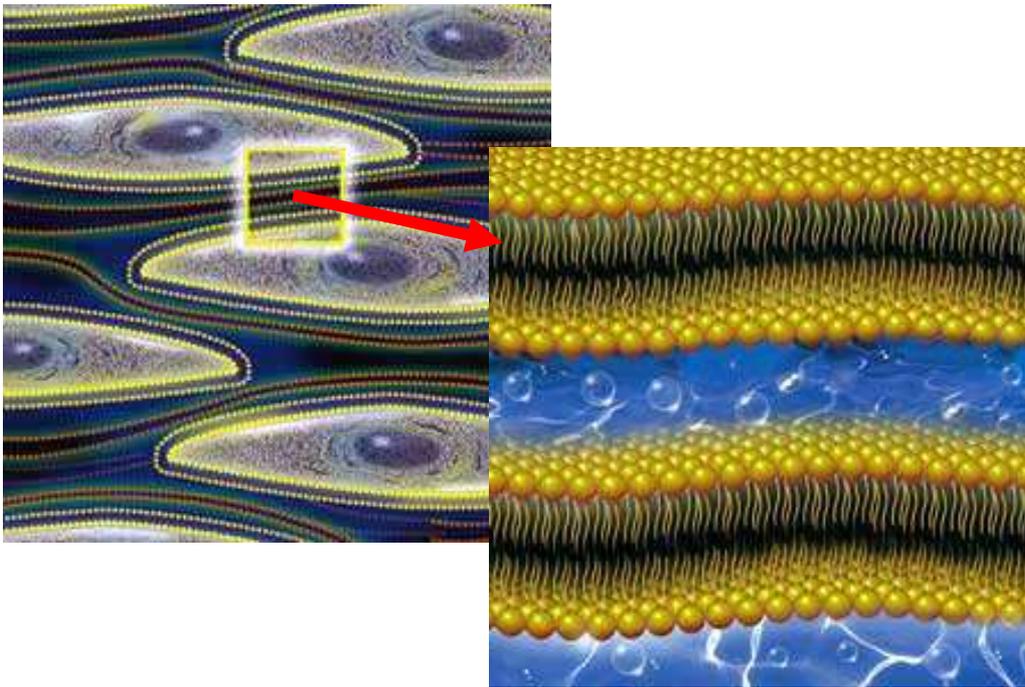
Structure o/w emulsion – lamellar



Liquid crystal emulsion



- Benefits of liquid crystal formation



Water, fatty acids, cholesterol, triglycerides and ceramides form the lamellar (layered) gel-like lipid system of the horny layer.



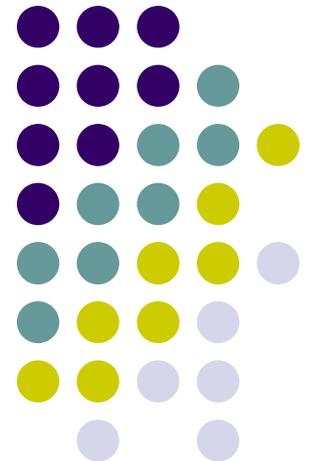
Liquid crystal emulsifiers

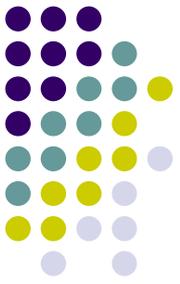
Examples

- Cetearyl glucoside with cetearyl alcohol
- Sorbitan olivate and cetearyl olivate
- Sorbitan stearate with sorbityl laurate
- Sorbitan stearate with sucrose cocoate
- Polyglyceryl-3 methylglucose distearate
- Potassium cetyl phosphate & hydrogenated palm glycerides
- Lauryl glucoside & polyglyceryl-2
dipolyhydroxystearate

Natural emulsifiers

Some more natural than others





The natural trend

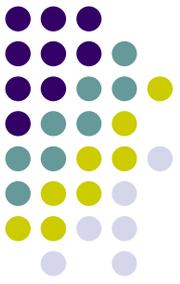
- Beeswax
 - Forms w/o or o/w emulsions but odour difficult to disguise and emulsions very heavy
- Lanolin
 - Forms w/o emulsions but no longer a favoured ingredient
- Lecithin
 - Very limited to niche markets
- Saponins
 - May be used as foaming agents but have limited use as emulsifiers

Natural emulsifiers



- The important parameter is that the system obtains natural certification from a recognised body such as Ecocert





“Fairly Natural” emulsifiers

- Natural oil esters and PEG-esters
- Natural oil glyceryl and polyglyceryl esters
- Natural oil PEG ethers & glycerides
- Alkyl glucosides
- Sucrose/glucose esters
 - in fact except for silicone-based emulsifiers virtually all others have a natural component in their molecule
 -but some are more natural than others!



Fairly “Natural” emulsifiers

- Cetearyl glucoside
- Cetyl olivate
- Coco-glucoside
- Sorbitan olivate
- Lauryl lactyl lactate
- Sodium stearate
- Sunflower seed oil glyceride
 - etc
- Natural oil polyglyceryl esters
- Natural oil PEG-n esters
 - Olive oil PEG-7 esters
- Hydrogenated natural oil esters
 - Hydrogenated olive oil cetyl esters
 - etc

Alfa Chemicals



- **Sucragel AOF BIO**; natural liquid emulsifier based on Sucrose laurate can be used in the oil phase as a co-emulsifier for creams and lotions, or it can be used to gel oils which can then in turn be diluted with water to form a fine sprayable emulsion.
- INCI: Glycerin & Prunus amygdalus dulcis (Sweet almond) oil & Sucrose laurate & Citrus aurantium dulcis (Orange) fruit water

Azelis Personal Care



- **BlanovaMuls GMSC**
 - Used to emulsify high amounts of oil and it is particularly suitable for the production of sprayable emulsions
 - Glyceryl stearate citrate
- **BlanovaMuls Eco 77**
 - Developed specifically for rich and caring product formulations
 - Glyceryl stearate citrate + Glyceryl stearate
- **BlanovaMuls Eco 2277 Eco**
 - Forms basis of emulsion concentrates
 - Aqua, Caprylic/capric triglyceride, Glycerin, Sodium lauroyl sarcosinate, Glyceryl stearate, Stearyl alcohol, Sodium stearyl lactylate, Glyceryl stearate citrate, Sodium benzoate, Dehydroxyxanthan gum

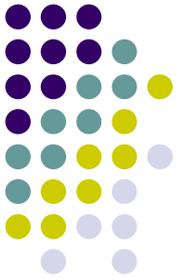


B&T - Olivem range



- 1000 = Cetearyl olivate + Sorbitan olivate
- 300 = Olive oil PEG-7 esters
- 400 = Sodium PEG-7 olive oil carboxylate
- 700 = PEG-4 olivate
- 900 = Sorbitan olivate
- Olivax as co-emulsifier and stabiliser =
 - Hydrogenated olive oil + Olea Europaea (Olive) fruit oil + Olea Europaea (Olive) oil unsaponifiables
 - JW uses Olivem 1000 to create lovely soft, stable emulsions

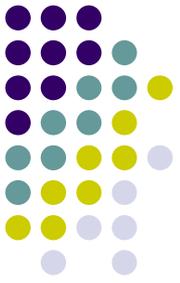
Cognis



- Dehymuls PGPH w/o emulsifier
 - Polyglyceryl-2 dipolyhydroxystearate
- Lameform TGI w/o emulsifier
 - Polyglyceryl-3 diisostearate
- Generol RE 10 o/w emulsifier
 - PEG-10 rapeseed sterol
- Emulgade Sucro o/w emulsifier
 - Sucrose polystearate; Hydrogenated polyisobutene
- Emulgade PL 68/50 o/w emulsifier
 - Cetearyl glucoside; Cetearyl alcohol

Croda emulsifier selector

<http://pceurope.crodadirect.com>



Selects combinations of emulsifiers to meet various criteria

- Alpha-hydroxy acids (AHA's)
- Anionic actives
- Antiperspirant salts
- Cationic actives
- Electrolytes e.g. > 1.0% NaCl
- High internal phase > 50%
- High polarity oils e.g. triglycerides
- Hair colourants
- Inorganic pigments
- Inorganic sunscreens
- Kojic acid
- Lactic acid
- Organic sunscreens
- Salicylic acid
- 100% silicone oil phase
- Sodium lactate
- Urea
- Green (Naturally derived & EO free)
- High pH > 9.0 Low pH < 5.0
- Emulsification system is Cationic / anionic / non-ionic

Croda



- Arlacel 1690 - W/O emulsifier for a wide range of oils, soft creams and milks
 - Sorbitan isostearate; Polyglyceryl-3 polyricinoleate
- Arlacel 2121 -O/W emulsifier, which produces hydrosomes in the emulsion to create formulations with excellent spreading properties for a smooth and light skin feel
 - Sorbitan stearate, Sucrose cocoate
- NatraGem E145 - 100% naturally derived, high HLB o/w emulsifier compatible with both low and high polarity oils with excellent electrolyte, pH and temperature tolerances.
 - Polyglyceryl-4 laurate/succinate
- NaturGem E140
 - Polyglyceryl-4 laurate/sebacate, Polyglyceryl-6 capylate/capratae

Degussa/Evonik



- Tegocare LTP o/w
 - Sorbitan laurate; Polyglyceryl-4 laurate; Dilauryl citrate
- Abil Care XL80; o/w
 - Bis-PEG/PPG-20/5 PEG/PPG20/5 dimethicone; Methoxy PEG/PPG-25/4 dimethicone; Caprylic/capric triglyceride
- Tego Care PSC3; o/w
 - Polyglyceryl-3 stearate/citrate
- Isolan GPS; w/o
 - Polyglyceryl-4 diisostearate/
polyhydroxystearate/sebacate (w/o)

Desert King



Andean Q/QDP Ultra:

INCI: Quillaja Saponaria (Soap Bark) extract

- Comes as either a pure natural liquid extract (Q Ultra) or as a spray dried (powder) extract. Both come in organic forms certified by Ecocert. It works as an o/w emulsifier or co-emulsifier. The extract comes from FSC certified sustainable plantations and is obtained in an environmentally sensitive way.

DSM



Amphisol K = Potassium cetyl phosphate

- An anionic oil/water emulsifier and an analogue of the natural phospholipids in the skin.

Amphisol A = Cetyl phosphate

- Used to emulsify and stabilise water-resistant skin-care and sun-care products for sensitive skin. Must be partially neutralised before use.
- JW has used Amphisol K to create very attractive sunscreen products containing high levels of micronised oxides.

Fibrestar



- **Imulsi-Fi™ A30** - An all natural product to be used in personal care products for emulsifying, suspending and thickening where a fine particle size is not needed.
 - INCI: Citrus aurantium sinensis (Orange) fiber

Gattefosse



Emulium Kappa; A peg-free emulsifier, accepted for use by the Soil Association and Ecocert. Designed to bring a luxurious cushion soft feel, long lasting comfort as well as boosting moisturising capacity for a wide range of formulations. It is based on a patented technology of hydrophilized vegetable waxes that can absorb up to 6 times their weight in water.

- Candelilla/jojoba/rice bran polyglyceryl-3 esters & Glyceryl stearate & Cetearyl alcohol & Sodium stearyl lactylate

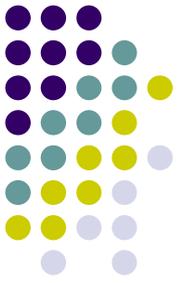
Gova



Neocare P3R w/o emulsifier derived from pure castor oil and glycerine for glossy, elegant emulsions. It claims skin hydrating and protecting properties while imparting a rich and elegant skin feel.

- It is compatible with vegetable oils, mineral oils, waxes, butters, sunscreens, silicones, essential oils and alcohol
- Electrolyte resistant
- Ideal for cold process lotions and creams and requires little homogenisation
- INCI: Polyglyceryl-3 polyricinoleate & Polyglycerlyl-3 ricinoleate.

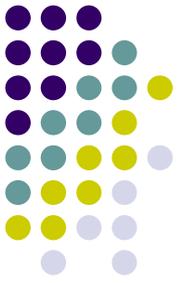
Inolex



- Emulsense: INCI: Brassicyl isoleucinate esylate; Brassica alcohol
 - Emulsense is a primary active cationic agent derived solely from fermentation and plant materials using sustainable green chemistry principals.
 - Its composition is 65% active (natural cationic) and 35% fatty alcohol
- Emulsense SC: INCI: Brassicyl isoleucinate esylate; Brassica glycerides; Brassica alcohol
 - Similar but designed for high oil loads



Kalichem



- Olivoil Emulsifier = Olivoyl hydrolyzed wheat protein, Cetearyl alcohol, Glyceryl oleate
- Olivoil Glutamate Emulsifier = Sodium olivoyl glutamate, Cetearyl alcohol, Glyceryl stearate
- Olivoil Avenate Emulsifier = Potassium olivoyl hydrolyzed oat protein, Cetearyl alcohol, Glyceryl stearate, Glyceryl oleate



Lonza



- Polyaldo polyglyceryl series of emulsifiers ECOCERT approved as natural replacement for PEGs.
- Suitable for W/O and O/W emulsions and applicable in broad pH range (3-10)
 - 10-1-O KFG; Polyglyceryl-10 Oleate HLB 14
 - 10-1-S KFG; Polyglyceryl-10 Stearate HLB 13
 - HGMP KFG; Polyglyceryl-10 Dipalmitate HLB 11
 - TGMS KFG; Triglyceryl Monostearate HLB 7
 - DGDO KFG; Polyglyceryl-10 Decaoleate HLB 3

Lucas Meyer



- **Heliofeel** - Polyvalent emulsifier that can cope with the presence of electrolytes to give stable gel cream systems using sunflower seed lecithin
 - Glyceryl stearate citrate, Polyglyceryl-3-stearate, Hydrogenated lecithin
- **Emulmetik series** - A variety of soy lecithin derived phospholipids combined with lecithin to act as co-emulsifiers and emulsifiers in natural systems
 - Lecithin, Phospholipids, Hydrogenated lecithin

Lucas Meyer



- **Amisol Duo** - A soft vegetable based dispersing agent composed of non-ionic, polar lipids.
 - Lecithin, Polyglyceryl-3 palmitate
- **Amisol Soft** - To create soft O/W emulsions with protective and soothing properties
 - Behenyl alcohol, Glyceryl stearate, Lecithin, Glycine soja (Soybean) sterols
- **Amisol Trio** - A natural complex rich in linoleic acid and Phytosterols.
 - Phospholipids, Glycine soja oil, Glycine soja sterols
- **Biophilic S** - Natural lamellar O/W emulsifier
 - Lecithin, C12-16 Alcohols, Palmitic acid



Seppic - Montanov Range

- S = Coco-glucoside & Coconut alcohol
 - 14 = Myristyl alcohol & Myristyl glucoside
 - 68 = Cetearyl alcohol & Cetearyl glucoside
 - 82 = Cetearyl alcohol & Cocoyl ethyl glucoside
 - 202 = Arachidyl behenyl alcohol & Arachidyl glucoside
 - L = C14-22 alcohols & C12-20 alkyl glucoside
 - WR = C20-22 alkyl phosphate & C20-22 alcohols
- Montanov 68 is one of JW's favourite emulsifiers

Sensient Technologies



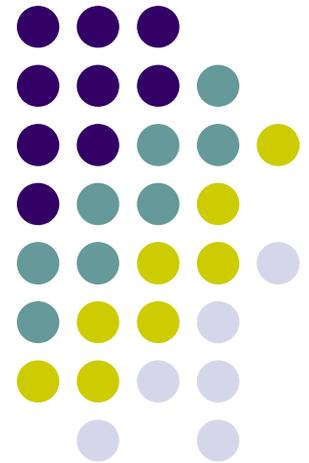
- **Natpure SOL** o/w solubiliser and emulsifier. Especially recommended as a solubiliser of essential oils, colours, and fragrances for outstanding clarity and stability
 - INCI: Glycerin & Sucrose laurate & Sorbitol & Sucrose dilaurate & Sucrose trilaurate
- **Natpure SF** w/o naturally derived emulsifier based on sucrose esters (Sensient Technologies)
 - INCI: Sucrose distearate & Sucrose stearate
- **Natpure Cellgum Plus** is a thixotropic colloidal thickener derived from wood. It is ideal for formulating spray products and is an excellent emulsifier for surfactant free O/W emulsions
 - Microcrystalline cellulose & Cellulose gum & Cellulose

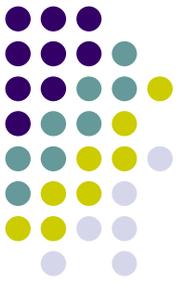
Seppic



- EasyNov w/o emulsifier used at concentrations between 1% and 4%. It gives emulsions that are completely stable over time and at high temperatures. It is said to enable up to 80% internal aqueous phase and emulsions have a soft silky feel
- Octyldodecanol & Octyl xyloside & PEG-30 dipolyhydroxystearate

P.I.T. emulsions

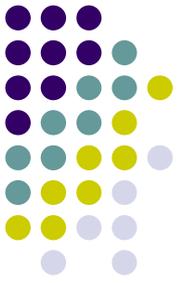




P.I.T. emulsions

- Fine dispersions with oil droplets < 200 nm
- Not affected by temperature
- High thermodynamic stability
- Extended storage life
- Based on natural, renewable raw materials
- Almost completely biodegradable
- In PIT-emulsions the droplets are so small that Brownian diffusion balances the gravity forces
- Narrow droplet size distribution minimises Ostwald ripening

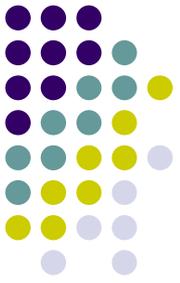
PIT emulsions



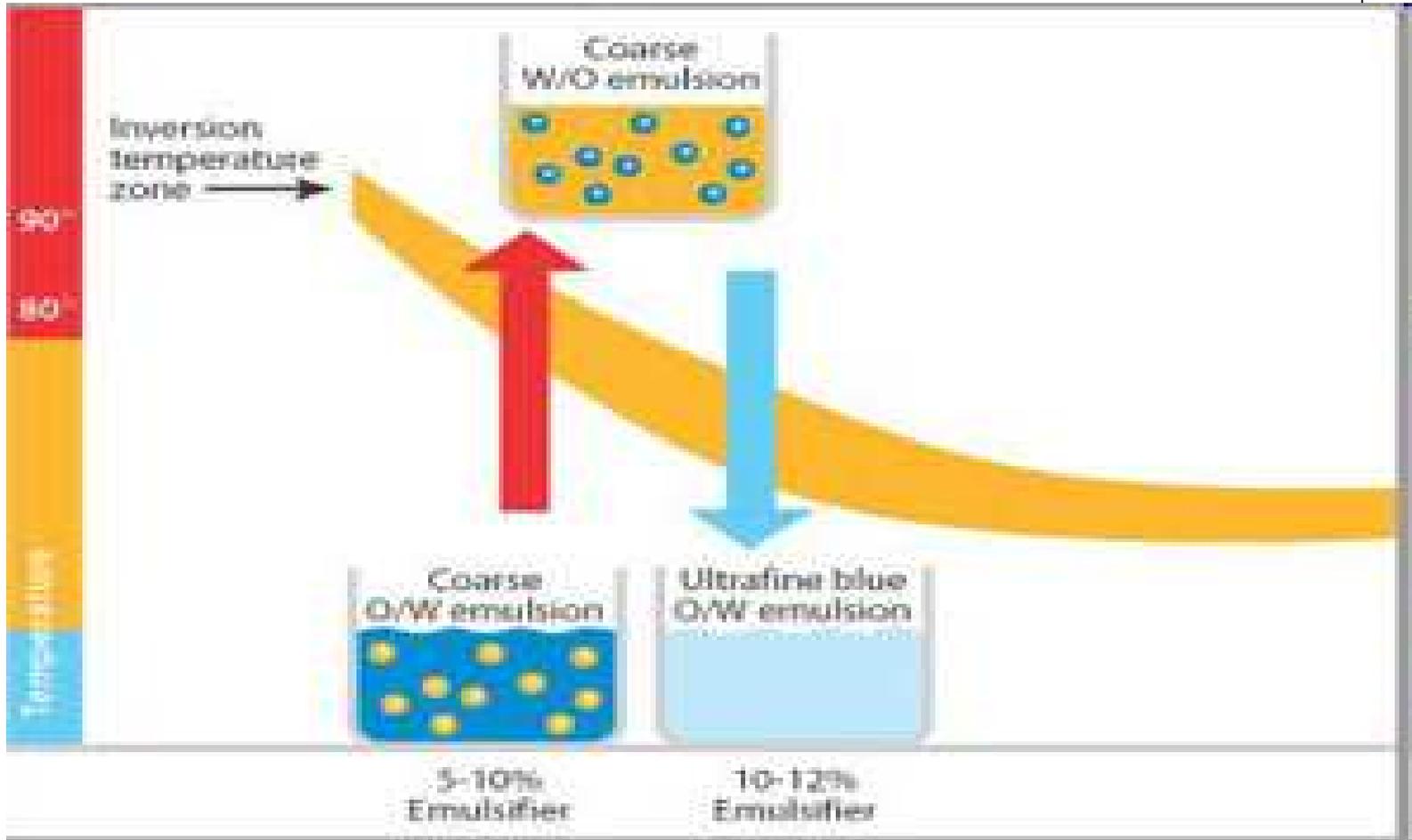
PIT Emulsions consisting of an oil phase, a water phase and ethoxylated nonionic emulsifiers, undergo a temperature-induced phase inversion, during which a microemulsion is formed. At elevated temperature, the system is a W/O emulsion and at low temperature, it is a O/W emulsion.

In the transition zone, the phase inversion temperature (PIT) range, the hydrophilic and lipophilic properties of the emulsifiers are in equilibrium, and the interfacial tension is reduced to a minimum.

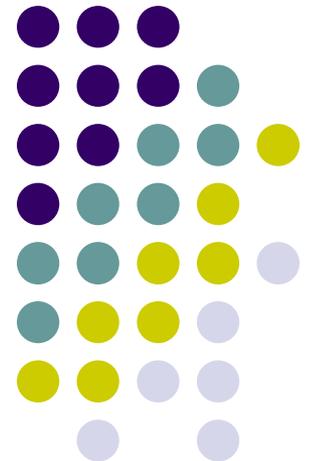
At this point, a microemulsion forms without particular mechanical energy input. The fine-disperse nature of the microemulsion is partially retained after cooling and the resulting emulsion displays an extremely fine droplet distribution of 100 – 300 nm.



P.I.T. Emulsions



Emulsifying silicones



Emulsifying Silicones

Dow Corning



ES-5226 DM Formulation Aid is a 37.5% dispersion of a silicone polyether in a low viscosity, volatile dimethicone fluid.

- INCI - Dimethicone, PEG/PPG-18/18 Dimethicone

ES-5227 DM Formulation Aid is 25% dispersion of a silicone polyether in a low viscosity non-volatile dimethicone fluid.

- Dimethicone, PEG/PPG-18/18 Dimethicone

Primary function of both is to produce water-in-silicone emulsions with textures ranging from lotion to cream.

Emulsifying Silicones

Dow Corning



DC ES-5612 Formulation Aid

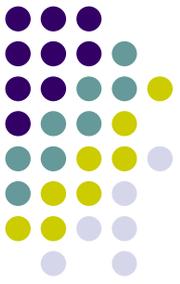
- INCI - PEG-10 Dimethicone, PEG-10, PEG-10 Monoallyl Ether, Tocopherol
- Silicone emulsifier designed to prepare low viscosity water-in-silicone and water-in-oil emulsions.

DC FZ2233

- INCI - Polysilicone 13
- Produces water-in-silicone and water-in-silicone and oil emulsions with a light creamy feel and very small particle size that will show increased stability.

Emulsifying Silicones

Dow Corning



DC BY 25-337 for the preparation low to high water content W/Si Emulsions and emulsions with mixed oil phases (oil + silicone). Also acts as a texture (thickening) enhancer for W/O and W/Si systems.

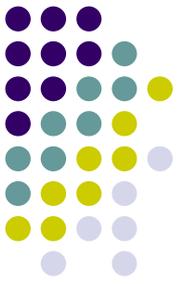
- PEG/PPG-19/10 Dimethicone, C13-16 Isoparaffin, C10-13 Isoparaffin

DC RM 2051 Thickening and emulsifying polymer in dimethicone that can be used in a wide range of applications to modify rheology and skin feel to give smooth, non-greasy, non-sticky applications.

- Aqua, Sodium Polyacrylate, Dimethicone, Cyclopentasiloxane, Trideceth-6, PEG/PPG-18/18 Dimethicone

DC BY11-030 Emulsifier/Gelling Agent For the creation of clear silicone gels containing non-polar ingredients. Helps pigment dispersion and stabilisation in silicone systems

- Cyclopentasiloxane, PEG/PPG-19/19 Dimethicone

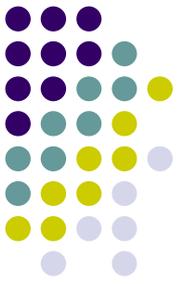


Croda selector & silicones

For Si/w emulsions a combination of Arlatone LC and Brij IC20 is used to produce (oil/Si)/w sprayable emulsions with improved electrolyte tolerance

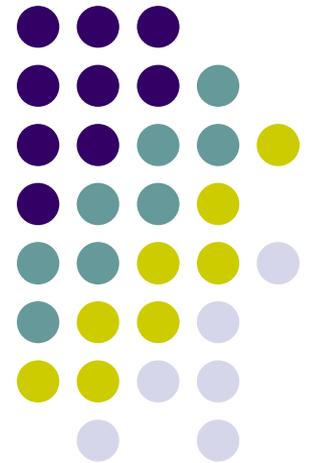
- Arlancel LC
 - Sorbitan Stearate; Sorbityl Laurate
 - Brij IC20
 - Isoceteth-20
- Same system used by JW to solve an almost impossible emulsion problem

Evonik: emulsifiers for high silicone content w/o creams



- **ABIL EM 90**
 - Cetyl PEG/PPG-10/1 Dimethicone
- **ABIL EM 97 S**
 - Bis-PEG/PPG-14/14 Dimethicone; Dimethicone
- **ABIL® WE 09**
 - Polyglyceryl-4 Isostearate; Cetyl PEG/PPG-10/1 Dimethicone; Hexyl Laurate
- **ISOLAN® PDI**
 - Diisostearoyl Polyglyceryl-3 Dimer Dilinoleate
- **TEGO® Care 450 (Si/W)**
 - Polyglyceryl-3 Methylglucose Distearate

Other emulsifiers

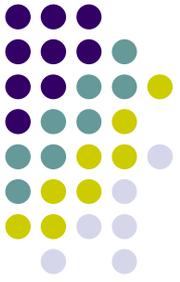


Jeen JEESPERESE range:



- Polyacrylate-based emulsifiers that hydrate quickly for an instant gel cream type formulation, compatible with silicones.
- CPW-n: Polyethylene/Sodium polyacrylate emulsifiers.
- CPW-S Sunflower wax; Sodium polyacrylate
- CPW-EW1LP Stearic acid; Cetareth-20, Cetearyl alcohol; Sodium polyacrylate
- CPW-GCS Stearic acid; Cetearyl alcohol; Glyceryl stearate; PEG-100 stearate; Sodium polyacrylate
- CPW-P Cetearyl alcohol, Sodium polyacrylate, Steareth-20; Polysorbate-60

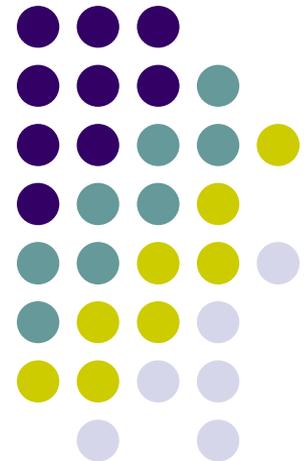
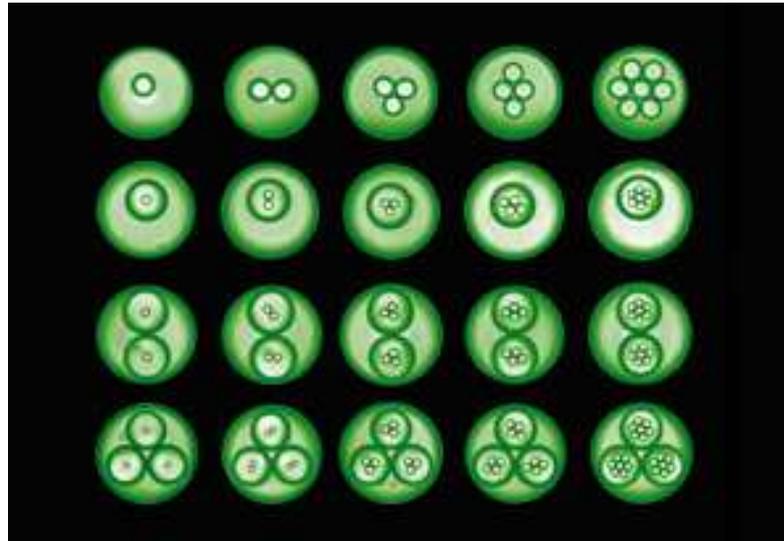
Rheolab



Described as natural hybrids -

- Naturex A100; Sodium Polyacrylate & Ethylhexyl Stearate & HEC & Trideceth 6 is an anionic hybrid
- Naturex C100; Polyquaternium 37 & Propylene & Glycol Dicaprylate / Dicaprate & HEC & PPG-1 Trideceth 6 is a cationic hybrid
- Water-swellaable cationic & anionic polymers dispersed in hydrophobic oils/esters for emulsion stabilisation are also available.

Multiple emulsions



Multiple emulsions

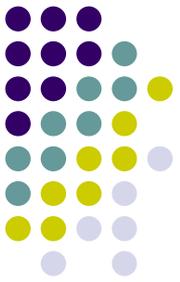
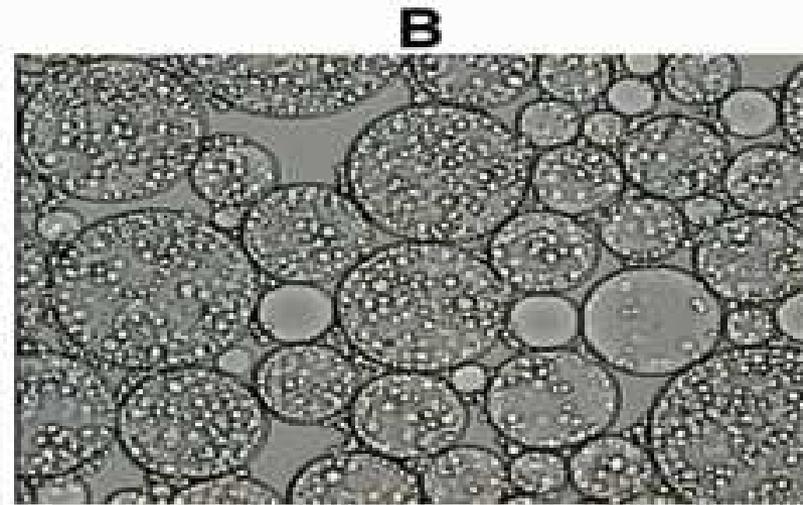
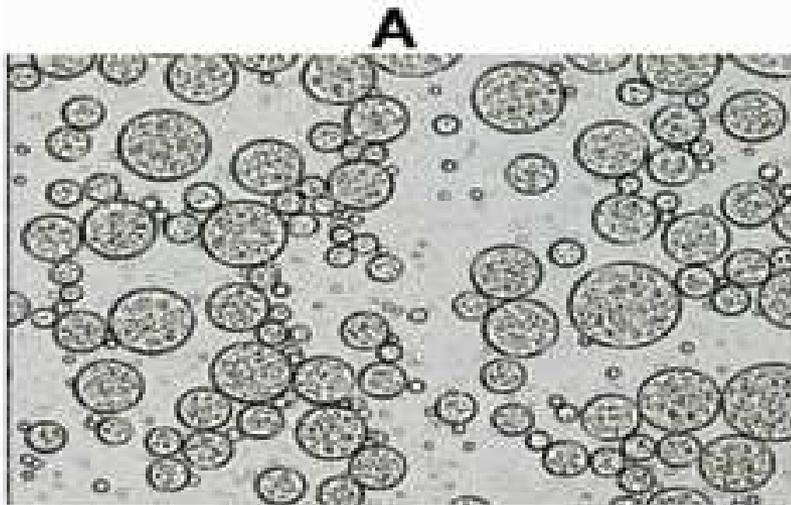


FIGURE 4

Photomicrographs of two multiple emulsions. A) is a non-aqueous system, an o/o/o emulsion and B) is an o/o/w emulsion. A is a formulation of castor oil-in-silicone oil-in castor oil. B is a multiple emulsion of castor oil-in-silicone oil-in water.



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Thank you for your time

John Woodruff
Creative Developments (Cosmetics) LTD.

