



Silicone emulsions for technical markets

What is an emulsion ?

- *Mixture of two non-miscible substances stabilised by surface active ingredients*
- *Particles (droplets) are stabilized and formed by surfactants*
- *O/W emulsions replace solvent based products (environmental friendly)*



Typical properties

- *O/W or W/O emulsions:*
 - *O/W emulsions (e.g. Sempure 60) can be diluted with water,*
 - *W/O emulsions not.*
- *Viscosity:*
 - *Depends on active content, surfactant type/concentration, thickener*
 - *Sharp increase for o/w emulsions >60% oil*
 - *Often pre-diluted with water before use*

Surfactant types

Types:

- *Non-ionic: (e.g. Alcohol ethoxylates)*
- *Anionic: (e.g. SodiumLaurylethersulphate)*
- *Cationic: (e.g. Alkylammoniumchloride)*
- *Amphoteric (both anionic & cationic)*

- *Crucial for emulsions stability*
- *Optimization of surfactant HLB based on emulsified substance (silicone oil, mineral oil, water (w/o emulsion))*

Surfactant choice

Non-ionic

- *Grease remover*
- *Resistant to water hardness deactivation*

Cationic

- *Softener*
- *Sanitizer*

Anionic

- *Cleaning & foaming properties*
- *Textile dirt remover*
- *Sensitive to water hardness deactivation*

Amphoteric

- *Mild, non irritant*
- *Compatible with all other surfactant types.*
- *Compatible with high concentrations of electrolytes, acids & alkalis*
- *High foaming properties*

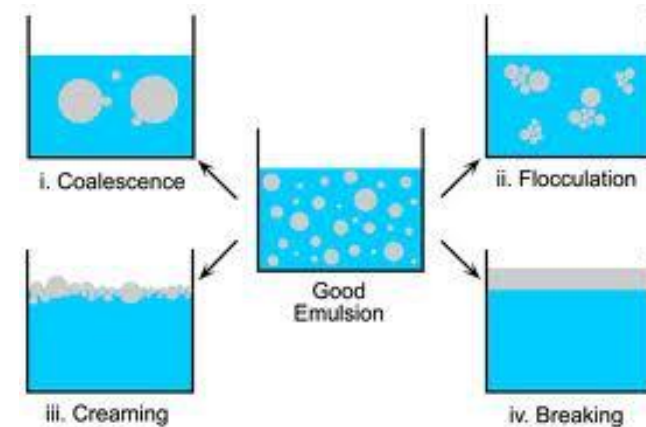
Shelf life

Instability = Coalescence, followed by

- *Flocculation*
- *Creaming*
- *Breaking*

Stability influenced by:

- *Oil density*
- *Particle size*
- *Emulsion viscosity*
- *Emulsification methodology and chemistry*



Stability

Medium

- - *Anionic emulsion are not compatible with cationics*
- - *High electrolyte concentrations, extreme pH's may also destroy emulsions*
- - *High temperature can also separate an emulsion*
- *Particle size*
 - *> 1 μm = risk of separation*
- *Frost*
 - *Can be stable, depends on formulation*
- *Shear*
 - *High shear = pressure through nozzles, centrifugal pumps...*
 - *risk of separation or change in particle size, thus stability*

Markets & product selector

Application	Mould release			Polish		Lubrication	
Product	Plastic / rubber	Aluminum / foundry (paintable)	Food contact	Car (paint & vinyl conditioner)	Furniture, floor, shoe, leather...	Hoses, conveyor belts, etc...	Yarn, thread
Sempure 35	X			X	X	X	X
Sempure 60	X			X	X	X	X
Sempure 357			X				
Sempure 5332		X					
Sempure HV 6500				X	X	X	
Sempure 1997				X	X		
Sempure 3733				X			

Markets & product selector

Application	Water repellant			
Product	Mineral / glass wool, fire-proof materials	Glass ware (anti-slip)	Synthetic fibers, fur, textile finish	Web offset
Sempure 35		X	X	X
Sempure 60	X	X	X	X
Sempure 1814	X			
Sempure HJS	X			
Sempure SW 4	X			
Sempure 379	X			
Sempure HV 6500				X
Waxil AST				X

Base oil technology

- *Medium viscosity silicone oil: Sempure 35, 60, 357*
- *High viscosity silicone oil: Sempure HV 6500, 1997*
- *Amino silicone: Sempure 3733*
- *Alkyl aryl silicone: Sempure 5332*
- *H-siloxane: Sempure 379*
- *Silanol fluid: Sempure 1814*
- *Silicone wax: Waxil AST*
- *Specialties: Sempure HJS, SW4*



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