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Spider Esters

A New Class of Polar Esters

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- As scientists, we want our world to be both highly predictable and simple.
 - Unfortunately, the world is not always that way.
 - An example of this is dealing with polar and non-polar materials. Products are generally referred to as either hydrophobic, which literally means water hating (oil phases) or hydrophilic, which literally means water loving (polar).
 - However, there are hydrophobic (water insoluble) materials that have increased polarity. These polar water insoluble materials include esters

➤ While still water insoluble, the presence of the ester linkage and the two oxygen atoms makes these materials more polar than hydrocarbons. Since likes dissolve likes, the use of esters as oil phases allow for incorporation of materials that have little or no solubility in hydrocarbon.



- Surfactants possess both a water soluble and oil soluble portion of the same molecule. This alters their properties, since simple separation is not possibility, despite the fact that pure oil phases and water phases do not mix. Addition of surfactants can result in dispersions separations and emulsions, depending upon the exact structure of the surfactant. Surfactants accomplish emulsification, wetting and detergency by reducing the surface tension of water .

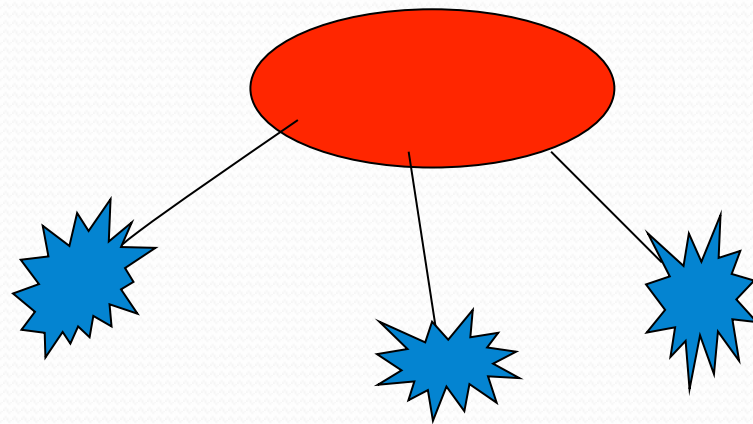


- A molecule acts like a surfactant because it assumes the lowest free energy in the system in part by being free to rotate its appendages. Molecules in which the rotation is blocked have little or no surface tension reduction and remain water insoluble at levels of alkoxylation that one would predict were water soluble.



- One of the ways this is achieved is by limiting the ability of the chains to rotate and assemble at lowest free energy.
- Spider esters are a series of products in which the rotation is limited by structure.
- We have dubbed these materials “spider esters” since they are multi-legged molecules that are anchored to a “body”, thereby restricting the rotation of the molecule. Additionally, the legs of the spider contain polyoxyalkylene groups closest to the body and oil soluble at the extremities.
- This arrangement blocks the water soluble group in small discrete positions so that rotation is significantly limited.

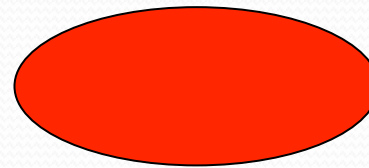
Spider Ester Construction



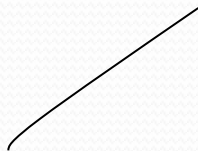


Spider Ester Construction

•Spider Body



•Water Soluble Leg



•Oil Soluble foot



Spider Ester Construction

❖ Spider Body

Glycerin (3)

Pentaerythritol (4)

Sorbitol (6)

❖ Water Soluble Leg

Ethylene oxide

Propylene oxide

Mixtures

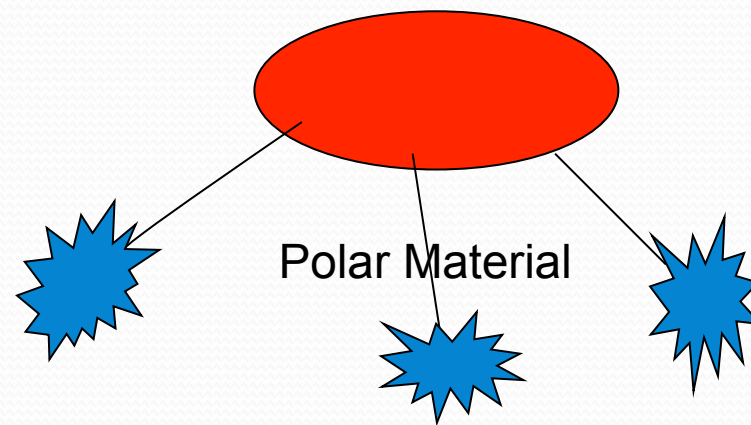
❖ Oil Soluble foot

Fatty Acids





Spider Ester Effect



The polar material is at lowest free energy within the legs of the spider

Solubility

Solvent (10% Weight)	Spider Ester[™] ESO	Spider Ester[™] GEC
Water	Milky	Milky
Propylene glycol	Translucent	Translucent
Isopropanol	Soluble	Soluble
Sorbitol	Translucent	Soluble
Cyclomethicone	Translucent	Translucent
Sunflower Oil	Soluble	Soluble
Isododecane (99A)	Soluble	Soluble
Octyl Octanolate	Soluble	Soluble

Spider Esters™ solubilize and encapsulate at least 10% by weight of:

- Salicylic acid
- Sun Screens
- Avobenzone
- Fragrances
- Others

➤ This encapsulation inherently provides protection of the active from degradation.

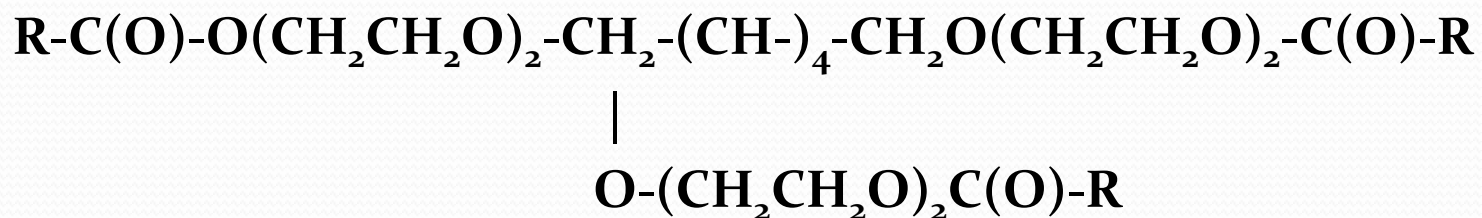


Representative Products



Product Name: Spider Ester ESO

INCI : Sorbeth-2-hexa-oleate



R is derived from oleic.



Product Name: Spider Ester GEC

INCI : Glycereth 6 tricocoate



$$a+b+c = 6$$

R is derived from coco.



Formulations



Spider Ester GEC

Sunscreen Stick

Component

wt%

Silsurf Resin 5580

12.50

Microcrystalline Wax 190/195

3.25

Ozokerite 1070

16.50

Spider Ester GEC

15.00

Silsurf 208-612

4.00

Isostearyl Neopentionate

23.75

Octocrylene

7.50

Oxybenzone

3.00

Avobenzone

2.00

Silica Spheres MSS-500

12.50

Procedure:

1. Add sunscreens to spider ester heat to 60°C
2. Add all other ingredients to another vessel except silica spheres to Vessel and heat until waxes melt.
3. Add (2) to (1)
4. Add Silica Spheres and mix until uniform.
5. Fill



Spider Ester ESO Treatment Butter with Beta Hydroxy Acid & Vitamin E

<i>Component</i>	<i>wt%</i>
Shea Butter	69.0
Spider Ester ESO	20.0
Beeswax	5.0
Salicylic Acid	1.0
Tocopherol Vitamin E	1.0
Silica Cab –O-Sil M-5	4.0

Procedure:

1. Add salicylic acid top spider ester and heat to 60°C
1. Heat Shea Butter, and Beeswax to 65°C until Beeswax is completely melted, add slowly to spider ester/salicylic acid
2. Add Salicylic Acid, Tocopherol Vitamin E and Silica Cab-0-Sil M-5 and cool.
3. Fill.

This product works best in tubes.



Spider Ester ESO Sunscreen Lotion

<i>Component</i>	<i>wt%</i>
Water	49.5
Polysurf 67 CF	0.5
Propylene Glycol	2.0
Tetrasodium EDTA Versene 100	0.4
Octocrylene	7.5
Oxybenzone	3.0
Avobenzone	2.0
Silsurf 612	4.0
Spider Ester ESO	5.0
Siltech F 0.65 Hexamethyl Disiloxane	25.0
Propylparaben	0.2
Methylparaben	0.4
Fragrance Fruity Fresh 146887	0.5



Spider Ester ESO Sunscreen Lotion

1. Heat water to 75-80C and dissolve the Polysurf. Mix until completely dissolved.
2. Cool to 50C.
3. Add Propylene Glycol and Versene to water.
4. In another vessel mix Sunscreens and Spider Ester heat to 60°C until all solids are completely dissolved. Add Silsurf and Paraben.
5. Add Siltech F 0.65 and maintain temperature at 50C.
6. Add Sunscreen mixture to water phase with high speed mixer. Mix until uniform.
7. Cool to 35C add Fragrance.
8. Fill

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Spider Ester ESO Sunscreen Cream

<i>Component</i>	<i>wt%</i>
Water	49.5
Polysurf 67 CF	0.5
Propylene Glycol	2.0
Tetrasodium EDTA Versene 100	0.4
Octocrylene	7.5
Oxybenzone	3.0
Avobenzone	2.0
Silsurf 612	4.0
Spider Ester ESO	10.0
Isopropyl Palmitate	10.0
Octyldodecyl Neopentanoate	10.0
Propylparaben	0.2
Methylparaben	0.4
Fragrance Fruity Fresh 146887	0.5

Viscosity

30,000



Spider Ester ESO Sunscreen Cream

Procedure:

1. Heat water to 75-80°C and dissolve the Polysurf.
2. Mix until completely dissolved.
3. Cool to 50° C
4. Add Propylene Glycol and Versene to water.
5. Mix sunscreens and Spider Ester and heat to 65°C until all solids completely dissolve. Add Silsurf, and Parabens.
6. Add sunscreen mixture to water phase with high speed mixer. Mix until uniform.
7. Cool to 35°C add Fragrance.
8. Fill.

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Spider Ester ESO Lip Balm with SPF & Vitamins

<i>Component</i>	<i>wt%</i>
Petrolatum	63.65
Spider Ester ESO	10.00
Ascorbic Acid Vitamin C	0.10
Octyl Methoxycinnamate	7.50
Octocrylene	7.00
Oxybenzone	6.00
Octyl Salicylate	5.00
Tocopherol Vitamin E	0.25
Grapefruit Fragrance	0.50

Procedure:

1. Disperse the Vitamin C and sunscreens in the Spider Ester.
2. Melt Petrolatum and add Spider Ester/sunscreen/Vitamin C mixture.
3. When product is clear add Vitamin E and Fragrance.
4. Cool and Fill.

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Spider Ester GEC Vitamin E Cream

<i>Component</i>	<i>wt%</i>
Water	49.5
Polysurf 67 CF	0.5
Glycerin	3.5
Tetrasodium EDTA Versene 100	0.4
Silsurf 612	4.0
Spider Ester GEC	5.0
Canola Oil	34.0
Tocopherol	2.0
Propylparaben	0.2
Methylparaben	0.4
Fragrance AN128870	0.5



Spider Ester GEC

Vitamin E Cream

<i>Component</i>	<i>wt%</i>
Water	49.5
Polysurf 67 CF	0.5
Glycerin	3.5
Tetrasodium EDTA Versene 100	0.4
Silsurf 612	4.0
Spider Ester GEC	5.0
Canola Oil	34.0
Tocopherol	2.0
Propylparaben	0.2
Methylparaben	0.4
Fragrance AN128870	0.5

Viscosity 40,000





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- Thank You