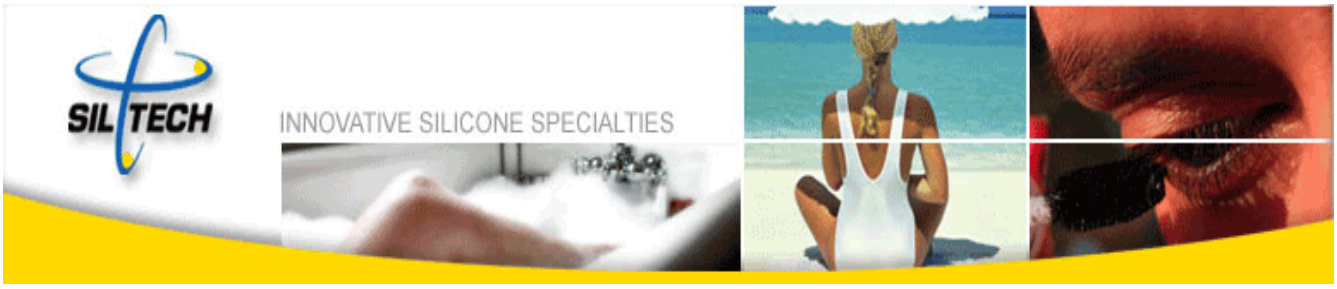
Products for Personal Care

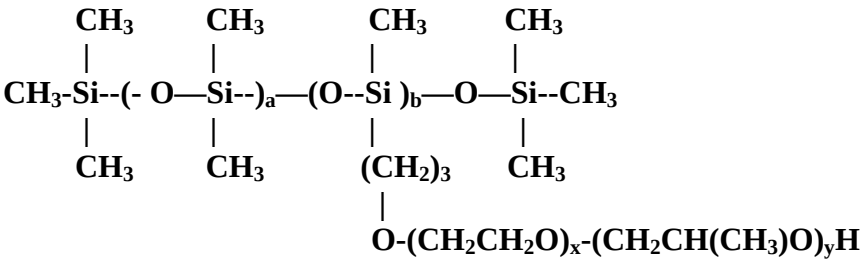


Select-a-Sil^{tm} silicone selection system

Presentation

Silicone Polyether Surfactants and Derivatives

The products of this class have been known by a variety of names over the years. Cosmetic people call them dimethicone copolyol, but they are also called silicone glycols, and silicone surfactants. Regardless of what they are called, they are a class of compounds that offer many formulation benefits. They conform to the following structure:



Depending upon the exact structure, and molecular weight, the compounds of this class can be what is called super wetters, traditional wetting agents, conditioners or emulsifiers.

To demonstrate this, we have chosen a homologous series of compounds each having 8 moles of polyoxyethylene present. Although the total molecular weight increases over the series, the equivalent molecular weight changes little. What in essence we are doing is putting more and more groups on the molecule, knitting them together. This results in not only modification of molecular weight, in very different performance properties.

Silsurf	Molecular Weight	Wetting 0.1% Sol	CMC mg/l	Surface Tension @ CMC	Eye Irritation 1 day	7day	Super Wetting*
A-008	633	7 sec	20	20	28	4	56
A-208	855	8 sec	20	20	13	2	5
B-208	1398	10 sec	20	20	5	2	2
C-208	2105	18 sec	23	22	4	0	2
D-208	2706	257 sec	23	22	2	0	2
J-208	6334	-	23	23	0	0	-

The term super wetting as applied here relates to the ability of a 1% solution of the test surfactant to spread on paraffin without mechanical means. The trisiloxane (Silsurf A008) is the only product in the series that demonstrates these properties. However, it also is the material with the most limited hydrolytic stability. Blending this material with another silicone glycol neither overcomes the hydrolytic instability of the trisiloxane, nor does it improve the wetting of the non trisiloxane component.

While super wetting is very structure specific, Draves wetting, (the ability to sink a cotton skein in a surfactant solution) is quite different. There is a gradual increase in wetting time as a function if molecular weight is increased. Eye irritation of the surfactant drops off as molecular weight increases. This means there are a number of compounds that have outstanding Draves Wetting, and at the same time low irritation.

Wetting turns out to be a critical factor in almost every application for silicone surfactants. Silicone surfactants used for conditioning are high molecular weight materials. They are also poor wetting agents. Therefore the ability to spread uniformly on substrates is difficult, resulting in non-uniform films. It is therefore recommended that a lower molecular weight silicone surfactant be added to wet out the higher molecular weight silicone surfactant. This is true for textile fabrics, plastics and hair. Since wetting occurs at or below the CMC, one should add enough to have the product present at that concentration available after the formulation has been cut to use concentration.

Table 1 describes the molecular weight of several of the products. Table 2 describes the wetting time for those same compounds. As can be easily seen, there is quite a variation in the speed of wetting. Proper selection offers the formulator products chosen for their specific properties.

TABLE 1

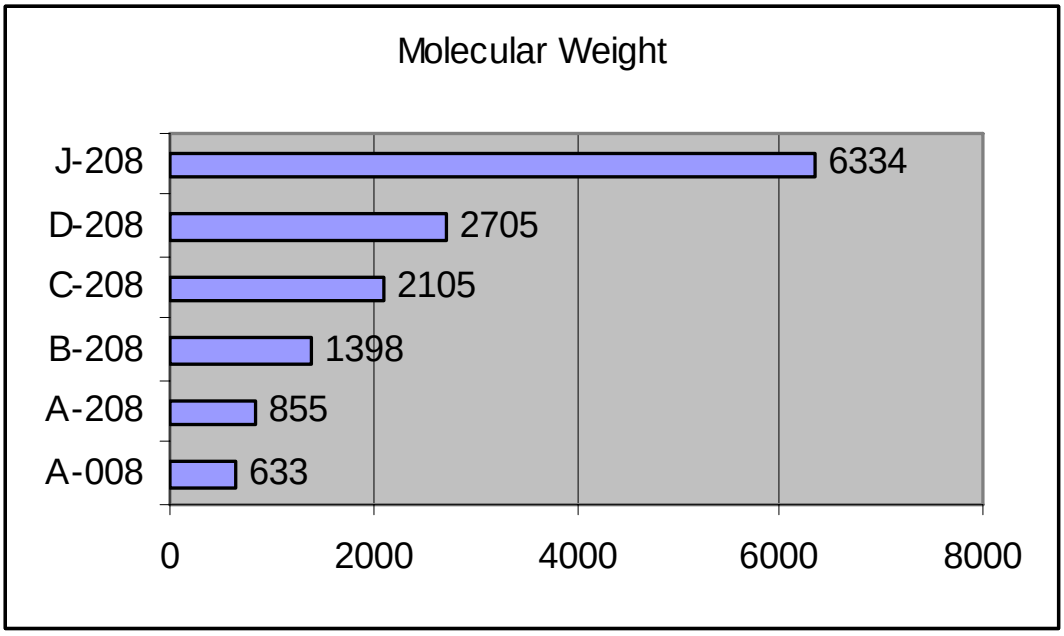
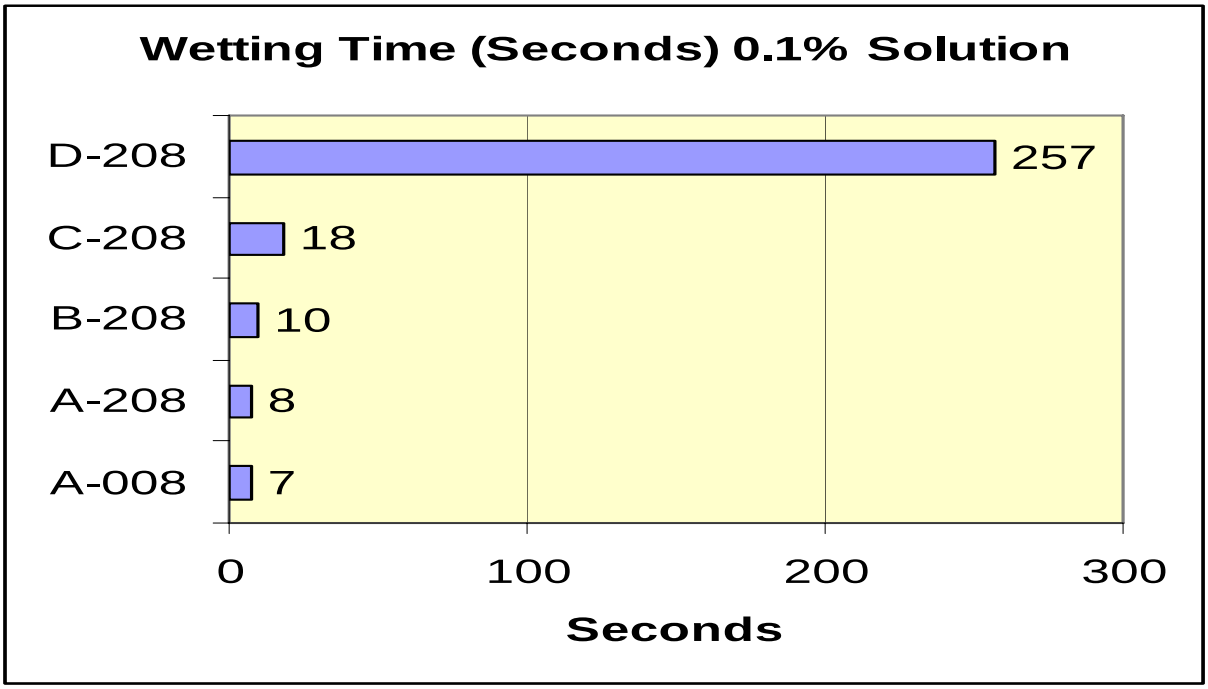


TABLE 2



The proper selection of silicone polyether for a given application will most likely include a lower molecular weight product for wetting and a higher molecular weight component for conditioning, slip and feel modification. Siltech has also developed and has patents pending on a variety of products that are synergistic blends of various silicone glycols and other surfactants.

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