

ChemBrief



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Optiflo® Rheology Modifiers and efflorescence

Rheology modifiers are often selected solely for their impact on the flow behavior of a coatings system with little if any regard given to the other properties they impact. It is well known and documented that nonionic associative thickeners offer the best overall flow characteristics of any rheology modifier class. Amidst increasing demand for higher performance coatings, nonionic associative thickener use has undergone significant growth over the past decade.

As formulators continue to look for “added benefits” from their additive packages, it is clearly evident that the impact of rheology modifiers extends well beyond their intended use as flow control additives. What may not so easily be seen is their ultimate impact on film and chemical resistance properties of the final coating. While no one class of rheology modifier may offer everything the formulator is looking for, it becomes quite apparent that nonionic associative thickeners are ideally suited for these high performance systems.

Coatings are exactly as the name implies, they are dry films designed to provide a protective yet decorative barrier to some substrate. Although the choice of binder bears the most relevance to overall system performance, including such film properties as adhesion, washability, scrub resistance, chalking resistance, UV resistance, stain block, and efflorescence, rheology modifiers can and do affect each of these along with other film properties. With this in mind, we will take a closer look at the various rheology modifier classes and their impact on efflorescence resistance of a 100% acrylic interior/exterior satin coating.

Efflorescence Resistance:

Efflorescence is a deposit of water-soluble salts that leach to the surface of masonry or concrete construction. The most common salts are sulfate and carbonate compounds of sodium, potassium, calcium, magnesium and aluminum.

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For efflorescence to occur three conditions must exist simultaneously:

- ◆ Water-soluble salts must be present within the masonry system
- ◆ A water source is needed to dissolve the salts
- ◆ Water must be in contact with the salts for a sufficient time to dissolve and transport them to the surface

The removal of any one of these conditions will prevent the occurrence of efflorescence.

Efflorescence Types:

There are two types of efflorescence that are usually encountered in the field, primary and secondary. Primary efflorescence results from the initial curing of concrete and may take several weeks to occur. Virtually nothing can be done to address this phenomenon, and as a result coatings are generally applied after its initial formation and subsequent removal. Secondary efflorescence results from renewed penetration of water (i.e. wet/dry cycles) into the structure that dissolves soluble salts and deposits them on the surface upon drying. The coating's ability to form a protective barrier is critical in preventing secondary efflorescence thus higher performance additives are required to help fulfill this need.

Benchmark results obtained from an independent testing laboratory conclusively

demonstrate the significant improvement that Optiflo®, based on patented HEAT (Hydrophobically modified Ethoxylated Aminoplast Thickeners) technology, offers in terms of efflorescence over other rheology modifier classes.

It is evident from Figure 1 that even at relatively low use levels the addition of many types of rheology modifiers interfere with the formation of a uniform film capable of protecting the substrate. Of the three major classes of rheology modifiers tested (cellulose derivatives, alkali swellables, and nonionic associatives), HEAT based nonionics offer the best barrier protection properties.

The performance of the cellulose based systems displayed very little efflorescence with use levels below 3 dry #/100 gallons. HASE based rheology modifiers have a dramatic, negative impact on efflorescence even at use levels below 2 dry #/100 gallons. In both cases of cellulose and HASE rheology modifiers there is a finite limit to the amount that can be added to any system before the barrier properties of the film become compromised.

Rheology Modifier Impact on Efflorescence
Loading in Dry #/100 gallons

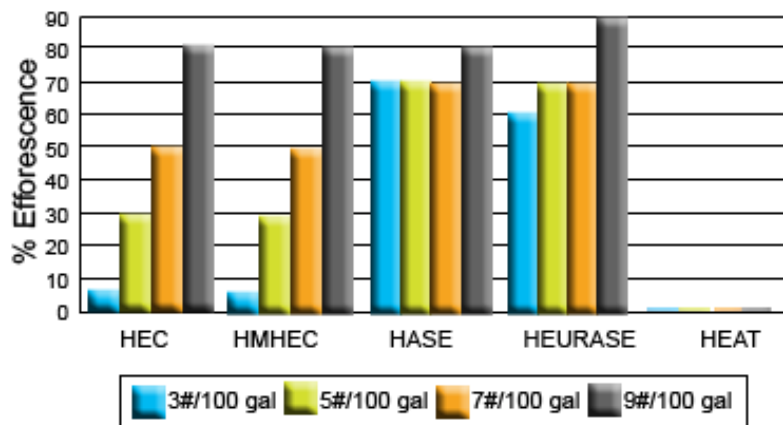


Figure 1



Efflorescence becomes more evident at higher use levels in all rheology modifier classes with the exception of the HEAT nonionic associative thickeners. Figures 2 & 3 illustrate the improvements in efflorescence resistance offered by this unique rheology modifier class. Improvements in other barrier related film properties have also been clearly defined in other areas such as corrosion and mildew resistance. Figure 4 is the graphical representation of the data that was supplied by an independent testing laboratory and shows the improvement that can be achieved in mildew resistance just by altering the rheology modifier package.

The addition of HEUR nonionic associative thickeners to the test system improved the performance verses the HEC Control; however the HEURs fail to match the performance of the HEAT products. From Table I (see next page), it is evident that the HEAT class of associative thickeners offers the best overall performance when the entire spectrum of exterior applications are taken into consideration.



Figure 2

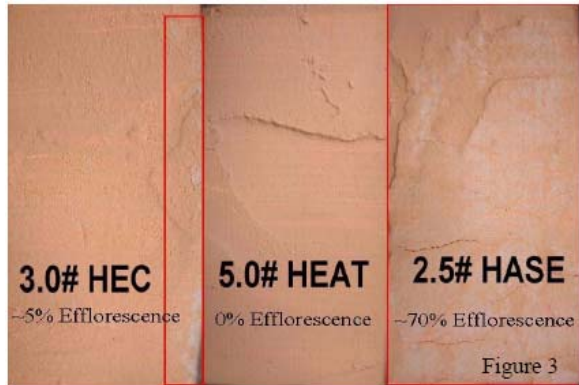


Figure 3

Conclusions:

Whether used alone or in combination with other classes of rheology modifiers, HEAT based associative thickeners provide an established technology platform from which the formulator can effectively improve the barrier properties of their coatings.

Florida Exposure Mildew Rating

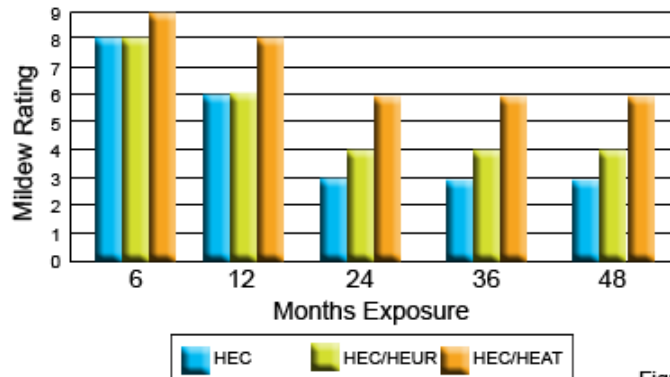


Figure 4

For more information on how Southern Clay Products can assist you, please contact us at (800) 324-2891 or visit us on the internet at www.scprod.com.



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