

Selvol™ Polyvinyl Alcohol as a Carrier for Fluorochemicals in Surface Sizing Paper and Paperboard Applications

Polyvinyl Alcohol Technical Bulletin



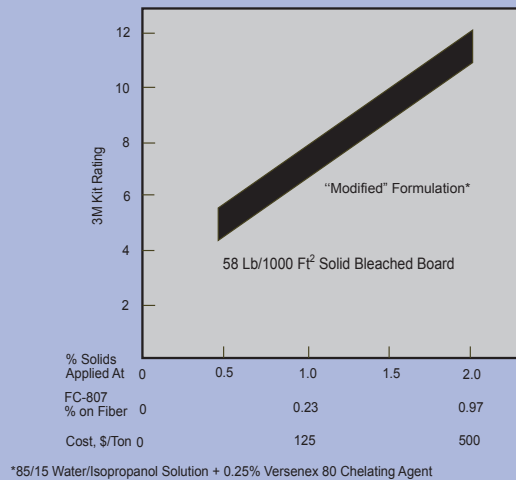
Polyvinyl alcohol (PVOH) is widely known as an effective carrier for fluorochemicals in the manufacture of food grade paper and paperboard products. While fluorochemicals are highly effective at resisting oils and greases, they are also very expensive. Polyvinyl alcohol provides a means of optimizing the performance of fluorochemicals so as to minimize their cost to the papermaker.

Laboratory Studies

Fluorochemicals

Surface sizing studies were conducted on 58-lb/1000-sq ft solid bleached paperboard (SBS) using a laboratory Keegan size press. Scotchban® Protector FC-807 was applied by itself, but diluted to 4.0, 1.0 and 0.5% solids. 3M Kit Rating results were a poor 3.5 at both the 1.0 and the 4.0 percent levels – probably reflecting alum and rosin performance interference. To prevent precipitation at the paperboard surface and to promote penetration of the FC-807, a chelating agent, Versenex 80, was added at 0.25% and a wetting agent, isopropyl alcohol, was added at 15% concentration based on water. The net effect was a significant improvement in performance, but at a very

**Figure 1
Scotchban FC-807 Alone
Cost Effectiveness**



high cost. Figure 1 shows that a surface application of this “modified” FC-807 system at 1.0% solids resulted in a 3M Kit Rating of 7.5, but at a cost of \$125/ton, and that 2.0% solids resulted in the maximum Kit Rating of 12, but at a cost of \$500/ton.

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Polyvinyl Alcohol

Polyvinyl alcohol by itself is very hydrophilic, and as a continuous film, exhibits total barrier properties to oils and greases. On paper and paperboard, however, the add-on level of PVOH is limited by its viscosity to very low percentages based on dry fiber weight. Thus, true barrier properties are never achieved. But even at low add-on levels, PVOH finds use in meeting papermakers' oil resistance needs. When applied to the 58-lb SBS paperboard in this study at 5% solution solids, Selvol 325 PVOH resulted in a 3M Kit Rating of 2.5, at a cost of about \$20/ton.

Polyvinyl Alcohol/ Fluorochemical Blends

When polyvinyl alcohol and the fluorochemical were blended and applied to the SBS paperboard, high 3M Kit Ratings were achieved at a cost much lower than with the fluorochemical by itself. An example is provided in Figure 2. A blend of the two, at 5/0.5 Selvol 165 PVOH/FC-807 (dry/dry), applied at 5.5% solids, resulted in a 3M Kit Rating of 8.5, at only \$35/ton.

Recommendation

Extensive laboratory work has indicated that higher hydrolyzed Selvol PVOH grades perform consistently better than lower hydrolysis grades when used to carry fluorochemicals. The preferred grade is Selvol 125, but any of the grades in Table 1 may be used.

Notes

Cost calculations for fluorochemical treatments were based on quantitative fluorine analysis by Galbraith Laboratories in Knoxville, TN, and by estimating \$25 as the purchase price on the dry basis weight of the fluorochemical.

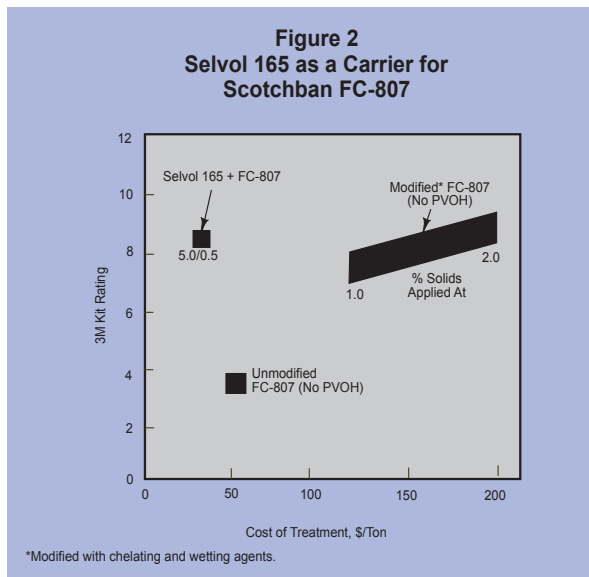


Table 1
Selvol PVOH Typical Properties

Grade	% Hydrolysis	Viscosity, cps @ 20 °C 4% Solution Solids
Selvol 125	99.3+	28-32
Selvol 165	99.3+	62-72
Selvol 325	98.0-98.8	28.5-32.5
Selvol 350	98.0-98.9	62-72

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