



# SELVOL POLYVINYL ALCOHOL AS A CARRIER FOR FLUROCHEMICALS IN SURFACE SIZING PAPER AND PAPERBOARD APPLICATIONS

Selvol 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 papermakers.

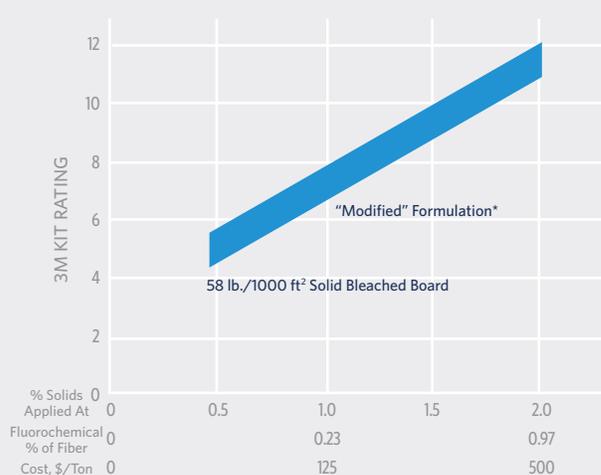
## LABORATORY STUDIES

### Fluorochemicals

Surface sizing studies were conducted on 58-lb/1000-sq ft solid bleached paperboard (SBS) using a laboratory Keegan size press. A fluorochemical was 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 4.0 percent levels - probably reflecting alum and rosin performance interference. To prevent precipitation at the paperboard surface and to promote penetration of the fluorochemical, 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 high cost. Figure 1 shows that a surface application of this "modified" fluorochemical system at 1.0% solids resulted in a 3M Kit Rating of 7.5 at a significantly increased cost per ton, and that 2.0% solids resulted in the maximum Kit Rating of 12 at a dramatically increased cost per ton.



FIGURE 1: Fluorochemicals Alone Cost Effectiveness



\*85/15 Water/Isopropanol Solution + 0.25% Versenex 80 Chelating Agent

### 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, Selvol 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 only 16% the cost per ton of the 1% fluorochemical solids system described in Figure 1.

### 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/fluorochemical (dry/dry), applied at 5.5% solids, resulted in a 3M Kit Rating of 8.5, at only 28% cost per ton of the 1% fluorochemical solids system described in Figure 1.

### 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 done in 1999 by Galbraith Laboratories in Knoxville, TN, and by estimating \$25 as the purchase price on the dry basis weight of the fluorochemical at the time of publish.

FIGURE 2: Selvol 165 as a Carrier for Fluorochemicals

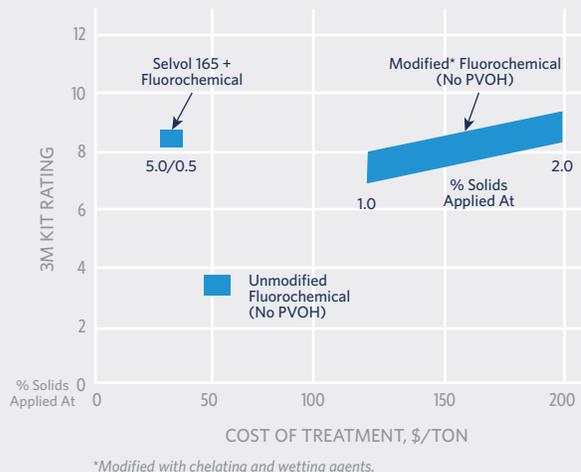


TABLE 1: Selvol PVOH Typical Properties

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



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