# A QUANTITATIVE MODEL FOR THE PREDICTION OF GLOSS RETENTION, COLOR CHANGE, AND CHALKING FOR POLY(VINYLIDENE FLUORIDE)/ACRYLIC BLENDS

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## Abstract

Poly(vinylidene fluoride) (PVDF) resins are the dominant component of some of the most weatherable commercially available decorative coatings. In commercial PVDF-based coatings, the binder system is almost invariably a blend of a PVDF resin, plus a miscible acrylic co-resin, in some proportion. The acrylic resin is used to adjust the balance of properties, as well as to reduce the raw material cost. When very high ratios of PVDF resin are used, the color retention and chalk resistance of PVDF coatings often can be measured in terms of decades. Hence, quantitative service life prediction models for the decorative properties of PVDF coatings are very much needed. We present here, for the first time, a model of this type. The model is based on the “contraction” theory of gloss loss and chalking, coupled with simple assumptions about the photochemical kinetics of the system. It enables the quantitative prediction of the rates of evolution of key decorative properties for PVDF-acrylic blends, relative to those rates for a comparable pure acrylic system. Because different mechanisms account for gloss loss, color change, and chalking, the relative rates of change for each of these properties can be different, in accordance with experimental observations. Differences related to system inhomogeneity, such as latex blend and pigment flocculation effects, can also be accounted for at least in a qualitative fashion. Results for accelerated weathering tests of the model will also be discussed.