MANUFACTURE AND TESTING OF WATER-BORNE PAINTS BY USING VINYL LATEX CONTAINING VeoVa10® MONOMER

A. C. AZNAR† and J. I. AMALVY†,‡,*

† *CIDEPINT, Centro de Investigación y Desarrollo en Tecnologia de Pinturas (CIC-CONICET). Av 52 entre 121 y 122, (1900) La Plata, Argentina.*
jamalvy@quimica.unlp.edu.ar
‡ *INIFTA (Facultad de Ciencias Exactas, Universidad Nacional de La Plata), Diag. 113 y 64 CC 16 Suc. 4 (1900) La Plata, Argentina*
jamalvy@inifta.unlp.edu.ar

***Abstract*— Two different water-borne dispersions (latex) containing different amounts of vinyl acetate and a commercial vinyl ester monomer (VeoVa10) were evaluated by incorporating them in paint formulations for wall protection. Three paint formulations were prepared with different PVC values. The main properties such as hiding power, washability, tension of adhesion, and elasticity were assessed. Changes in color, gloss and adhesion and the extension of chalking, checking, cracking and blistering were also evaluated in normal and accelerated weathering tests. The results indicate that both dispersions are suitable for wall protection (interior or exterior, permanent or temporary protection) and they are compatible with the most common additives used in the Argentinean and Mercosur markets. The presence of VeoVa10 in the binder composition improves the water and UV resistances of the paint. A styrenic-acrylic latex, commonly used in the local market, was used as comparative product.**

***Keywords* — water-borne paints, vinyl binders VeoVa10® latex, wall protection**

I. INTRODUCTION

Latex dispersions for water-based coating formulations with low amount (or zero) of volatile organic compounds (VOCs) are obtained typically from emulsion polymerization. To produce decorative and long lasting films adequate pigments, fillers and additives are added.

With the purpose of obtaining the best coating performance with a good balance of price, it is necessary to add the smallest quantity of binder. Considering that the binder is both the promoter in the adhesion of the film coating to the substrate and the pigment packing and the fillers, a large quantity of binder reduces the hiding power of the coating.

Latex paints are most commonly applied on in- and outdoor masonry substrates. In the first case, the decorative feature is intended to be highlighted (color, gloss, film uniformity), and in the second one the resistance to aggressive agents of the environment against the film coating (UV-radiation, humidity, rain, pollution, high temperature).

Other properties such as hardness, elasticity and adhesion should be suitable enough to last ageing. Polymeric vinyl dispersions have been used for the formulation of water-based coating to be applied on masonry (Flick, 1975). However the slight resistance to water and to UV radiation of the films has limited their use and they have been substituted by acrylic dispersions that posse better resistance properties, but with a higher cost. The introduction of new vinyl compounds has contributed to the development of vinyl dispersions with better properties. In particular a Vinyl ester of Versatic acid known as VeoVa® (Shell Chemicals, 1988), which contains a polimerizable double bond, has been successfully used.

The general chemical formula of the VeoVa is shown in Fig. 1, where R1 and R2 are (branched) alkyl groups.

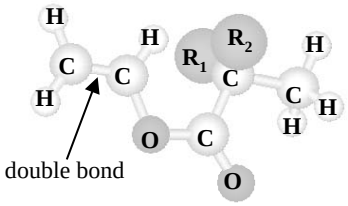

Figure 1: Chemical structure of VeoVa.

According to the total number of carbon atoms three derivatives VeoVa9, VeoVa10 and VeoVa11 are known. In this work dispersions which contain 10 carbon atoms isomers VeoVa10, for which R1+R2 = C_7H_{16} were tested.

The (co)polymerization in emulsion of VeoVa10 with vinyl acetate (VAc) originates vinyl latex that produces films with better water resistance, UV-resistance and alkali resistance which lead to superior durability higher than those produced by pure vinyl latexes (Aten and Vegter, 1970). VeoVa and VAc have similar reactivity in radical polymerization (Resolution Performance Products, 2001) and the random (co)polymerization protects the ester group of VAc from hydrolysis through the so-called "umbrella effect", improving the hydrolytic stability of the polymer (Decocq *et al.*, 1999). This enables such polymers to be successfully used as paint binders on alkaline substrates, such as exterior concrete. The highly branched hydrophobic struc-