PREPARATION OF PHOSPHATE-FUNCTIONAL CORE-SHELL POLYMER LATEXES AND INVESTIGATION INTO THEIR USE IN PROTECTIVE COATINGS

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Due to increasing concerns on the environmental impact of volatile organic compounds (VOCs), there has been a reduction in the use of solvent-borne coatings over the past decade. As a result, the use of low VOC/VOC-free waterborne coatings, or emulsion paints, has increased, especially in the decorative market. Phosphate-containing polymers have been shown to be effective, 'green' corrosion inhibitors in solvent-borne and epoxy coatings.[1, 3] They are able to improve adhesion to metal substrates and corrosion performance.[1, 3] The targeted inclusion of functional groups, such as fluorine and phosphate, in the shell of a core-shell latex dispersion has been achieved using seeded emulsion polymerisation.[4-6] In this poster, the influence of phosphate groups on the water uptake of the free and metal-bound films of a series of poly(styrene-co-butyl acrylate-co-phosphated methacrylate) latexes, prepared via semi-continuous seeded emulsion polymerisation. Latex dispersions with high solid contents (30 wt. %) were prepared with shell thicknesses in the range 25-75 nm and phosphate monomer contents of 0–7 wt. %. All polymerisations exceeded 95 % monomer conversion and final particle diameters were in the range of 189-275 nm. The latex series were cast at 30 °C to ensure good film formation on HDPE (for free films), aluminium or carbon-steel. The film formation of the latexes was confirmed using AFM to observe film structure. These films were subjected to Dynamic Vapour Sorption (DVS) analysis and bulk water uptake to probe the effect of the hydrophilic phosphate groups on the water uptake. Control particles containing methacrylic acid and ß-carboxyethyl acrylate were used as comparison. Although the films are relatively hydrophilic, we intend to determine whether the inclusion of the phosphate functionality has an overall positive impact on the protection imparted by films prepared from these latexes.

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