Effect of Particle Size on Properties of Water-Borne Pressure-Sensitive Adhesives

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Abstract

Growing environment pressures and the advent of increasingly stringent legislation concerning solvent emission have forced the coatings industry to seek the replacement of solvent-borne adhesives by all-solid coatings and/or water-borne coatings [1]. As a consequence, there has been growing interest in, and use of, water-borne pressure-sensitive adhesives (PSAs). Effects of components and their miscibility upon water-borne PSA properties have been studied previously [2-7], but little has been reported on the effect of latex particle size on PSA properties.

This paper reports synthesis of a series of poly[(n-butyl acrylate)-*co*-(acrylic acid)] latexes with different sizes using a semi-batch emulsion polymerisation process. By changing the level of surfactant (Aerosol MA), the z-average particle diameter was varied from 124 nm to 366 nm. The polymerisations proceeded under monomer-starved conditions and values of d_z measured for samples removed during the polymerisations were consistent with theoretical prediction for particle growth without secondary nucleation or coagulation. The gel contents of the polymers were determined by Soxhlet extraction, and their transitional behavior by dynamic mechanical thermal analysis. The performance of the latexes as PSAs was measured according to FINAT Test Methods. The results from 180° peel adhesion and shear resistance testing will be reported and correlated with latex particle size, surfactant level and polymer properties.

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