

A preliminary investigation of coating properties of different ratios of palm: soy oil-based alkyd: epoxy resins

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The purpose of this research was to develop polyalkyds from readily available, low-cost sustainable raw materials by alcoholysis-polyesterification method at lab scale. Palm alkyds has non-self-drying characteristics, therefore 30:70 wt% palm-soy oil blend was polymerized to incorporate more unsaturation into the main alkyd chains. 30:70 wt% palm-soy oil blend was dehydrated with the aim of increasing the degree of unsaturation. The variation of physico-chemical properties of dehydrated oil blend such as acid value, saponification value, iodine value and fatty acid composition were determined. Three types of alkyd resin formulations were developed by varying different parameters such as phthalic anhydride, glycerol and reaction time at 240 °C. Physico-chemico-mechanical properties of the prepared alkyd resins like acid value, viscosity, saponification value, volatile matter, etc. were evaluated. A series of alkyd/epoxy co-blends were prepared with 80:20, 70:30, 60:40 and 50:50 by wt% ratio of alkyd: epoxy with the aim of assessing their coating characteristics. The structural elucidation of raw materials and their copolymer blends was performed using spectroscopic techniques, while coating and drying properties were evaluated by performance tests on application to glass substrates, which have cured either by UV irradiation or baking. The drying time of coatings cured at temperatures varied from 10 to 180 min at 140-180 °C range. All of the epoxy-alkyd coatings were light to dark yellowish in colour. Film properties such as swelling ratio, gel content, water, chemical resistance, wettability, chemical resistivity, pencil hardness and surface morphology were investigated. It could prove that blending has resulted a dramatic improvement in coating characteristics of alkyd resins comparative to virgin alkyds. Further this is green technology and potentially suitable to consume renewable resource materials in surface coatings with the benefit of minimizing petroleum-based materials.

Keywords: palm: soy oil, alkyds, surface coatings, FTIR studies and films

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