584a Fatty Acid Based Monomers for Fire Resistant Vinyl Ester and Unsaturated Polyester Resins

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In this study, a brominated fatty acid based monomer was synthesized to asses its potential to prepare fire resistant polymers with vinyl esters (VE) and unsaturated polyesters (UP). Oleic acid was first brominated to form 9-10 di-bromo stearic acid. The brominated acid was then reacted with glycidyl methacrylate to give 9-10 di-bromo stearic acid glycidyl methacrylate (Di-BrSAGMA). This fatty acid based monomer was used to replace styrene in VE and UP formulations. The brominated fatty acid based monomer exhibited a much higher viscosity compared to the non-brominated analog: oleic acid glycidyl methacrylate (OAGMA) due to the loss of unsaturation and to the polar interactions introduced by the two Br atoms. Thus, 9-10 di-bromo stearic acid glycidyl methacrylate (Di-BrSAGMA) was used in the presence of OAGMA and styrene in VE and UP resins to make the resins more processable. Thermomechanical properties of the polymers were determined via Dynamic Mechanical Analysis (DMA) and the heat resistance of the polymers was determined via Thermal Gravimetric Analysis (TGA). Formulations containing 15-20wt % Di-BrSAGMA- 20-15wt % styrene showed viscosities that are in a processable range and mechanical properties that are in a comparable range with those of the commercial formulations containing only styrene as the comonomer. The Di-BrSAGMA monomer does not only improve the fire resistance of the polymers but also decrease the Volatile Organic Compound (VOC) emission of the resins by replacing styrene with a much less volatile monomer.