

Title:

Synthesis and characterization of moisture cured prepolymer polyurethane films

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Polyurethane prepolymers are a group of materials representing a reactive intermediate between monomeric isocyanates and polyurethane polymers. They are the polycondensation reaction product of a diisocyanate (hard segments) and a material with hydroxyl functionality such as a polyol - glycol of high molecular weight (flexible segments). Most polyols used in polyurethane synthesis are based on polyether, polyester or polycarbonate structures. About isocyanate, its structure determines its reactivity and is known that aliphatic isocyanates are less reactive than aromatic ones.

The properties of these prepolymers and the final products (adhesives, sealants and coatings) can be tuned by selecting suitable polyol and isocyanate components, as well as their molar ratio. When water emulsifiable polymers are intended, anionic monomer dimethylolpropionic acid (DMPA) is incorporated in the chain as internal emulsifier.

The aim of this work was to synthesize and characterize moisture cured polyurethane prepolymers for high gloss coating applications. Desired resin must be emulsifiable in water (for easy cleaning of the reactor and auxiliary equipment) and the respective coating must be transparent, colorless and tack free.

The following parameters were studied: chemical nature and molecular weight of polyol (polyether and polycarbonate, from 400 to 2000 molecular weight), initial molar ratio of isocyanate to hydroxyl groups (NCO/OH ratio from 1.5 to 2.5) and presence or absence of DMPA. The isocyanate used was always isophorone diisocyanate.

The coatings obtained were characterized in terms of thermal stability, Buchholz hardness, scratch resistance, tack, gloss and yellowness index. The results were analysed and related to the expected polymer structures for the different cases. The best performance was obtained for polycarbonate polyol with higher NCO/OH ratio and containing DMPA.