

# SYNTHESIS AND TESTING OF SOY-BASED POLYOLS: PHOSPHATE AND GLYCEROLYSIS OLIGOMERS

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## ABSTRACT

Soy-based polyols are important industrial prepolymeric materials that use renewable resource. They react with isocyanates to produce polyurethanes (PU) and can be produced at costs less than polyols derived from petrochemicals. This project proposes new soy-based polyols with high hydroxy equivalent weights that produce significant reactivity with isocyanate in flexible and rigid polyurethane foams and bioelastomers. Biocatalytic, transesterification and polymerization processes were evaluated to increase equivalent weights and hydroxyl functionality of soy-based polyols used in polyurethane formulations.

Oligomeric soy-based polyols were synthesized using the following chemistries: 1) acidolysis of epoxidized soybean oil with phosphoric acid, 2) glycerol transesterification of bodied soybean oil, 3) ethylene glycol alcoholysis of epoxidized soybean oil, and 4) enzymatic polymerization.

Soy-based polyol products described in this study have physicochemical properties comparable to both commercial triglyceride-based and petroleum-based polyols with relatively significant reactivity with isocyanate to produce polyurethane products that include rigid and flexible polyurethane foams, and bioelastomers.