

POLYURETHANE FOAMS
CONTAINING RENEWABLE CASTOR OIL REPLACEMENT

Rui Xing

Dr. Fu-hung Hsieh, Thesis Supervisor

ABSTRACT

In this project, castor oil was chosen as a renewable biobased polyol in order to replace the nonrenewable petroleum-based polyols. Water-blown rigid foams were made from polyols with different levels of castor oil replacement. For foams without castor oil and with 25% castor oil replacement, the effects of water added content were studied. Another group of foams made from a castor oil/ glycerol mixture were also prepared to investigate the effects of hydroxyl number. With the help of glycerol, rigid polyurethane foams with 80%-95% castor oil replacement were successfully prepared and showed competitive physical properties. Water-blown flexible foams were made from polyols using different levels of castor oil replacement. The influence of cross-linker contents and isocyanate index on flexible foam was studied. Results show that castor oil replacement often leads to a high cross-linking density. With 0.5% necessary cross-linker and low isocyanate index, flexible polyurethane foams with 100% castor oil replacement showed a good recovery property and proved to be a suitable alternative to nonrenewable petroleum-based polyols.