

The Development of Rigid Polyurethane Foam Insulating Panels for the Construction Industry Using Low Cost Polyols Derived from Canola Oil

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Abstract

Conventional polyurethane (PU) foam is produced from the reaction between petroleum derived polyols and isocyanates with other additives to aid foam formation and reactivity. Recently, with the increasing emphasis on issues concerning waste disposal and depletion of non-renewable resources, it would be desirable to replace petroleum-derived ingredients in PU foam formulations. In this work, we have used a novel polyol mixture produced from canola oil via epoxidation. Thus, we have been able to replace about half of the material used in the foam panel with polyol from a renewable resource produced by an inexpensive process emphasizing green chemistry. In this work we explore the differences between the reactions that form PU foams from commercial polyol formulations to those using the canola-derived polyols. We also demonstrate how the properties of PU insulating foams incorporating various levels of renewable materials compare with standard formulations in terms of compressive strength, R-value, closed-cell content, thermal mechanical properties and ease of production. We have found that the overall properties of PU insulation foams prepared from canola-derived polyols are comparable to that of commercial PU foams.