The Development of Canola Oil Based Bio-resins

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Abstract

Thermoset resins are amongst the most commonly used materials in the automotive, construction, and furniture industries where they are used in a wide variety of composite materials ranging from particleboard to glass fibre panels. At present, thermoset resins are mainly produced from petrochemicals. Furthermore, some of the starting materials that are used in their production, such as formaldehyde, are associated with levels of toxicity and potential environmental, health and safety concerns. Bio-based resins made from vegetable oils offer a sustainable alternative to petroleum-based thermoset resins, with overall lower carbon emissions. Our research is focusing on developing viable ways of making them using cost-effective green technology. Here, we describe the development of thermosetting resin systems, initially developed using epoxidized canola oil. We have shown that understanding both the production these epoxides intermediates as well as their further reactions with multifunctional ligands is key to converting oils into thermosets such as epoxy or polyurethane resins. Finally, we evaluate the replacement potential of thermoset resins containing significant renewable content for conventional petroleum-based products.