

ECO-CHALLENGES OF BIO-BASED UNSATURATED RESINS

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ABSTRACT

Unsaturated polyester resins are formed by the polycondensation reaction between acids and diols. The initially liquid resin is converted to a solid by cross-linking reactions. This is done by creating free radicals at unsaturated bonds, which propagate in a chain reaction to other unsaturated bonds in adjacent molecules, linking them in the process. Unsaturated polyester resins (UPRs) have been known for many years. The production of UPRs started in the 1930s. These polymers have been at the center of a real revolution in the industry, because it can provide great performances and a very high flexibility of use.

In recent years, due to the increased environmental pollution levels, research focuses on the production of polymers from renewable monomers, the so-called biobased polymers.

This work was based on the production of UPRs from renewable monomers and additives. Succinic acid can be derived from renewable resources in a biotechnological production process. Because of its chemical structure as linear C4 dicarboxylic acid it can be used as biobased monomer in different polycondensation reactions as polyesters. Succinic acid is a dicarboxylic acid which is a new biobased monomer with a huge market and environmental potential. Nanocellulose is also an environmentally friendly material which can be used as additive in resins, in order to improve their mechanical performance. Nanocellulose is drawing increasing interest for use in environmental remediation technologies due to its numerous unique properties and functionalities.

Succinic acid, ethylene glycol and other unsaturated acids at different ratios were used to prepare unsaturated polyester resins and then nanocellulose was added in them. The physicochemical properties of the prepared resins were examined with ¹H NMR, FTIR, DSC and TGA.

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