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Investigation into the Synthetic Modification of Camphene for the Synthesis of a Renewable Polyacrylamide

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PURPOSE OF THE ABSTRACT

The traditional sources of monomers for polymerisation, crude oil and natural gas, are unsustainable. [1] The resources are finite and the production of fossil fuel based plastics tends to produce more greenhouse gases than the alternative of greener routes to form renewable plastics from biomass. Terpenes and terpenoids are a hydrocarbon rich class of naturally occurring compounds with numerous stereogenic centres [2] that have already been targeted as potential monomers. [3] They are a cheap, abundant and found in many classes of trees and plants including sources in waste or non-competitive streams. [4]

A renewable polyacrylamide has been synthesised from camphene. Camphene can be found naturally or synthesised industrially via the catalytic isomerisation of its more common cousin alpha pinene. Alpha pinene can be sustainably harvested from pine tree sap or extracted from waste materials in the paper making industry.

Isobornyl acrylate has already been studied extensively and manufactured on large scale. However, polyacrylamides can potentially have different interesting properties due to the hydrogen bonding between the repeating units. The monomer was synthesised using the Ritter reaction before free radical polymerisation to form a homopolymer. After optimisation, both the monomer and polymerization have been conducted at large scale and the polymer was tested for potential industrial applications at Croda.

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FIGURES

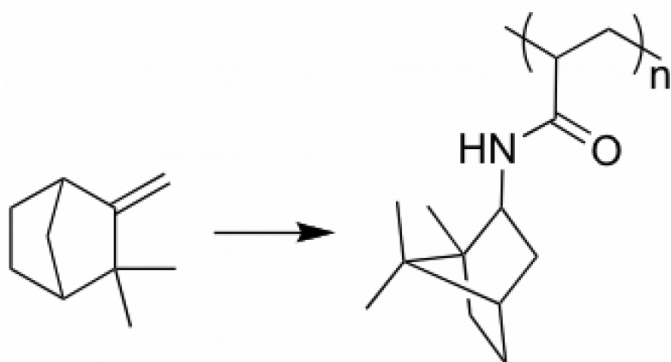


FIGURE 1

Formation of Isobornyl acrylamide from Camphene

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FIGURE 2

KEYWORDS

polymers | renewable | terpenes | sustainable

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