The Effects of Catalysts in the Depolymerization of Chitin Using Ionic Liquids

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Due to the human dependency and current depletion of petroleum, scientists are searching for more environmentally friendly sources to create feedstock chemicals which are then turned into various forms of plastics. This experiment aims to depolymerize fungal chitin into its monomer unit N-acetyl-D-glucosamine (NAG) using Ionic Liquids (IL).When depolymerizing chitin, which ionic liquid catalyst design, will hydrolyze chitin the most efficiently into NAG, a propyl carbon chain (C3SO3H), a butyl carbon chain (C4SO3H), or a hexyl carbon chain (C6SO3H)? The experimenter predicts that changing the alkyl length will affect the percent conversion of the Ganoderma Lucidum chitin into its monomer unit NAG. The ionic liquid 1-butyl-3-methyl imidazolium chloride (C4mim Cl) was used as the solvent. Each catalyst was added to the chitin solution. When depolymerizing chitin, a sample was taken at every five minutes for the first hour and then every fifteen minutes for the second hour. Dilutions were then performed to be analyzed using the UV-Vis Spectrophotometer. Stock solutions were used to produce a linear relationship needed in the calculation of percent conversion from the absorbance of the chitin solution and IL catalyst data. Results show the highest percent conversion of chitin into reducing sugars was the catalyst C3SO3H at t25. The project verifies the use of using IL as a solvent in the depolymerization of chitin as well as showing how the structural changes of to the ionic liquid catalyst, such as alkyl chain length, affects the percent conversion of chitin into its monomer unit N-acetyl-D-glucosamine (NAG). This opens up the scientific community to the study of chitin and its use of ionic liquids as a “green” solution in the production of plastics.

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