Cellulose Dissolution and Hydrolysis in Acidic Ionic Liquids

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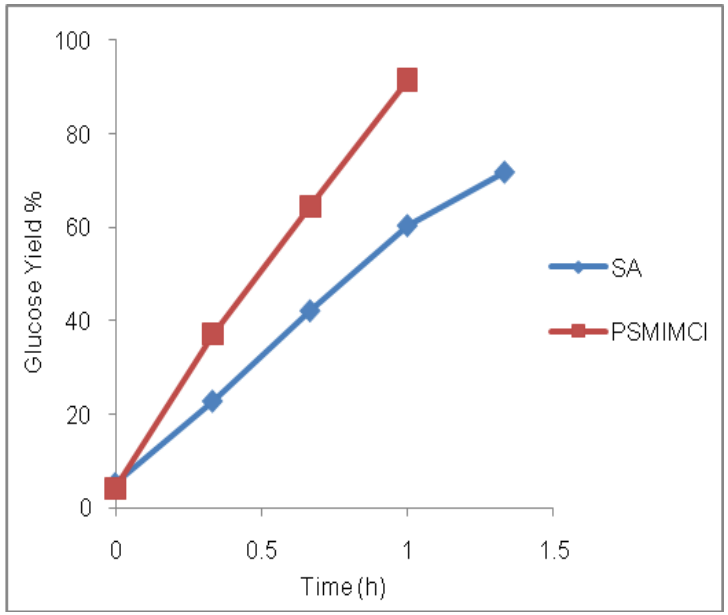
Brönsted acidic ionic liquid 1-(1propylsulfonic) -3-methylimidazolium chloride (PSMIMCl) shows a higher catalytic activity than sulfuric acid in the hydrolysis of cellulose model compound D-cellobiose to D-glucose in water at 90-120 °C. This catalytic activity enhancement is more significant at higher temperatures, and at 120°C, PSMIMCl produced 64.5% glucose yield, whereas H_2SO_4 produced only 42.2% after 40 min. reaction, and this is a 52.8% enhancement of catalytic activity due to the alkylimidazolium group attached to the sulfonic acid group. ^{1}H NMR Monitoring of the D-cellobiose hydrolysis in PSMIMCl and sulfuric acid mediums failed to reveal intermediates in the hydrolysis reaction and this is probably due to rapid conversion of the intermediate(s) to a mixture of D-glucose anomers with $\alpha : \beta \approx 1: 1.6$



Change in percent yields of glucose produced during the hydrolysis of D-cellobiose in aqueous 1-(1-propylsulfonic)-3-methylimidazolium chloride (PSMIMCl), and H_2SO_4 (SA) mediums at 120 °C. 30.0 mg of D-cellobiose in 10.0 mL of 0.0321 mol H^+/L acid mediums were used in all experiments. Average of triplicate experiments.