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Quaternized γ-Fe_2O_3@cellulose ionomer: An efficient recyclable catalyst for Michael-type addition reaction

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Abstract

Owe to unique advantages of heterogeneous catalytic reactions, there is increasing interest to use this type of chemical transformations in organic synthesis. Among various heterogeneous catalytic systems, magnetic supported ionic liquids are emerging ones in the chemical synthesis. As a result, this research focuses on developing an efficient magnetically recyclable catalytic system for Michael-type addition reaction based on quaternized γ-Fe_2O_3@cellulose ionomer. Core-shell structured magnetite cellulose nanosphere was synthesized by one step precipitation route and further modified with epichlorohydrin and hexamethylenetetramine. Anion exchange reaction was performed with polytungstophosphate. Synthesized nanocatalyst was characterized with FESEM, FTIR, VSM, EDX and TEM techniques. Vinyl pyridine and three types of functional groups i.e., hydroxyl, thiol, and amine were employed to evaluate the catalyst performance. Results showed that the addition reaction promoted up to 95% within 2h reaction time at moderate temperature (50°C) moreover the nanocatalyst showed good recyclability after three catalytic run as the reaction efficiency was more than 80% at the end of the third cycle which confirmed high efficiency of the presented system as a green heterogeneous catalyst to synthesis intermediate organic compounds.

Keywords: Cellulose, Ionomer, Michael-type addition.