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Abstract

In this survey, ultrasonic irradiation was used as a source of energy and a mild method for producing 5-hydroxymethylfurfural (5-HMF) from fructose in the presence of SBA-15 grafted with different amount of alumina at room temperature. Effect of different parameters such as the power of ultrasonic irradiation, alumina loading on SBA-15, catalyst amount, reaction time, and solvent was investigated. Catalysts were characterized using different techniques such as FT-IR, XRD, BET, SEM, TEM, EDX, elemental mapping and ICP analysis. While dehydration reaction at room temperature gave <5% 5-HMF after 48 h, after 150 min sonication under the power of 300 W the HMF yield reached to 47 % at room temperature. The effect of various solvents such as DMSO, NMP, DMF and sulfolane was investigated and DMSO was selected as suitable solvent for dehydration of fructose. Finally, the reusability of catalyst was examined and it was found that the recovered catalyst showed high activity in repeated experiments.

Keywords: Ultrasonic irradiation, 5-hydroxymethylfurfural (HMF), dehydration of fructose, modified SBA-15.

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