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**Dehydration of fructose and glucose to 5-hydroxymethylfurfural over Al-KCC-1 silica**

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**Abstract**

In this research, the influence of several factors such as reaction time, catalyst weight, temperature and different solvents on dehydration reaction of fructose and glucose to 5-hydroxymethylfurfural (HMF) was surveyed. Nanosphere Al-KCC-1 silica with fibrous morphology was manufactured and used as proficient and recyclable catalyst for this reaction. SEM, TEM, BET, XRD, EDX, elemental mapping, ICP and FT-IR spectroscopy methods were applied for characterization of the Al-KCC-1 (molar ratio Si/Al=5, 40) catalysts. 162 °C and 1 h are the best conditions for the fructose dehydration. Under this situation HMF yield and selectivity are 92.9% and 94.5% respectively and fructose conversion is 98.4%. Also 170 °C and 2 h are the best conditions for the glucose dehydration. In this situation HMF yield and selectivity are 39.0% and 39.9% respectively and glucose conversion is 97.8%.

**Keywords:** Glucose; Fructose; HMF production; Al-KCC-1; Dehydration of carbohydrates**\* Corresponding author.** Tel: +983133913256, Fax: +9833912350; E-mail: anajafi@cc.iut.ac.ir;

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**1. Introduction**

Today most of the chemical reactions are driven by heterogeneous catalysts. Some issues like easy separation of products, reusability of catalyst and no corrosion of equipment make heterogeneous catalysts more appropriate and cost-effective than homogenous catalysts [1–3]. The mesoporosity is advantageous when reactant and product molecules are large. Silica mesoporous materials with high

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