Kinetic study of ethanol dry reforming using lanthanum copper perovskite

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ABSTRACT
This paper reports the syngas production from ethanol dry reforming reaction for a greener and sustainable process. The aims were to delineate the effect of lanthanum-copper-based perovskite catalyst on the kinetics of the reaction at the temperatures spanning from 725 to 800 °C. The citric sol–gel method was employed to prepare the catalysts by using lanthanum and copper nitrate salts by mixing them based on equal mass of the metals in the desired perovskite structure. The reactions were tested in a tubular reactor using 0.1 of g catalyst between 125 and 160 µm of particle size, which was reduced in-situ by using hydrogen before the reaction. The reactants were mixed in a few carbon dioxide to ethanol molar ratios from 2.5 to 1 and entered the reactor at 1.43 min of space time under atmospheric pressure to ensure the negligibility of mass transport hindrance. At steady states, the products were sampled and analysed in a GC-TCD. The parameters of power law were obtained from reactant consumption against various feedstock flows with $R^2 > 96\%$ based on differential reactor method. 44.2 kJ /mol of activation energy and other rate constants were obtained.

KEYWORDS
Perovskite; Hydrogen; Kinetics; Ethanol; Dry reforming

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