ABSTRACT

WASTE BIOMASS DERIVED CATALYST FOR BIODIESEL PRODUCTION FROM WASTE COOKING OIL

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Biodiesel has become more attractive recently because of its environmental benefits and the fact that it is made from renewable resources. Chemically biodiesel is fatty acid methyl ester (FAME).It is produced by transesterification of triglycerides with alcohol in the presence of a catalyst. Homogeneous and heterogeneous types of catalyst are used for transesterification. The most notable catalyst used in producing biodiesel is the homogeneous alkaline catalyst such as NaOH, KOH. However because of various difficulties associated with the use of homogeneous alkaline catalyst, the use of heterogeneous catalyst has gained popularity in recent years. Among the various heterogeneous catalysts, the most effective metal oxide was reported to be calcium oxide which was due to its easy availability, cheapness, low toxicity and high catalytic activity. Recently researchers have introduced a novel method of preparing CaO from waste egg shells and used it for biodiesel production. Based on these findings, we have undertaken the study for the preparation of solid catalyst from the waste chicken egg shells. Parent catalyst from waste egg shells (ECaO) was prepared using solid state reaction routes and then the parent catalyst was modified by doping with Strontium (Sr) from (1-3)wt% via wet impregnation method. Three catalyst were prepared namely- ESr1 (1% Sr doped), ESr2 (2% Sr doped), ESr3 (3% Sr doped). Characterization of the prepared catalysts was carried out by X-ray diffraction (XRD), Scanning electron microscope (SEM), Energy dispersive X-ray (EDX) and Fourier transform infrared spectrometer (FT-IR). The effects of the molar ratio of methanol to oil, reaction temperature, catalyst amount, reaction time were investigated. The experimental results showed that a 9:1 molar ratio of methanol to oil, addition of 3 wt% of catalyst, 70 °C reaction temperature gave the best results, and the biodiesel yield exceeded 97% at 4 h.When transesterification was carried out by employing the above reaction conditions, conversion of 78% was obtained for 1 % doping, while that for 2% and 3% Sr doping there is complete conversion of the methyl ester hence 2% loading is assumed to be optimum loading.

Keywords: *Biodiesel; Homogeneous; Heterogeneous; Transesterification; Catalyst.*