Biodiesel Production Using Heterogeneous Nanoparticles (CO doped ZnO) and Sunflower Oil [†]

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Abstract: Biodiesel – Fatty Acid Methyl Ester (FAME) is the green fuel used as a blend in petroleum fuel. National Policy of biofuel 2018 aims to blend 5% of biodiesel in a diesel by 2030 in India. The biodiesel can be produced with the transesterification of triglycerides and methanol using catalysts with byproduct glycerol. In this catalytic reaction, catalysts play a most significant role in biodiesel production. The nanosized particles have a large surface area, high activity, selectivity, and reusability. In this study, the Co-doped ZnO and Sunflower oil are used to produce biodiesel. The sunflower has a very low acid value, so it is very feasible to convert it into biodiesel. Cobalt (Co) doped ZnO nanoparticles have a high basic nature, which is useful for converting oil to biodiesel. The nanoparticles are in a round shape agglomeration state with an average size of ~75 nm. The optimum conditions for biodiesel from sunflower oil using Co-doped ZnO are 65 ^{0}C temperature, 90 minutes, Catalysts loading of 0.2wt%, and 700 rpm with 99% conversion. The reusability of catalysts is up to the 4th cycle with 50% conversion. The process is economically viable; easy catalysts separation and reusability with high conversion make the process commercially viable.

Keywords: biodiesel; transesterification; nanoparticles.

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Conflicts of Interest

The authors declare no conflict of interest.