PROJECT REPORT ON

REDUCTION OF FREE FATTY ACIDS IN KARANJA OIL USING SOLID CATALYSTS UNDER MICROWAVE IRRADIATION

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ABSTRACT

Biodiesel, an alternative diesel fuel, is usually produced from food-grade vegetable oils using transesterification process. Non edible oils are the potential feedstocks due to its low cost. But this oil contains high amount of free fatty acids that tends to form soap during transesterification process. The objective of this work is to reduce free fatty acids from non-edible oil using solid catalysts under microwave irradiation. The objective also includes parametric studies and optimization of parameters to obtain oil with low free acids.

This report discusses an experimental investigation to reduce the free fatty acid from Karanja oil (*Pongamia pinnata)* under microwave irradiation using heterogenous solid catalyst calcium oxide. A domestic microwave oven which was suitably modified is used in the current work to carry out the experiments. Different parameters like microwave power, catalyst type, catalyst concentration, agitation speed were studied to reduce free fatty acid content of oil.A four factor-five level central composite rotatable design was used to obtain the optimum values for the process parameters.

Acid catalysts Indion, Amberlyst and base catalyst Calcium oxide (CaO) were tested for reduction of FFA under microwave irradiation. CaO was found to reduce FFA to a greater extent than the other two. The experiments were conducted by varying parameters to study their effects over reduction of FFA. The parameters were optimized; at microwave power of 140 W, 2 min irradiation time, 12 wt% calcium oxide concentration and 40.6 wt% methanol concentration FFA content was found to reduce from 5% to 1±0.1%.