

Development and Characterization of Bio-Mix Fuel produced from the Mixture of Waste Chicken Fat, Used Cooking Oil and Its Impact on CI Engine Application

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Abstract

In India, food industries are growing fast day by day. The wastage coming out from these industries like meat waste and used cooking oil are nearly 4.9 million tons/year. Due to the lag of waste management, these wastes have been dumped in landfills which increase environmental pollution and health problem for human as well as animals. To solve this problem, an attention has been made to develop a renewable catalyst from egg shell which is a poultry waste product for the production of biodiesel. Fourier transform-infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) were used to characterize the synthesized catalyst. For biodiesel production, chicken fat and waste cooking oil were used. The chicken fat was extracted from the waste poultry meat and used cooking oil was taken from the college canteen. These chicken fat and waste cooking oil were mixed together to form a raw bio-mix oil. This raw bio-mix oil was converted to bio-mix methyl ester through the transesterification reaction. The reaction parameters like methanol/oil ratio, catalyst and reaction time were investigated. Two samples of bio-mix biodiesel (BMB-I and BMB-II) were prepared, BMB-I from the developed catalyst and BMB-II from the base catalyst (KOH). Furthermore, fuel properties were investigated and found to be within the standard values. Engine study shows that both bio-mix biodiesel samples (BMB-I, BMB-II) have higher brake specific fuel consumption (BSFC) and lower brake thermal efficiency (BTE) as compared to diesel fuel. Exhaust emissions like NO_x, CO, CO₂, HC and smoke were found to be lower for BME-I as compared to BMB-II and diesel fuel respectively. Thus the catalyst developed in this study was found to be cost effective and low toxic for biodiesel production.