
RESEARCH PAPER

Biodiesel production from cotton seed oil using alkali catalyst and its characterization

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Biodiesel production has received considerable attention in the past as a biodegradable and non-polluting fuel. The production of biodiesel by transesterification process employing alkali catalyst has been widely accepted for its high conversion and reaction rates. In India, edible oils like sunflower, mustard, palm, cotton seed oil, groundnut oil etc., are available in abundance, which can be converted to biodiesel. In the present study, biodiesel has been prepared from cotton seed oil. As the acid value is less than two, it is easily converted to biodiesel by transesterification process. The experimental work revealed the suitability of sodium hydroxide / potassium hydroxide and methanol as solvent for maximum methanolysis at 60-70°C in 45 minutes. Properties of biodiesel are in concordance with international standards.

Key words : Biodiesel, Cotton seed oil, Transesterification, Renewable energy

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INTRODUCTION

Biodiesel, an alternative diesel fuel, is made from renewable biological sources such as vegetable oils and animal fats. Its biodegradable and non-toxic, has low emission profiles and so it is environmentally beneficial. Vegetables oils are potentially in exhaustible source of energy with an energetic content close to diesel fuel. The vegetable oil fuels were not acceptable because they were more expensive than petroleum fuels. However, with recent increases in petroleum prices and uncertainties concerning petroleum availability, there is a renewed interest in vegetable oil fuels for diesel engines.

Biodiesel is alkyl esters made from the transesterification of both vegetable oil and animal fats which are chemically triglycerides in which three fatty groups are ester bonded to one glycerol molecule. Transesterification is the process of reacting triglyceride of the vegetable oils with solvents such as butanol, ethanol and methanol in the presence of catalyst *viz.*, sodium hydroxide / potassium hydroxide to produce fatty acid methyl esters and glycerol. There is a decrease in viscosity and improvement in fuel properties of the product fatty acid alkyl esters through the process of transesterification.

Biodiesel can be used in the pure form or as blends on conventional petrodiesel in automobiles without any major modifications. This paper deals with preparation of alkali catalyzed methyl ester from cotton seed oil and its properties to ascertain its suitability as biodiesel.

RESEARCH METHODOLOGY

Transesterification process:

Transesterification of cotton seed oil to obtain biodiesel consist in replacing the glycerol of triglycerides with a short chain alcohol in the presence of a catalyst. In this method, according to the free acids present in oil, the amount of catalyst was selected. The catalyst (sodium hydroxide / potassium hydroxide-1g) was dissolved in 45ml of alcohol (Methanol/ Ethanol/ Butanol/ Isopropyl alcohol) under low temperature using 100ml of oil. In this process glycerol and methyl esters (biodiesel) are obtained and separated in two different immiscible phases, distributing amongst them an excess of added alcohol and catalyst.

Optimization of process parameters:

From the alkali catalyst thus identified, the optimum quantity required for maximum yield of biodiesel was found