PRODUCTION OF BIODIESEL FROM EGYPTIAN JOJOBA OIL

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SUMMARY

The demand for energy around the world is increasing; specifically the demand for petroleum fuels that is rapidly becoming scarcer and more expensive. The scientific community has forced to investigate new type of renewable energy sources, mainly due to the greenhouse effect brought about by the growing usage of fossil energies and thus to increase the time over which fossil fuels will still be available. Biodiesel has become more attractive because of its environmental benefits and it is obtained from renewable resources. Chemically biodiesel is mono alkyl esters of long chain fatty acids derived from renewable feed stock like edible oils and non edible oils. There is a growing interest in using Egyptian jojoba oil (non-edible oil) as the feedstock for biodiesel production .This study discuss the production of biodiesel from Egyptian jojoba oil by transesterification with methanol in presence of an alkaline catalyst (KOH) to give the corresponding mono alkyl esters. The variables affecting the yield of the biodiesel produced were studied. The variables investigated were reaction time (0.5–3.5 hr), catalyst concentration (0.3–2 wt.%), temperature (20-65°C) and methanol: oil molar ratio (3:1–10:1). From the results obtained, the highest yield percentage was obtained using a methanol:oil molar ratio of 6:1, KOH as catalyst (0.5%) and 60±1°C temperature for 3 hrs. The actual yield of biodiesel was determined according to GC-MS. Also, it was found that both n-propanol and n-butanol gave actual yield less than methanol. From the results it was clear that the produced biodiesel fuel satisfied the recommended standards range of biodiesel fuel. Numerical correlation using regression analysis for the actual yield of biodiesel produced in terms of the operating conditions of the transesterification process was presented.

Also, measurements of chemical and physical properties for Egyptian jojoba and petro diesel oil blending in different ratios with diesel fuel (B10, B20 and B100) have been carried out. The results indicated a good potential for using biodiesel produced from Egyptian jojoba oil as an alternative for diesel engine fuel. B100 has a higher viscosity when compared to pure petro diesel fuel (B10 and B20). B10 and B20 have flash point higher than pure petro diesel fuel. B100 do not contain any sulfur thus it protects the engine parts, decrease the acidic pollution. Due to blending process the sulphur content decreases. The water content in B100, B10 and B20 is lower than the pure petro diesel fuel. The calorific value in B100, B10 and B20 is higher than that of pure petro diesel fuel which reduces the output power of the engine. B10 is the recommended blending ratio due to lower viscosity which helps in fuel injection and atomization inside the engine and its properties near to pure petro diesel fuel and in some cases better. Also, reduces the emissions except NO_x which is increased like all biodiesel fuels.