



Assessment of Biodiesel Derived from Waste Cooking Oil as an Alternative Fuel for Diesel Engines

Ferial Zaher^{1*}, M.S.Gad²

¹Fats and Oils Department, Food Industry and Nutrition Division, National Research Centre, 33 EL Bohouth St., Dokki, Giza, Egypt, P.O.12622.

²Mechanical Engineering Department, Engineering Research Division, National Research Centre, 33 EL Bohouth st., Dokki, Giza, Egypt, P.O.12622.

Abstract: Biodiesel has a vital role in recent years as an alternative fuel for diesel engines. In this study, biodiesel was produced from waste cooking oil by transesterification process with methyl alcohol in presence of sodium hydroxide as a catalyst and then was assessed as a fuel. This assessment has been made in view of its fuel properties as well as the performance characteristics of a diesel engine running using biodiesel or its blends with regular diesel fuel. The fuel properties considered were the flash point, pour point, calorific value, viscosity, cetane number, carbon residue, ash and sulfur percentages. The results have shown that the properties of the prepared biodiesel were in good agreement with the Egyptian standard specifications of diesel fuel. Moreover, it was advantageous over petrol diesel as the percentages of sulfur, ash and carbon residues were zeros. On the other hand, the performance of a diesel engine was evaluated in terms of the specific fuel consumption, thermal efficiency, exhaust gas temperature and air- fuel ratio when running using biodiesel or its blends with regular diesel fuels as compared to diesel fuel. The engine used was a four stroke single cylinder diesel engine which was run at a constant speed of 1500 rpm and at a variable engine loads. The engine test was made using biodiesel, diesel and blends of them containing 25, 50 and 75 % by volume. The results have shown that the thermal efficiency of the engine can be improved by blending biodiesel with regular diesel at 50% level. However, the use of pure biodiesel or its blends with regular diesel at percentages lower or higher than 50% will cause a reduction in the engine thermal efficiency.

Keywords: Waste Cooking Oil; Biodiesel; Diesel Fuel; Diesel engine; Performance.