

Improvement of low-quality diesel through the use of biodiesel

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ABSTRACT

The transportation of petroleum diesel, petrol and jet fuel using the same pipeline lead to the formation of an off-specification product known as the interface. The interface cannot be used on its own as it does not meet the quality specifications. It should be blended with a product of higher quality. Failure to blend the interface results in loss of the product and costs will arise that are associated with its disposal. In this paper, the authors examine the use of jatropha biodiesel to improve the quality of the interface. The tests were performed using the American Society for Testing and Materials (ASTM) methods. Jatropha biodiesel was used since it is being produced locally. Blending ratios of 3%, 5% and 7% interface were used and the biodiesel was found to have average flash point values of 138 °C, 135 °C and 132 °C respectively. These values are greater than 130 °C which is the minimum expected value. The sulphur content and acid number improved indicating that biodiesel can be effectively used to improve the quality of petroleum diesel.

Keywords: biodiesel, off-specifications, interface, blending, petroleum diesel, flash point

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1.0 INTRODUCTION

A multipurpose pipeline is used to transport petroleum-based fuels from one point to another. These products are petrol, diesel and jet fuel. As a result, a mixture of two products called an interface is produced when the products mix. The interface does not meet the specifications hence cannot be used on its own. The interface should be blended with a better quality product to meet the required standards. The blending process is usually delayed since it depends on the availability of higher quality diesel. As a result, the interface increases to millions of liters thus affecting the fuel supply, where less fuel than intended is available to the market, leading to fuel shortages.

According to the National Oil Infrastructure Company of Zimbabwe (NOIC), (2013) diesel with a minimum flash point of 57 °C is accepted in Zimbabwe. Other countries including Zambia, the Democratic Republic of Congo and Tanzania pegged their minimum flash point at values

greater than 57 °C. Furthermore, the interface product has flash point values lower than 57 °C and does not meet the specification of diesel. Since some of these countries get their fuel through Zimbabwe, they sometimes wait for a longer period to get the fuel that best suits their specifications. This does not only affect business relations but can also lead to fuel shortages in these countries.

Zimbabwe is currently facing fuel challenges, as a result, the fuel is mostly available at the illegal markets where it is overcharged. There is also a noticeable price increase in petroleum-based fuels. From January 2019 to date, diesel prices have been increasing. The economy is greatly affected as every business is linked to fuel prices. An increase in fuel prices leads to an increase in the transport cost, thus affecting the prices of goods and services. Power grid electricity is affected by load shedding and many companies are losing production time. Some of the companies rely on diesel as an alternative source of fuel, but this is hindered by diesel shortages.