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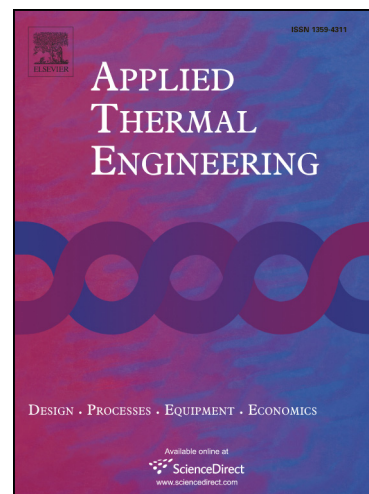
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## Effect of Blending Waste Tyre Derived Fuel on Oxidation Stability of Biodiesel and Performance and Emission Studies of a Diesel Engine

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### Abstract:

The oxidation stability of biodiesel plays an important role for its long term storage. Although it is possible to obtain the required oxidation stability of any biodiesel by using synthetic antioxidants, it will at the same time increase the cost of the resultant fuel as antioxidants are expensive. The phenolic compounds present in the pyrolysis oil may act as natural antioxidants to biodiesel. Tyre pyrolysis oil (TPO) derived from waste automobile tyres through pyrolysis contains few phenolic compounds. Therefore, in this investigation, an attempt was made to analyse the influence of blending different amounts of TPO with jatropha methyl ester (JME) on the oxidation stability of the blend. For this purpose, 20%, 40% and 60% (on volume basis) of TPO were blended with the JME and designated as JMETPOXX blend where XX indicates the percentage of TPO. This work reveals that blending TPO with JME, there is significant improvement in the oxidation stability of JMETPO blends. **The JME exhibited oxidation stability of 3.28 h while for JMETPO20, JMETPO40 and JMETPO60 the value of oxidation stability was 8.2, 13.6, and 16.7 h respectively.** In addition to this, an experimental investigation was also carried out by using the JMETPO20 blend, to evaluate the behaviour of the diesel engine run on the biodiesel blend, with and without synthetic antioxidants. **The addition of antioxidants tert-butyl hydroquinone (TBHQ), pyrogallol (PY) and propyl gallate (PG) to the JMETPO20 blend resulted in a mean reduction in brake specific energy consumption by about 2.3%, 7% and 5.4% respectively at full load compared to that of JMETPO20 blend without antioxidant.** Based on the experimental findings, this study suggests that blending 20% TPO with 80% JME can reduce dosage of antioxidant by about 50%.

**Keywords:** Biodiesel; Diesel Engine; Oxidation Stability; Performance; Tyre Pyrolysis Oil

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