

Effect of BHA and BHT antioxidant additives on engine performance and emission of a CI engine fueled with palm oil methyl ester-diesel fuel blend

Mohd Hafiz Ali¹, Adam Abdullah^{2}, Mohd Hafizil Mohd Yasin¹*

¹Department of Mechanical Engineering, Politeknik Kota Kinabalu, 88460 Kota Kinabalu, Sabah, Malaysia adam@ump.edu.my

²Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia

ABSTRACT

Biodiesel usage in a diesel engine is widely used to substitute the mineral diesel that many studies achieved in lessen the engine emission to the environment. An experimental study has been carried out to investigate the effect of antioxidant on engine performance and exhaust emission of a CI engine fueled with B20 (20 vol% palm oil methyl ester (POME) and 80 vol.% diesel fuel (DF) blend). The two synthetic antioxidants namely, butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) were tested on a Yanmar TF-120M single cylinder diesel engine at a constant engine speed of 1800 rpm with various engine loads. According to engine performance test results, brake specific fuel consumption (BSFC) of B20 with antioxidants were decreased compared to B20 without antioxidants. BHT was optimal as BSFC mean values were considerably reduced by 13.36% and brake mean efficiency (BTE) mean values were increased by 16.27% in the all engine loads when compared to B20. BHA antioxidant with B20 shows mean reduction of nitrogen oxides (NO_x) by 49.69%. However, the formation of carbon monoxide (CO) emissions and hydrocarbon (HC) were increased with the addition of both antioxidants to B20. Overall results show that the B20 blends with BHA or BHT antioxidant can be used in diesel engines without any modifications.

Keywords: Diesel engine, biodiesel, performance, emissions, antioxidant.