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The effects of the fuel injection pressure on the performance and emission characteristics of a diesel engine fuelled with waste cooking oil biodiesel-diesel blends

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1 **The effects of the fuel injection pressure on the performance and emission**  
2 **characteristics of a diesel engine fuelled with waste cooking oil biodiesel-diesel**  
3 **blends**

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10 **Abstract**

11 In this study, the effect of fuel injection pressure on the performance and emission  
12 characteristics of a diesel engine fuelled with waste cooking oil biodiesel (WCOB) and its 5-30%  
13 (v/v) blends with diesel fuel were investigated and compared with diesel fuel. The engine  
14 experiments were conducted under six different fuel injection pressures (170-220 bars), eleven  
15 different engine speeds (1000-3000 rpm), and full load to find the optimum pressure which gives  
16 best results is identified for each fuel. The results compared with diesel fuel showed that biodiesel  
17 fuels confirmed that the reductions in the engine torque, brake power, CO, UHC, and smoke  
18 opacity; however brake specific fuel consumption, exhaust gas temperature, NO<sub>x</sub> and CO<sub>2</sub>  
19 emissions increased. On the other hand, the increased injection pressure caused to increase in the  
20 engine torques, brake powers, and brake thermal efficiencies up to 210 bar. Moreover, the increased  
21 injection pressure caused to decrease in UHC, and smoke opacity, while the increase NO<sub>x</sub> and CO<sub>2</sub>  
22 emissions. The results indicated that fuel blends can be used in the diesel engine without any  
23 modification. When over all the results were evaluated, the optimum fuel injection pressure was  
24 found to be at 210 bar for WCOB and fuel blends.

25 **Keywords:** Waste cooking oil, biodiesel, engine performance, exhaust emission, fuel injection  
26 pressure

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