

## **Performance and exhaust emissions of a diesel engine using diesel nanoemulsions as alternative fuels**

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**Egyptian journal of petroleum, Vol. 28, pp.197-204, 2019.**

### **Abstract**

The aim of this paper is to investigate the effect of water-in-diesel fuel nanoemulsions on diesel engine performance and exhaust emissions of a single cylinder diesel engine at different engine loads. Emulsified diesel fuel was prepared by mixing diesel fuel with surfactant in the percentage of 4, 6, 8 and 10 wt% of the emulsion total weight. Emulsified diesel oils with varying content of water and surfactant concentrations were prepared via the batch method technique. Different concentrations of water as 5, 6 and 7 wt% was gradually added. Effect of water content and surfactant concentration on engine performance parameters and exhaust emissions were investigated. From the obtained results, specific fuel consumptions for water diesel emulsions were reduced by 8% compared to pure diesel fuel at 4 wt% surfactant concentration, 7 wt% water content and engine load of 1 kW. Furthermore, the lowest HC, CO and NO<sub>x</sub> emissions value of 66, 48 and 32%, respectively were obtained in case of using 6 wt% of surfactant concentration, 7% water content and engine load of 1 kW. The prepared emulsified diesel fuel achieved a higher engine performance and lower exhaust emissions compared to neat diesel fuel.