

Experimental Analysis of SI Engine Performance and Emission Characteristics with Gasoline-Denatured Spirit Blends as Alternative Fuels

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Abstract

The experimental study focused on investigating benefits of unleaded gasoline (P100) – denatured spirit [DNS (ethanol 93.3% v/v + water 6.7% v/v)] blends as fuel in a four cylinder four stroke SI engine. Performance tests were conducted to study volumetric efficiency (VolE), brake thermal efficiency (BThE), brake power (BP), engine torque (torque), brake specific fuel consumption (BSFC). Engine exhaust emissions were investigated for carbon monoxide (CO), hydrocarbons (HC), oxides of nitrogen (NO_x) and carbon dioxide (CO₂). Experiments were conducted at different engine speeds between 2500 - 4500 rpm maintaining throttle position of 50% throughout the experiments. The fuel blends used include DNS30P70 (ethanol 28 % + water 2% + gasoline 70 %), DNS50P50 (ethanol 46.65 % + water 3.35 % + gasoline 50 %) and DNS85P15 (ethanol 79.3 % + water 5.7 % + gasoline 15 %) which were compared with base fuel P100. The investigations revealed that blending DNS with P100 increases BThE, VolE, BP, torque and BSFC. The CO, HC, NO_x and CO₂ emissions in the exhaust decrease when compared to P100 operation. The DNS85P15 blend produced encouraging results in improved engine performance and decreased engine exhaust emission.

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