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EFFECT OF HYDROGEN ADDITION ON EXHAUST EMISSIONS AND PERFORMANCE OF A SPARK IGNITION ENGINE

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Abstract

The use of hydrogen in spark ignition engines as a supplementary fuel can enhance combustion and reduce toxic emissions. Difficulties in hydrogen storage and production limit its use in internal combustion engines. This paper investigates the performance of a spark ignition engine with the addition of a mixture of hydrogen (H_2) and oxygen (O_2) into the intake manifold. Hydrogen is produced by an alkaline electrolyser and consumed simultaneously to eliminate the need for a storage device. Flow rates of 0 and 10 L/min H_2-O_2 mixture were introduced into the manifold. No flow, or 0 L/min, refers to the case without hydrogen, and 10 L/min represents the case with hydrogen. Brake torque, fuel consumption, nitrogen oxides, carbon monoxide, and total unburned hydrocarbons were measured. The results show that brake power, brake torque, and nitrogen oxide emissions increased with the addition of H_2-O_2, while total unburned hydrocarbons, carbon monoxide emissions, and brake-specific energy consumption decreased.

Key words: electrolysis, hydrogen fuel, spark ignition engine

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