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Preparation and characterization of pyrolytic oil through pyrolysis of neem seed and study of performance, combustion and emission characteristics in CI engine

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Abstract

This paper deals with production of pyrolytic oil from neem seed and using this pyrolytic oil in the form of blend with fossil diesel to study the performance and emission characteristics in CI engine. Thermal and catalytic pyrolysis of non edible neem seed was performed in a slow fixed bed pyrolyser to produce pyrolytic oil. Maximum pyrolytic oil obtained in thermal pyrolysis was 55% wt and in catalytic pyrolysis was 60% wt using both Al_2O_3 and K_2CO_3 catalysts followed by 41%wt and 38%wt for zeolite and kaolin catalysts respectively. The catalytic pyrolysis improved pH and calorific values of 12.4% and 14.4% respectively as compared to thermal pyrolysis. Blends of neem seed catalytic pyrolytic oil (NB) with fossil diesel in the ratio of 5% (NB5) and 10% (NB10) by volume were tested on an unmodified CI engine. Brake thermal efficiency (BTE) was lower at part load conditions and higher at full load condition up to 3.7% in the case of blends as compared to fossil diesel operation. Higher Brake Specific Fuel Consumption (BSFC) was observed in the case of NB5 blend on all load conditions, up to 23.9%. Reduction in emission levels were observed for HC (46.9%), CO (42.2%), CO_2 (29.8%) and NOx (20.7%) at full load condition. This study