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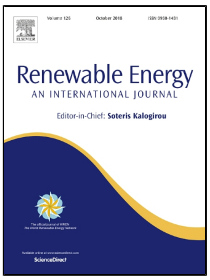

Mitigation of carbon footprints through a blend of biofuels and oxygenates, combined with post-combustion capture system in a single cylinder CI engine

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Mitigation of carbon footprints through a blend of biofuels and oxygenates, combined with post-combustion capture system in a single cylinder CI engine

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Abstract

Mitigation of carbon footprints in compression ignition (CI) engines can be achieved using biofuels (carbon neutral and carbon dioxide (CO_2) sequestration effects), with oxygenates and effective post-combustion capture systems. The present study focuses on the net reduction of CO_2 emissions through the combination of karanja oil methyl ester (KOME), orange oil (ORG), oxygenates blended fuel and zeolite-based post-combustion capture system (ZPCS) in a single cylinder CI engine. KOME emitted higher CO_2 emissions as compared to the diesel. Blending equal volume of ORG with KOME reduced CO_2 emissions further by 27% compared to KOME but still higher compared to diesel by 11 %, at 100 % load condition. Four oxygenates, namely methanol (M), ethanol (E), n-butanol (B) and n-pentanol (P) were blended 20% by volume with the KOME-ORG. KOME-ORG + M20 emitted minimum CO_2 compared to other oxygenate blends due to stoichiometric carbon balance, about 38 % less compared to KOME nearly reaching diesel emission characteristics at 100 % load. Additionally ZCPS was placed in the exhaust line and tested with all oxygenate blends with KOME-ORG, methanol blend led to 65 % reduction in CO_2 emissions compared to KOME and 53 % reduction compared to diesel, at 100 % load .