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INVESTIGATION ON THE EFFECT OF NANOCATALYST ($\text{CeO}_2 + \text{ZrO}_2$) BLENDED BIODIESEL IN CRDI-VCR ENGINE FOR REDUCING EMISSIONS AND FUEL CONSUMPTION

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Abstract

Experimental research has been performed to improve the performance of the engine using Cerium and zirconium oxide nanoparticles ($\text{CeO}_2 + \text{ZrO}_2$) blended with rice bran biodiesel. The diffusion and zeta potential principles are used for the dispersion of nanoparticles in biodiesel to improve long-term stability, avoid clogging, and aggregation along with sedimentation in base fuel and reduce nozzle choking. The volume of sample fuel is 70% diesel and 30% rice bran biofuel. The Nanoadditives blended biodiesel with exhaust gas circulation (EGR) are exhibited to enhance the brake thermal efficiency (BTE) and reduced the specific fuel consumption (SFC), and emissions like NO_x , CO and HC. The experiment has been conducted at variable compression ratio (VCR) 16.5:1, 17.5:1, 18.5:1, and 19.5:1, load conditions 0%, 25%, 50%, 75%, and 100%. Through the experiment, it is found that at 18.5, compression ratios (CR) has higher BTE 32.73% and reduced harmful emissions of CO 0.162%, HC 84 ppm and smoke 36.7%. At 17.5:1, CR represent lower fuel consumption of 0.29 kg/kWh and a considerable reduction of greenhouse gases of NO_x 1312 ppm is noted at other CR. Finally, the overall best effectiveness is found at 17.5:1 CR and 18.5:1 CR.

Keywords: CRDI-VCR engine, engine performances, emissions, nanoparticles

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