

Experimental Investigation on the Effect of Cerium Oxide Nanoparticle Fuel Additives on Pumpkin Seed Oil in CI Engine

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ABSTRACT:

Major portion of today's energy demand in the world is being satisfied with fossil fuels. On the record of confronting the energy crisis, bio fuels have been utilized as a promising source of fuel for IC Engines. This research work is to prove that with necessary modifications in Compression Ignition (CI) engine, the efficiency can be improved and it can be made equivalent or still better than mineral diesels. An experimental investigation was made to evaluate the performance and emission characteristics of a diesel engine using different blends of pumpkin seed oil with cerium oxide and nano particle as additive in diesel. Pumpkin seed oil was blended with diesel in proportions of 10%, 20%, and 30% by volume. Performance and emission parameters were studied under different loading conditions in CI engines.

KEYWORDS:

Compression ignition engine; Pumpkin seed oil; Cerium oxide additives; Performance; Emission

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1. Introduction

Due to the oil embargo and subsequent war, it was very crucial problem for the best utilization of energy for both developed and developing countries. Then, it was the first time that the crude petroleum importing nations stroked the shock when the oil exporting countries bargained higher prices. This crucial energy crisis forced all the countries to look for unconventional sources of energy and proficient utilization of energy. Then the focus of the country planners has been changed to more efficiency, extra productivity and least production cost. This resulted in an abrupt, long term and multi-aspect solution to the problems emerging from short supplies and increased energy demands throughout the world. Diesel engines are the most productive prime movers, from the perspective of ensuring worldwide condition and worries for long haul vitality security. It winds up important to create elective powers with properties equivalent to oil based energies. Dissimilar to rest of the world, India's interest for diesel power is about six times that of mineral diesel fuel thus looking for alternative options. It is obvious from the above considerations that, these days India [3] is confronting the twin issues of quick weariness of petroleum products and ecological debasement. Subsequently, there is an earnest need to lessen reliance on oil determined fuels for better economy and condition.

In the transportation and agribusiness division, different inexhaustible fluid bio-fuels got from organic assets have ended up being great choices for energies

than those got from the unrefined oils. The most encouraging biofuel and nearest to being aggressive in current markets without appropriations are ethanol, methanol, vegetable oils and biodiesel. Biodiesel can be mixed in any proportion with oil diesel. Its higher Cetane number expands the ignition notwithstanding when mixed in the oil diesel. Hossain et al [1] tested a multi-cylinder water cooled CI engine with karanja oil. The engine cooling water circuit and fuel supply systems were modified such that hot coolant preheated the biodiesel prior to injection. Compared to fossil diesel, the Brake Specific Fuel Consumption (BSFC) was 3% higher for the plant oils and the brake thermal efficiency (BTE) was almost similar which resulted in higher CO₂ and NO_x emissions.

Ahmed et al [2] investigated by blending the lemongrass oil with diesel with various extents and tested the performance of blended diesel. The tests were done for crude lemongrass oil, 20% lemongrass oil, 40% lemongrass oil and 80% with diesel. The execution was contemplated and it is inferred that, the mixing of 20%, 40%, 60%, 80% and 100% at room temperature gave better fuel utilization and furthermore enhances outflow standards. Adam et al [4] and Tiwari et al [5] researched the execution and discharge attributes of a diesel motor filled with diesel and mixes of cotton seed oil based biodiesel contrasted with that of diesel. Motor execution with biodiesel does not vary enormously from that of diesel fuel. The trial results demonstrated that the utilization of rubber seed oil based biodiesel is practical option in contrast to diesel.