

62. Title: Micro Emulsion Fuel

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Keywords: Microemulsions, Bio Fuels, Bio-alcohols

Domain: Renewable Energy

Summary: Microemulsions are thermodynamically stable and optically isotropic colloidal dispersions of oil, water, and surfactant, with dispersed droplets size less than a quarter of the wavelength of visible light. Water-in-oil microemulsions are used as a fuel replacement, as they improve the fuel atomization and efficiency, as well as reduce the combustion temperature and NO_x, PM, CO, and smoke emissions. The water droplets present in the microemulsions rapidly evaporate at high temperatures in combustion chamber, causing secondary atomization or micro explosions result in improved mixing and efficiency as well. The diesel-based microemulsion fuels is developed without the need of any additional surfactant, thereby making the entire process facile and economical. This formulation for microemulsion fuel reduces the dependence on fossil fuels and reduces exhaust gas emissions.

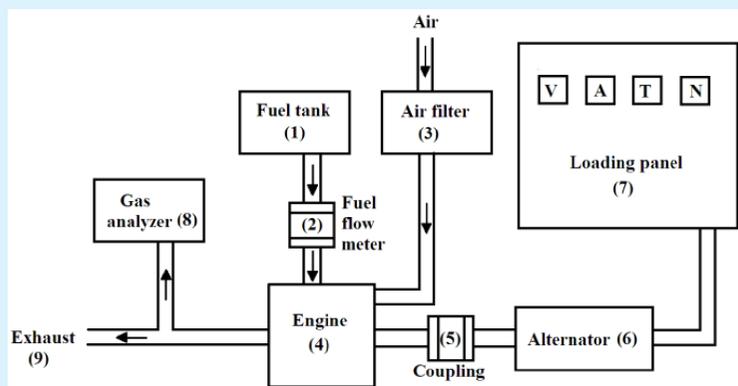


Image: Schematic diagram of the Set-Up

Advantages:

- » Simple and inexpensive method reduces exhaust gas emissions via microemulsion fuels.
- » Alcohol-based microemulsion fuels with 30% diesel replacement, at load a of 2.4 kW and speed of 1500 rpm, showed reduction in fuel consumption, reduction in emissions of CO, unburnt HC, and CO₂, and increase in thermal efficiency.

- » Does not require use of surfactant or a combination of surfactants/co-surfactants leading to minimal costs.
- » Provides increased efficiency and reduced level of pollutants such as NO_x, CO, smoke/soot, and unburnt hydrocarbons.
- » Satisfies ASTM standards, and had properties close to those of neat diesel.
- » The calorific values for the microemulsion fuel showed maximum reduction of 8.31% as compared to neat diesel.
- » Brake thermal efficiency increased by 15.38% and brake specific fuel consumption lowered by 5.04%.

Scale of Development: A functional prototype microemulsion fuel is developed and tested in laboratory environment

Technology Readiness Level: 4

IP Status: Granted Indian Patent 355787