Abstract

An experimental study was conducted for the influence of bio fuels prepared from addition of vegetable oils (olive oil and castor oil) in different percents to liquid hydrocarbon fuels include gas oil and kerosene in continuous combustion burners .

The percent addition was varied from 5% to 15% for olive oil and varied from 5% to 10% for castor oil . The droplet size was decreased from 160 μm to 80 μm by increasing the atomization pressure for blend olive oil with gas oil fuel, and decreased from 140 μm to 60 μm for blend olive oil with kerosene fuel.

The droplet size was decreased from 220 μm to 100 μm by increasing the atomization pressure for blend castor oil with gas oil fuel , and decreased from 200 μm to 90 μm for blend castor oil with kerosene fuel . The local equivalence ratio was varied from 0.85 to 1.7 .

The burner used is formed from an air-blast atomizer constructed of a (0.0144 m^2) iron block which consists of four plain-jet atomizers distributed within a square plane, and the distance between them is (2 cm) within the block. Each plain-jet atomizer consists of a fuel tube of (0.5 mm) outside diameter and (0.3 mm) inside diameter, surrounded concentrically by an air tube of (1.3 mm) inside diameter. The block consists also of nine ports for main air flowing. Each port is (15 mm) diameter.

It was found that the reduction of fuel droplet size lead to reduce all pollutants . The maximum reduction in CO, UHC ,NO_x and soot emissions was (42.98%, 45.42 %, 44.98 %, 49.5 %), respectively for blend 10 % olive oil with 90 % kerosene, and the maximum reduction in CO, UHC NO_x and soot emissions was (39.42%, 38.36%, 34.01%, 39.34%), respectively for blend 10 % castor oil with 90 % kerosene . CO, UHC, and soot emissions are increasing with increasing equivalence ratio at constant atomization pressure, but the NO_x emissions is decreasing with increasing equivalence ratio. Additionally, the emissions from the kerosene fuel were generally found less than those from the gas oil.