

Abstract

An experimental study is conducted on the influence of the operating parameters of a constant pressure burner on the emitted pollutants. The liquid hydrocarbon fuels studied are kerosene and gas oil. The inlet air temperature was varied from 30°C to 70°C in 10°C degree increments, atomization pressure was varied from 1 bar to 5 bar in 1 bar increments, and the local equivalence ratio was varied from 0.8 to 1.7.

The burner which is used may be made use in industrial furnace, which contain on an air-blast atomizer was designed and manufactured to generate the droplets. The atomizer is a 0.0144 m square iron block which consists of four plain-jet atomizers distributed within square plane and the distance between them is 2cm 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 is found that the CO and UHC are inversely proportional to inlet air temperature. In contrast, soot is directly proportional to inlet air temperature at constant atomization pressure and various equivalence ratios. CO, UHC, and Soot are inversely proportional to atomization pressure at constant inlet air temperature and various equivalence ratios. CO, UHC, and soot are directly proportional to equivalence ratio at constant atomization pressure and various inlet air temperatures. Emissions from a constant pressure burner depend on the physical and chemical properties of fuel, such as (viscosity and surface tension, volatility, H/C ratio, lower heating value and aromatic content). And, it is found that the emissions from gas oil are generally more than emissions from kerosene fuel, for example, when equivalence ratio increases from 0.8 to 1.7 at $T_{\text{inlet}} = 30^{\circ}\text{C}$, and $p_{\text{atomization}} = 2\text{bar}$, changing kerosene fuel with gas oil

fuel increase emissions by (18.8%,17.5% ,10.22%) for CO ,UHC , and soot emissions, respectively .