

COMBUSTION OF RICE HULL IN A FLUIDISED BED FURNACE

Solot Suwanayuen, Tanong Chayawattana, Yuthapong Surachpakorn, Suvit Tia and Chaiyot Tangsathitkulchai
Department of Chemical Engineering, King Mongkut's Institute of Technology Thonburi

Abstract

The combustion and heat transfer characteristics of rice hull were investigated in a fluidised bed combustor of $45 \times 45 \text{ cm}^2$ cross-sectional area. Effect of air-to-fuel ratio (A/F) on the combustion and thermal efficiencies of the unit was studied at a fixed fuel feed rate of 13.6 kg/h and at two bed temperature of 770°C and 20°C . Overall heat transfer coefficients for in-bed and over-bed water tubes, designated by U_i and U_o respectively, were also estimated as a function of air velocity.

For the range of A/F ratio studied (70-200% excess air) the combustion efficiency was well above 98%, while the thermal efficiency varied from 50-60%, almost insensitive to A/F ratio. Overbed heat transfer coefficient appeared to increase with increasing fluidising air velocity but the opposite effect was observed for the variation of the inbed coefficient. The values of U_i and U_o were found to vary from 100-200 $\text{W/m}^2 \text{K}$ and 20-40 $\text{W/m}^2 \text{K}$, respectively for inlet air velocity ranging from 12-22 cm/s.