

The used of aqueous urea solution in reduction of noxious emissions in bio fuel combustion system using selective non-catalytic reduction

Abstract:

Selective Non-Catalytic Reduction (SNCR) of nitric oxide was studied experimentally by injecting different concentrations of aqueous urea solution; urea and ammonia in a pilot-scale Bio-fuel fired tunnel furnace at 3-4 % excess oxygen level and with low ppm of baseline NO_x ranged from 65 to 75 ppm within the investigated temperature range. The furnace simulated small-scale combustion systems where the operating temperatures are usually in the range of about 973 to 1323 K and NO_x emission level remains below 100 ppm. NO_x reductions were studied with the variation of different parameters such as injection temperature, residence time, Normalized Stoichiometric Ratio (NSR) of the reagent, carrier gas pressure, etc. A significant result shows that for NSR, at higher NSR, ammonia could give significant reduction of NO_x at the investigated injection temperature. Meanwhile, for the effect of residence time, both aqueous solution shows that the NO_x reduction increased with increase in residence time. Finally for the effect on injection temperature, both aqueous solution, up to a certain temperature NO_x reduction continued to increase with increasing injection temperature and afterward the reduction decayed with further increase in temperature.