Variables, Kinetics and Mechanisms Of Heterogeneous Reburning

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Abstract

The variables, kinetics and mechanisms of heterogeneous reburning have been studied in a flow reactor with a simulated flue gas. It has been found that the efficiency of heterogeneous reburning depends on the origin of the char, char preparation history, and the presence of oxidants, CO_2 and O_2, and the reducing agent, CO, in reburning. The intrinsic rate constants for surface NO reduction in various gaseous environments have been estimated and compared with those published. In addition to its large surface area, the effectiveness of lignite char appears to be attributable to its ability to promote two consecutive reactions: 1) the gasification of char by CO_2 and O_2 for production of CO, and, 2) the removal of surface oxygen complexes, including those formed after adsorption of NO, by gaseous CO, for the regeneration of reactive sites. Moreover, lignite ash also catalyzes the decomposition of HCN, a major intermediate of NO conversion during gas reburning. These observations suggest that reburning by a mixed fuel containing natural gas and lignite char can be a potentially attractive route for the in-furnace control of nitrogen oxide.