

COAL GASIFICATION IN CIRCULATING FLUIDIZED BED REACTOR

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INTRODUCTION.

This research project is aimed at developing circulating fluidized bed gasification technology for coal being mined in Kazakhstan. The main goal is to construct a gasification technology for extra-high ash containing coals mined in Kazakhstan, particularly Ekibastuz, Maikuben, Mamyt and Torgay coals. To achieve this goal, the project will be developed in two main steps. The first step is modeling gasification process and designing the model simulation software. The second step is constructing circulating fluidized bed gasification technology.

MATERIALS AND METHODS.

The software programs to be used are: Aspen Plus, ChemCAD, ANSYS CFD and Barracuda. Aspen Plus and ChemCAD simulations have been carried out on coals. From these simulations chemical reactivity of coals and their sensitivity to reaction conditions will be determined. Different environmental variables such as pressure and temperature will be applied to the system to determine their effect on the gasification performance of the coal.¹ The results obtained from the simulation will be used to analyze how a circulating fluidized bed gasification model can be exploited for industrial applications by using ANSYS CFD and CFPD Barracuda software.²

RESULTS AND DISCUSSION.

Certain parameters have been already optimized with Aspen Plus simulation program. During the simulation, Ekibastuz coal showed various results due to different air flow and steam conditions. The optimal flow rate of air and steam used in modeling were 25 and 50 kg per hour respectively. The temperature in the reactor converting coal to syngas was varied between 700K and 1073K.

CONCLUSIONS.

Using Aspen Plus, preliminary data for the coal gasification process design were obtained. According to this analysis, Ekibastuz coal could be recommended for use in industrial pilot applications.

Future work includes design process by ChemCAD, ANSYS CFD and CFPD Barracuda.

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