

EFFECT OF FLUIDIZED BED MATERIALS ON SINTERING BEHAVIOR OF COAL ASHES

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Abstract

Sintering of coal ashes mixed with fluidized bed material (silica) was studied to assess the bed agglomeration problem in a fluidized bed combustor. The sintering behavior was investigated by a laboratory test method based on compressive strength measurements of sintered products. Physical and chemical changes of the sintered products were ascertained from scanning electron microscope (SEM-energy dispersive X-ray (EDX) and X-ray diffractometer (XRD) techniques. The coal ashes studied were ASTM ashes of coals from four different seams namely, Maemoh, Banpu, Chiengmuan and Lanna. Previous sintering results of these pure coal ashes indicated that the strength of these sintered ashes depends primarily on the sintering temperature and chemical reactions of their own chemical compositions. By adding 15 wt% of bed particles, i.e., quartz (CaSO_4) and the appearance of more glassy phase plus the presence of cristobalite (SiO_2), as indicated by XRD of all sintered products (except Lanna ash with silica) suggests that anhydrite probably reacted with silica, leading to the formation of low melting complex silicate glasses. These silicate glasses decreased the viscosity of ash components and accelerated sintering rate, thus resulting in the higher developed sinter strength. For Lanna ash, the very low pellet strength and the chemically unchanged phases indicated that the addition of silica had no measurable effect because neither substantial sintering nor chemical reaction occurred in this type of coal ash.