

Relationship between mercury capture in fly ash carbons and petrographic characteristics

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ABSTRACT

Four fly ash samples from different power stations that burn coals of different rank (from anthracites to sub bituminous coals), were used in this study. The unburned particles in these fly ashes (fly ash carbons), were concentrated by size fractionation and oil agglomeration.

In order to determine the mechanism governing the interactions between mercury and the unburned carbons, the whole fly ashes and the fly ash carbon concentrates were characterized. Surface area and Lost of Ignition (LOI) were determined in all samples. Their particle morphology and particle textural composition was studied by means of SEM and optical microscopy. The fly carbons were classified according their different physico-optical properties and related to isotropy/anisotropy, fused/unfused character, origin and morphology, etc.. The inorganic components were classified following standard classifications for inorganic matter in fly ashes. This allowed the relation between the nature of particle and its capacity for mercury adsorption to be determined. The degree of structural order of the unburned particles was studied by Raman spectroscopy.

The behavior of the fly ashes and unburned concentrates as sorbents for Hg was evaluated in a laboratory scale device. The results of retention capacity and efficiency were related with the petrographic characteristics of the unburned particle.

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