Understanding mercury oxidation and retention by fly ash

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ABSTRACT

It is well known that fly ashes may capture different proportions of mercury species in the gas phase. The mercury capture in fly ash is thought to be a function of both surface area and surface chemistry. However, other properties, including mineral and chemical composition, and carbon type particles may also affect mercury capacities. Previous work has identified that generally MgO, CaO and TiO_2 can adsorb mercury. However, the components of fly ashes responsible of this retention and the conditions that improve the capture have not been fully identified. Accordingly, the objective of this work is to understand the effect of fly ash on mercury speciation and retention, particularly the identification of components of fly ash that may be responsible for mercury oxidation.

In this work, a series of fly ashes have been procured and characterized. Mercury retention experiments have been carried out in a laboratory scale reactor. Correlations have been found between mercury capture performance and carbon content; surface iron and sulfur concentrations; aluminum, silicon, and other oxidation promoters; as well as surface areas and pore volumes of fly ash. Current studies are focused on mercury speciation studies on both solid and gas phases in an attempt to understand mercury oxidation on the surface of fly ash. The results form this work will facilitate taking profit of the properties of fly ashes for improving mercury capture, not only in the retention particle devices but also in relation with sorbents to be used in the system.

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