

Ozonation for the Chemical Modification of Carbon Surfaces in Fly Ash

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ABSTRACT

Residual or unburned carbon in fly ash is known to adsorb the chemical surfactants used in concrete mixtures, making them unavailable for the stabilization of the micro-void system that is desirable for freeze / thaw resistance. Contacting fly ash with dry ozone-containing gases at or near room temperature has previously been shown to dramatically reduce the undesired adsorptive behavior of unburned carbon residues without removing significant amounts of carbon mass. The present paper will discuss in detail the kinetics and mechanism of this ozone/carbon reaction, the changes in oxide functionality and carbon surface properties, and the progress in the development, scale-up, and evaluation of a commercial-scale ash treatment processes based on this principle. The process will be shown to have special advantages for an important class of ash samples derived from low-rank coals with low carbon weight fraction but high carbon adsorptivity.

