

## Coal emissions adverse human health effects associated with ultrafine/nano-particles role and resultant engineering controls

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### Abstract

There are multiple elements which enable coal geochemistry: (1) boiler and pollution control system design parameters, (2) temperature of flue gas at collection point, (3) feed coal and also other fuels like petroleum coke, tires and biomass geochemistry and (4) fuel feed particle size distribution homogeneity distribution, maintenance of pulverisers, etc. Even though there is a large number of hazardous element pollutants in the coal-processing industry, investigations on micrometer and nanometer-sized particles including their aqueous colloids formation reactions and their behaviour entering the environment are relatively few in numbers. X-ray diffraction (XRD), High Resolution-Transmission Electron microscopy (HR-TEM)/ (Energy Dispersive Spectroscopy) EDS/ (selected-area diffraction pattern) SAED, Field Emission-Scanning Electron Microscopy (FE-SEM)/EDS and granulometric distribution analysis were used as an integrated characterization techniques tool box to determine both geochemistry and nanomineralogy for coal fly ashes (CFAs) from Brazil's largest coal power plant. Ultrafine/nano-particles size distribution from coal combustion emissions was estimated during the tests. In addition the iron and silicon content was determined as 54.6% of the total 390 different particles observed by electron beam, results aimed that these two particles represent major minerals in the environment particles normally. These data may help in future investigations to asses human health actions related with nano-particles.

## **Keywords**

Advanced analytical techniques, Air pollution, Brazilian coal ashes, Engineering controls