## Particle Size Dependence Metal Adsorption on Coal Fly Ash from Acid Mine Drainage

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Adsorption of Fe, Al, Mn, Pb, and Zn by size fractionated coal fly ash from synthetically prepared acid mine drainage was carried out while regulating the pH between 6.5 to 7 by adding limestone. Batch experiments were conducted to evaluate the effect of particle size, contact time, and dose on adsorption behaviour of metals. Kinetic study showed initial rapid uptake of metals in the first 3 hours with equilibrium reaching within 6 hours except in the case of Pb by both ash size fractions. In addition, adsorption rate was found to increase with increasing in the amount of adsorbent and the particle size. The adsorption data for both fractions of ash were well correlated with Freundlich isotherm model. Further, adsorption kinetics was found fitting better with pseudo-second order model with higher rate of adsorption in the case coarse fraction of ash. The mechanisms involved are postulated to be surface adsorption and hydroxide precipitation. Efficiency of the adsorbents tested with the AMD of Jaintia coalfield confirmed better effectiveness of metal adsorptions by coarse fractions of ash.

Keywords: Coal fly ash, Acid mine Drainage, Adsorption.