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
The Effect of Ionic Electrolytes and pH on the Zeta Potential of Fine Coal Particles

of

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**Abstract:** Many environmental problems are attributed to coal combustion and utilization, a subject receiving increasing attention worldwide. Some of these problems could be minimized or even avoided if coal cleaning, properly applied, was considered an economical and effective technique for removing hazardous elements or reducing their concentrations before combustion. The coal samples used in this study were separated into particle sizes of 4, 12, and 40 mesh. Then these samples were subjected to sink-float treatment in a  $ZnCl_2$  solution of 1.3 density. The sample used for zeta potential determination was prepared by grinding both sink and float coal samples down to --100 mesh. A coal-water suspension of given solid content (wt %) was prepared at its natural pH of 4.5 (except for the experiments for determining the effect of suspension pH) with the desired concentrations of cation and anion electrolytes. The results of the experiments to investigate the effect of suspension pH and concentration of electrolytes on the zeta potential of coal particles were analyzed using analysis of variance (ANOVA). According to the results of this analysis,  $K^+$ ,  $Ca^{2+}$ , and  $NO_3^-$  ions on the surface of coal particles had a minor effect on the observed zeta potentials. However,  $Al^{3+}$ ,  $SO_4^{2-}$ , and  $CO_3^{2-}$  ions on the surface of coal particles had a significant effect on the observed zeta potentials. In addition, the zeta potential of the coal particles reached a maximum in  $1 \times 10^{-1}$  M solutions of both cationic and anionic electrolytes. Furthermore, in this study it was observed that the surface charge of the coal particles decreased at low pH and increased at high pH.

**Key Words:** Zeta potential, cationic electrolytes, anionic electrolytes

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