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Polycarboxylate adsorption on coal surfaces and its effect on viscosity of coal-water slurries

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ABSTRACT

It is extremely important to reveal the adsorption behavior of polycarboxylate (PC) on coal to improve the performance of PC and even enhance its fabrication and preparation. In this work, three kinds of low rank coal with different ratios of oxygen to carbon (O/C) were employed to prepare coal-water slurries and analyze performances. Apparent viscosities of the slurries were tested. The contact angle and adsorption of PC dispersant on coal were measured. It is observed that the viscosity reduction of CWS is dependent on the saturated adsorption of PC on coal. The order of viscosity reduction is same with the hydrophilicity / hydrophobicity of the PC on the coal surfaces, which corresponds well with the ratio of O/C in coal. So the future dispersant should be designed to improve its adsorption on coal according to the ratio of O/C in coal. Moreover, using a Scanning Electron Microscopy-Energy Dispersive Spectrometer, and zeta potential analysis, we demonstrate the morphology of PC dispersant on coal and clarify further the mechanism of the efficient PC dispersant. Extra dosage of the PC will prevent relative movement between coal particles thus increasing the viscosity of CWSs. So, it is quite necessary to control the proper dosage of the PC dispersant on the basis of the adsorption values in the slurry processing.

Keywords: Adsorption behavior; dispersion performance; polycarboxylate dispersant; coal-water

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