
Clay Mineral Segregation by Flocculation in the Porters Creek Formation

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Abstract: The Porters Creek Formation is mined as an absorbent clay in Illinois, Mississippi, Missouri, and Tennessee. The absorptive properties of the Porters Creek Formation are due to the high content of smectite which constitutes >50% of the minerals present. Analyses of 220 samples of the Porters Creek collected in Illinois, Missouri, and Tennessee indicate that the smectite content is highest on the western side of the Mississippi embayment and that the kaolinite content is highest on the northeastern side. The major influx of detrital clays appears to have entered the embayment from a large river on the northeast side. A major control of the distribution of clay minerals during the time of Porters Creek deposition was differential flocculation of kaolinite, illite, and smectite, as evidenced by the numerous syneresis cracks on bedding planes in the area of greatest kaolinite content. Estimates of the smectite, illite, and kaolinite contents suggest both horizontal and vertical variations among these clay minerals. In certain localities the oxidation of pyrite has created acid conditions, which apparently were conducive to the formation of authigenic halloysite.

Key Words: Flocculation • Illite • Kaolinite • Sedimentation • Smectite

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