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THEORETICAL EVALUATION OF THE RATIONAL USE OF LATEX REAGENT DURING SELECTIVE FLOCCULATION OF FINELY DISPERSED COAL

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The article is devoted to one of the most difficult problems of coal technology – the processing of finely dispersed (-100-200 microns) and ultra fine (-50 microns) coal. The effectiveness of the traditional gravity and flotation technologies is decreasing significantly with a reduction in the size of the enriched coal. One of the promising directions for the extraction of such coal from ordinary coal mass into concentrate is a flocculation-flotation technology, which provides a selective flocculation of ultrafine (-50 μm) coal before flotation using synthetic latex reagents. The authors have performed a theoretical analysis and an analytical assessment of the rational consumption of latex flocculant in the process of selective flocculation of ultrafine (-50 μm) coal in the framework of the flocculation-flotation technology for its enrichment.

The task was divided into two stages. At first, the rational length of latex chains between coal particles was determined. It is shown that the optimal costs of latex flocculant should provide an average length of polymer bridges between coal particles in the range of 100-300 nm. The large length of these bridges is impractical because it does not only increase the binding energy of coal particles into floccules, but also weakens it. The secondary energy minimum disappears at large distances, and, accordingly, the long-range interaction between particles.

At the second stage, the analytical expression for the consumption of the latex flocculant was derived. At the same time, it was assumed that in order to determine the latex flocculant consumption, in addition to the length of its chains, it is necessary to determine the degree of coverage of the coal surface of a known specific area with latex chains. The obtained analytical expression allows us to theoretically evaluate the optimal boundaries of flocculent consumption depending on the properties of the initial coal, colloid-chemical characteristics of the used synthetic latex and bond lengths.

Keywords: coal enrichment, flocculation-flotation technology, selective latex flocculation, rational consumption of the latex flocculant.

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