Development of environmental friendly single reagent for coal flotation


Abstract

Froth flotation is an important means of upgrading the fine fraction of raw coal, typically particles finer than 0.5mm. In coal flotation, reagents are required to enhance the hydrophobicity of the coal surface. Water insoluble hydrocarbons are widely used as collectors to increase the affinity of coal particles towards the air bubbles. These collectors are basically non-polar oils like diesel, kerosene and certain coal-tar distillates along with a frother in many cases. Thus, it is necessary to add collector and frother separately in the coal flotation. However, these petroleum based collectors have negative impact on the environment. Attempts were made to formulate an eco-friendly single reagent to replace diesel-frother system without hindering the flotation process performance. Among the many reagents (Sokem 530 and Sokem 570 series) developed and evaluated at laboratory level, the best one, Sokem 573C, was selected for the plant trials. Laboratory flotation tests carried out on a coking coal sample sourced from one of the operating coal preparation plants in eastern India analyzing 21.06% ash and using this single reagent at 0.32 kg/t resulted in a froth yield of 50.20% at 9.35% ash. This compared well with the performance of dual reagent system of diesel - frother being practised in the plant. Based on encouraging laboratory flotation results and kinetics studies, plant trials were conducted in the coal preparation plant. The results of plant trials using this single reagent, Sokem 573C, were found satisfactory and economical as compared to those using diesel-frother system. This single reagent is non-petroleum & vegetable oil based, biodegradable and environmental friendly.