IMPROVEMENT OF THE MECHANICAL PROPERTIES OF ACTIVATED CARBONS USED CARBON IN PULP PROCESS FOR GOLD RECOVERY

Abstract

Activated carbons are widely used in the carbon in pulp processes for gold recovery for their high adsorption capacity of the gold-cyanide complex; however, due to their low attrition resistance in this process, high quantities of gold are lost in the fine coal discarded in the cyanurated pulps. Therefore, this research focuses on the production of activated carbons (AC) of high mechanical resistance. For this purpose, the impregnation of glass-forming substances such as sodium metasilicate pentahydrate ($Na_2SiO_3 \cdot 5H_2O$) and enamel frits were studied. In the composite formulation, sodium tetraborate decahydrate ($Na_2B_4O_7 \cdot 10H_2O$) was used as a fluxing agent and granular activated carbon (4 mm) of palm kernel (89% hardness and 849 m^2/g of specific surface) was employed as raw material in this research. The composition of the melting salts and fusion temperatures (600-1000 °C) were modified in order to optimize AC mechanical resistance. The AC-glass salt composite presented a 98% hardness and 470 m^2/g specific surface. In contrast, the AC-frits composite achieved a 95% hardness and 690 m^2/g of specific surface. The attrition losses of the AC were 53%; while the composites AC-glass salt and AC-frits presented attrition losses of 36 and 39% respectively. Composites quality were evaluated through carbon in pulp essays. Recoveries of gold-cyanide complex were 98, 57 and 90% for AC, AC-glass salt and AC-frits composites, respectively. In conclusion, in the composite with frits, the superficial reinforcement mechanisms are the most appropriate to obtain activated carbons with high mechanical strength and adsorption performance within the standards required in mining.