**Treatment of Black Copper with the Use of Iron Scrap- Part l**

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## ABSTRACT

Currently, there is a large amount of mineral resources not being exploited in large copper minings, a clear example are black copper minerals. These resources are generally not incorporated into the extraction circuits or are not treated, either in stocks, leach pads, or debris. These exotic minerals have considerable amounts of Cu and Mn, which are commercially very attractive. They are refractory to conventional leaching processes, therefore, the use of reducing agents is necessary for treatment of these minerals in order to dissolve the present MnO2, which in turn allows Cu extraction. In this research, iron scrap Fe0 was used as a reducing agent for the dissolution of Mn from a black copper mineral in an acidic medium and compared to previous studies of the use of Fe2+ under the same conditions. In addition, the effects of a pretreatment process (agglomeration and curing) by adding NaCl are investigated in order to favor the reduction of MnO2. Finally, it was discovered that there is a higher kinetics of dissolution of Mn when working with Fe0 in short periods of time, although similar extraction efficiencies are obtained after prolonged times. The pretreatment process by adding NaCl resulted in increased Mn extraction in short periods of time (30 min). At applying high concentrations of the reducing agent, the effect of particle size on the dissolution rate of MnO2 was shown to be insignificant.

***Keywords:***MnO2; reducing agent, leaching; Fe0

**Obrada crnog bakra upotrebom otpadnog gvožđa - I deo**

Trenutno postoji znatna količina sekundarnih sirovina koja se ne eksploatiše u velikim kopovima bakra, poput crnog bakra. Ovi resursi uglavnom nisu deo standardnih procesa ekstrakcije ili se ne tretiraju, bilo kao šljaka, otpad ili prašina. Iako ovi otpadni materijali sadrže znatne količine komercijalno vrednih metala, bakra i mangana, otporni su na uobičajene procese luženja. Iz tog razloga je upotreba redukujućih sredstava neophodna za tretiranje ovih sirovina kako bi se rastvorio prisutni MnO2, što zauzvrat omogućava ekstrakciju Cu. U ovom istraživanju, otpadno gvožđe Fe0 korišćeno je kao redukciono sredstvo za izluživanje Mn iz crnog bakra u kiselom medijumu i rezultati su upoređeni sa prethodnim studijama u kojima su korišćeni Fe2+ joni kao redukciono sredstvo pod istim uslovima. Pored toga, ispitani su efekti postupka prethodne obrade dodavanjem NaCl sa ciljem favorizovanja redukcije MnO2. Pokazano je da se dobija brže rastvaranje Mn pri korišćenju Fe0 u početnom vremenskom periodu, iako se posle dužeg vremena dobijaju slične efikasnosti ekstrakcije. Proces prethodne obrade dodavanjem NaCl doveo je do povećane ekstrakcije Mn u početnom vremenskom periodu (30 min). Pokazano je da veličina čestica nema značajan uticaj.na brzinu rastvaranja MnO2 pri primeni velike koncentracije redukujućeg agensa.

Ključne reči: MnO2; redukujuće sredstvo, luženje; Fe0