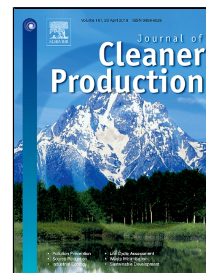


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M. Asadi, M.R.Tavakoli Mohammadi, Farhad Moosakazemi, M.J. Esmaeili, M. Zakeri

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Development of an environmentally friendly flowsheet to produce acid grade fluorite concentrate

M. Asadi ^a, M. R. Tavakoli Mohammadi ^{a1}, Farhad Moosakazemi ^a, M. J. Esmacili ^b, M. Zakeri ^b

^a Beneficiation and Hydrometallurgy Research Group, Mineral processing Research Center, Academic Center for Education, Culture and Research (ACCER) on TMU, Tehran, Iran

^b Research Group of Control and Modeling of Mineral Processing Systems, Mineral processing Research Center, Academic Center for Education, Culture and Research (ACCER) on TMU, Tehran, Iran

Abstract

Acid grade fluorite concentrate (AGFC) is the most valuable product of fluorite processing units. In this study, an environmentally friendly flowsheet is developed for the production of AGFC. The ore of the Kamar Mehdi fluorite mine (Tabas, Iran) is considered as a case study with grade of 76.65% fluorite, 21.62% dolomite and 0.32% hematite. The performance of ore flotation by changing operational parameters is evaluated in the presence of common and new fatty acid collectors, sodium oleate (SO) and sodium lauryl sarcosine (SLS), respectively. The best rougher concentrate ($\text{CaF}_2=88.49\%$) was obtained for 100 g/t of SLS and 500 g/t of dextrin at pH=4. The concentrate is leached by acetic acid for the selective dissolution of dolomite. The acetic acid concentration of 0.31 M, the temperature of 80.33°C, time of 126.29 min are chosen as optimum operational conditions using central composite design (CCD). It was found out the liquid to solid ratio of 4:1 is suitable for leaching purpose. AGFC containing 98.71% fluorite, 0.19% silica, and 0.05% sulfur is obtained by 91.55% dissolution of dolomite under these conditions. Finally, the calcium and magnesium acetate (CA & MA) is produced as an environmentally friendly by-product through the crystallization of the leaching filtrate.

Keywords: Acid grade fluorite concentrate, Flotation, Leaching, Crystallization

¹ Corresponding author Tel.: +98 912 2984498
E-mail: r.tavakoli@acecr.ac.ir

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