

## Accepted Manuscript

Measurement of collector concentrations to make an efficient mixture for flotation of a low grade apatite

M. Jafari, S. Chehreh Chelgani, P. Pourghahramani, H. Ebadi

PII: S0263-2241(18)30136-2  
DOI: <https://doi.org/10.1016/j.measurement.2018.02.037>  
Reference: MEASUR 5285

To appear in: *Measurement*

Received Date: 16 October 2017  
Revised Date: 1 February 2018  
Accepted Date: 21 February 2018



Please cite this article as: M. Jafari, S. Chehreh Chelgani, P. Pourghahramani, H. Ebadi, Measurement of collector concentrations to make an efficient mixture for flotation of a low grade apatite, *Measurement* (2018), doi: <https://doi.org/10.1016/j.measurement.2018.02.037>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Measurement of collector concentrations to make an efficient mixture for flotation of a low grade apatite

M. Jafari<sup>a</sup>, S. Chehreh Chelgani<sup>b,\*</sup>, P. Pourghahramani<sup>c</sup>, H. Ebadi<sup>c</sup>

<sup>a</sup>School of Mining Engineering, University of Tehran, Tehran 16846-13114, Iran

<sup>b</sup>Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI 48109, USA

<sup>c</sup>Mining Engineering Department, Sahand University of Technology, Tabriz, Iran

---

## Abstract

It was well documented that a mixture of collectors could have synergistic advantages over the use of an individual collector for apatite flotation. Therefore, it would be an essential procedure to determine an optimum amount of each collector for development of an efficient mixture (collector). In this study, a mixture design (MD) model was used to find an optimum amount of different typical apatite anionic collectors (Atrac, Alke and Dirol) and make an efficient mixture for the direct flotation of a low grade apatite ore. Assessment of responses for apatite flotation tests which their collectors were designed by MD showed that Dirol has the highest selectivity whereas Alke has the highest collectivity for the direct flotation of apatite. According to the experiments, the MD model computed that a mixture collector with Dirol: 364 (g/t), Alke: 295.2 (g/t) and Atrac: 140.8 (g/t) concentrations can provide the most efficient responses through the apatite flotation. Results based on the purposed concentrations for the mixed collector demonstrated that higher apatite flotation responses (grade: 14%, recovery: 76%, and S.E.: 66%) in comparison with the performance of tests with a single collector. These results can be used to design flotation conditions for the apatite flotation-separation in the industrial scale and assessment of collector concentrations for other investigations.

**Keywords:** Flotation; Apatite; Mixture design; Low grade; Collector; Concentration

---

## 1. Introduction

Phosphate is generally consumed for the manufacture of fertilizer and plays a critical role in the development of agricultural industry [1, 2]. Igneous rocks, sea sediments and biogenetic materials are the three main groups of its resources [1-3]. Apatite minerals categorized to the: 1) Hydroxylapatite ( $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$ ), 2) Fluorapatite ( $\text{Ca}_5(\text{PO}_4)_3(\text{F})$ ) and 3) Chlorapatite ( $\text{Ca}_5(\text{PO}_4)_3(\text{Cl})$ ) [4]. Based on the quality (grade) of apatite ores, they divided into the three sections: 1) low-grade ores with 12-16%  $\text{P}_2\text{O}_5$  2) intermediate ores with 17-25%  $\text{P}_2\text{O}_5$  and 3) high-grade ores with 25-35%  $\text{P}_2\text{O}_5$  [5]. Froth flotation is a typical technique for separation of phosphate rocks from its associated minerals (mainly

Download English Version:

<https://daneshyari.com/en/article/7121246>

Download Persian Version:

<https://daneshyari.com/article/7121246>

[Daneshyari.com](https://daneshyari.com)