

Improved Collectors for Flotation of Bastnaesite



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Introduction

Bastnaesite is an important mineral because of its abundance and rare earth content. Calcite and barite are the most common gangue minerals associated with bastnaesite. The importance of finding a suitable collector that can be selective against the gangue minerals without heated conditioning is critical to the advancement of the beneficiation of bastnaesite. This review will present some previous research that has been done on bastnaesite flotation and a comparison of new collectors used.

Background

Rare earth elements have been receiving a considerable amount of attention over the last few decades because of their increasing use and importance in today's industry. Bastnaesite is a fluorocarbonate and is one of the most abundant minerals that contain rare earth elements. The major rare earth elements composing bastnaesite

are cerium, lanthanum, and praseodymium, but this may differentiate between ore bodies. The major reserves of Bastnaesite are in China, United States, and Brazil [1]. Applications for the rare earth elements are: catalysts, glass coloring, phosphors, magnets, and polishing. Flotation is a preferred beneficiation technique for effective concentration of the Rare Earths [2-7].

Objectives

The first objective was to present a mineralogical analysis study of bastnaesite ore. This is shown in Figure 1. Next a literature study was performed and some reference is included. Finally, the goal of current work was to evaluate and optimize conditions for the top performing flotation collectors using micro flotation to achieve high selectivity for the beneficiation of bastnaesite and to improve recovery and economics of mining. These results are illustrated in Figure 2.

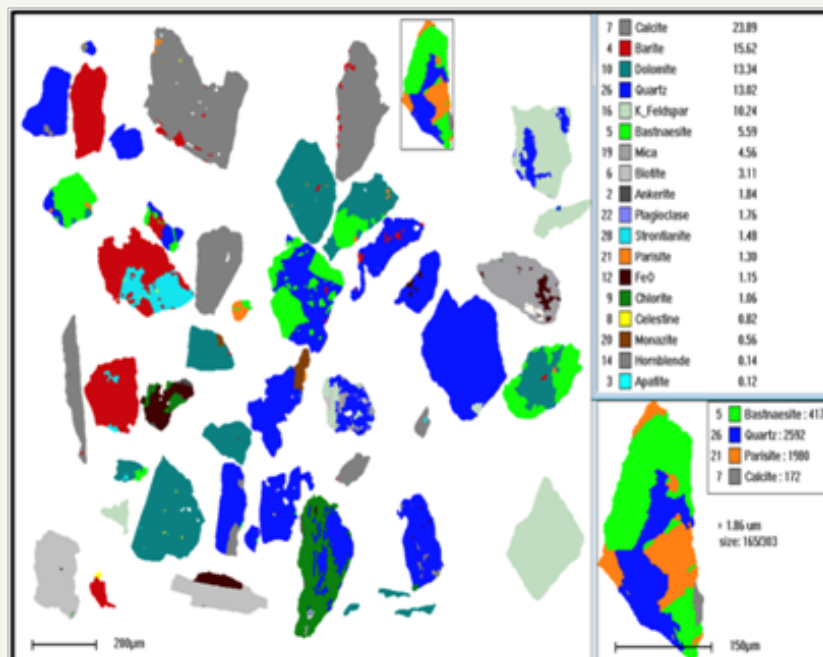


Figure 1: Automated mineralogical image of bastnaesite ore +100 mesh.

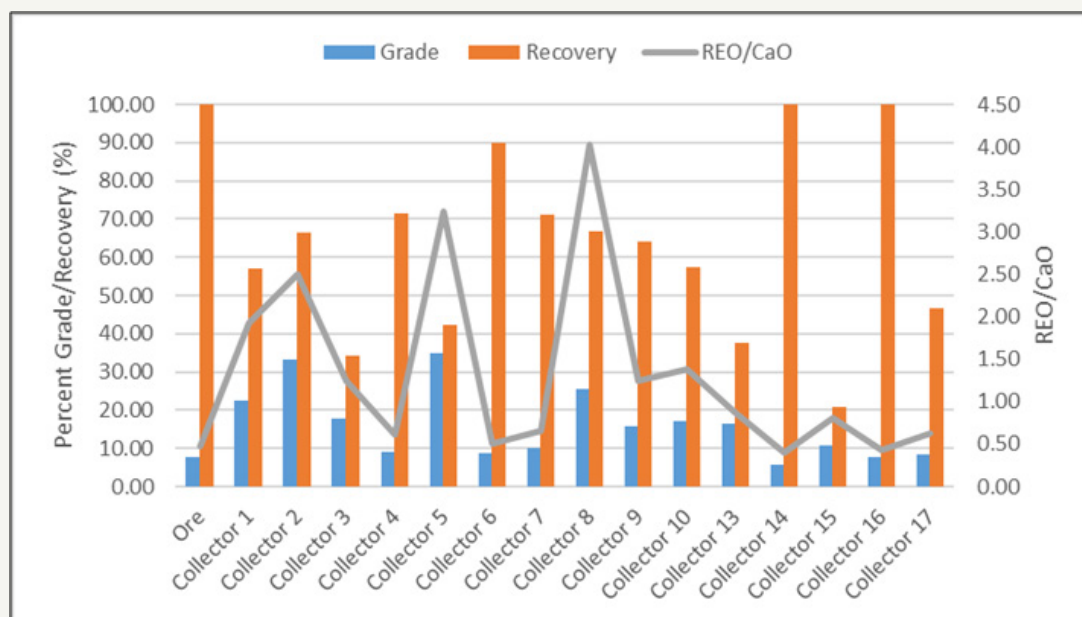


Figure 2: Micro flotation comparative testing of 17 novel collectors on bastnaesite ore.

Conclusion

A literature review was done on the beneficiation of bastnaesite along with detailed characterization of bastnaesite ore obtained from the Mountain Pass mine. Micro flotation studies were then performed, and candidate collectors were down selected from seventeen possible formulations based on the recovery and grade of desired and undesired minerals. The fundamental and further bench scale studies on the down selected collectors will be reported in subsequent publications.

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