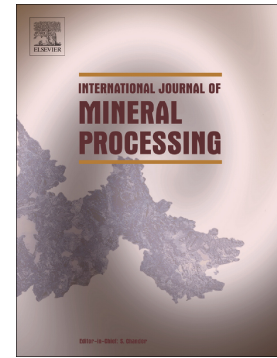


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Flotation separation of scheelite from calcite using mixed collectors

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Abstract: Flotation separation of scheelite from calcite is difficult due to the similarities in their surface properties. In this work, the flotation behavior of scheelite and calcite using oxidized paraffin soap(OPS), benzohydroxamic acid(BHA) and the mixed OPS/BHA collectors was investigated through micro-flotation experiments. The flotation results of single mineral experiments demonstrated a higher selectivity for the flotation of scheelite from calcite at pH 9 than individual OPS and BHA when using water glass as depressant. In order to probe the validity of the findings, mixed binary minerals experiments, contact angle and zeta potential experiments were also carried out successfully.

Keywords: Scheelite, Calcite, mixed collectors, Flotation separation

1 Introduction

Tungsten is an important non-ferrous metals that used in the electron, alloys, chemical engineering, as well as other industries (Bar et al., 2000; Ilhan et al., 2013; Rao, 1996). The global tungsten resources with industrial utilization value are mainly derived from wolframite and scheelite. China is a country with abundant wolframite and scheelite resource with huge reserves on top of the world, and scheelite usually coexists with other Ca-bearing minerals in ore deposits, such as fluorite (CaF_2), calcite (CaCO_3), fluorapatite [$\text{Ca}_{10}(\text{PO}_4)_6\text{F}_2$](Deng et al., 2016), however, the most common calcium containing gangue in scheelite ores is calcite(Filippova et al., 2014; Filippova et al., 2012; Somasundaran et al., 1985). In practice, the commonly used method for recovering scheelite minerals from calcite is flotation. However, it is difficult to separate scheelite from calcite minerals due to the same Ca site on their surfaces, resulting similar flotation performance when using fatty acid as collectors(Miller and Misra, 1984; Marinakis et al., 1985; Feng et al., 2015; Antti and Forssberg, 1989; Rao et al., 1991; Miller et al., 1995; Kou et al., 2010), hence the separation is not always satisfactory in industry (Houot, 1982; Mishra, 1982; Pugh and Stenius, 1985; Zheng and Smith, 1997). To achieve excellent separation performance, many investigations indicated that using collector mixtures can have a synergistic advantage over the use of single collector on the flotation of scheelite when using water glass for depressing calcite. Gao et al (2015) discovered that the mixed anionic/anionic(733/MES) collectors exhibited a higher selectivity for the flotation separation of scheelite from calcite and fluorite than the 733-collector alone.. Huang et al (2016) found that there is a high selectivity and recovery for the flotation of scheelite from calcite at pH 7 using

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