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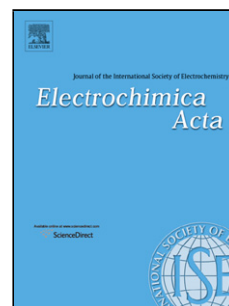
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Electrolytic Extraction of Copper, Molybdenum and Rhenium from Molten Sulfide Electrolyte

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Abstract

The validity of the electrochemical series for metal sulfides decomposition in their standard state has been tested experimentally at 1500 K for La_2S_3 , Cu_2S , MoS_2 , and ReS_2 in a molten electrolyte with the following molar composition: $(\text{BaS})_{54}-(\text{Cu}_2\text{S})_{31}-(\text{La}_2\text{S}_3)_{15}$ (electrolyte B). Voltammetry measurements indicated the presence of faradaic reactions in the investigated electrolyte with and without the addition of MoS_2 and/or ReS_2 . Electrolysis experiments showed that the addition of La_2S_3 to $\text{BaS-Cu}_2\text{S}$ increases the faradaic efficiency for liquid copper production with respect to a previously studied $(\text{BaS})_{54}-(\text{Cu}_2\text{S})_{46}$ electrolyte, and enabled isolation of elemental sulfur as the anodic product. Electrochemical measurements suggested the need to take into account the activity of dissolved Cu_2S in order to explain the observed cell voltage during electrolysis. Electrolysis in the presence and absence of ReS_2 and/or MoS_2 confirmed their relative stability as predicted by assuming decomposition in their standard states. Analysis of the metal products electrowon from an electrolyte containing Cu_2S , MoS_2 , and ReS_2 indicates that simultaneous production of solid and liquid phases with nonequilibrium compositions.

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