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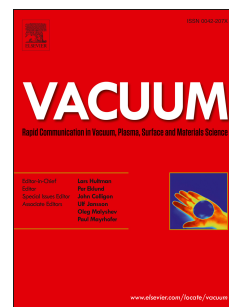
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Kinetics of Pb Evaporation from Pb-Sn Liquid Alloy in Vacuum Distillation

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Abstract

In this work, the kinetics of Pb evaporating from Pb-Sn alloy has been investigated. The experiments were performed in the temperature range 1200 K to 1400 K and the pressure of 10 Pa. The results indicated that the evaporation of Pb follow first order kinetics. The overall mass transfer coefficients of lead evaporation from Pb-Sn alloy are $2.68 \times 10^{-6} \text{ m} \cdot \text{s}^{-1}$, $5.01 \times 10^{-6} \text{ m} \cdot \text{s}^{-1}$ and $1.92 \times 10^{-5} \text{ m} \cdot \text{s}^{-1}$ at 1200 K, 1300 K and 1400 K, respectively. Additionally, the apparent activation energy of lead evaporation from molten Pb-Sn alloy was calculated. It revealed that the mass transfer of lead in the vapor phase is not rate limiting in the vacuum distillation. The Pb evaporation from Pb-Sn alloy was mix-controlled by vaporization and liquid mass transfer. The mass transfer in the liquid phase is a major rate-limiting step under the present experimental conditions.

Key words: Pb-Sn alloy; Separation; Kinetics; Vacuum distillation

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