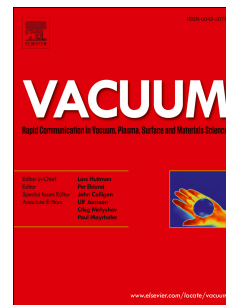


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An investigation of saturated vapor pressure regarding low-volatility organophosphorus extractants Di-(2-Ethylhexyl) Phosphoric Acid and Tributyl Phosphate: Correlation and thermodynamics study

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ABSTRACT

New saturated vapor pressure (p_{sat}) data of organophosphorus extractants, di-(2-ethylhexyl) phosphoric acid (D2EHPA) and tributyl phosphate (TBP), were investigated in $T = (383.8 - 546.2)$ K and $p_{\text{sat}} = (0.13 - 6.67)$ kPa using vacuum distillation method. The data was found to be a good fit with Antoine, August, Riedel and Wagner equation. Regression constants prove to be very useful in estimating p_{sat} at operating temperature. Intermolecular hydrogen bonding affected D2EHPA having lower p_{sat} in comparison with TBP. Thermodynamic properties of both molar enthalpy and molar entropy of vaporization were obtained using the Clausius-Clapeyron equation. As temperature increased, molar enthalpy and molar entropy of vaporization decreased showing a positive deviation from Trouton's rule. Using the relations of molar enthalpy and temperature, saturated liquid heat capacity was obtained. All data can be usefully employed for the design of a distillation column or evaporator for recycling of both extractants from organic wastewater.

Keywords: Saturated vapor pressure; Enthalpy of vaporization; Entropy of vaporization; Saturated liquid heat capacity; Acentric factor

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