

Accepted Manuscript

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PII: S0167-7322(18)32059-2
DOI: doi:[10.1016/j.molliq.2018.06.078](https://doi.org/10.1016/j.molliq.2018.06.078)
Reference: MOLLIQ 9276
To appear in: *Journal of Molecular Liquids*
Received date: 18 April 2018
Revised date: 18 June 2018
Accepted date: 19 June 2018

Please cite this article as: Sonia Cortés, Martha Claros, Yecid P. Jimenez , Thermodynamic properties of aqueous ternary system CuSO₄ + PEG 4000 + H₂O at different temperatures. Molliq (2018), doi:[10.1016/j.molliq.2018.06.078](https://doi.org/10.1016/j.molliq.2018.06.078)

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Thermodynamic properties of aqueous ternary system $\text{CuSO}_4 + \text{PEG 4000} + \text{H}_2\text{O}$ at different temperatures

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Abstract

The present study has the aim to investigate the thermodynamic behaviour of the aqueous ternary system composed of CuSO_4 and poly(ethylene glycol) (PEG). These compounds are known to form aqueous two-phase systems for applications in metal ions and biomolecules partitioning. To have a better understanding of these systems, water activities were determined at different temperatures ($T = 303.15, 313.15, 323.15$ and 333.15 K), using a vapour pressure osmometer. The results indicate that CuSO_4 has a significant effect on the water activity of the system composed by salt-PEG-water. Additionally, water activities of the constituent binary systems, $\text{CuSO}_4 + \text{H}_2\text{O}$ and $\text{PEG 4000} + \text{H}_2\text{O}$, were measured at the same temperatures of the ternary system.

From these experimental measurements the vapour pressure values were determined for the systems and correlated with the extended UNIQUAC model, obtaining a good agreement between the experimental and correlated data.

Keywords: Water activity, poly(ethylene glycol), copper sulphate, UNIQUAC

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