

عنوان مقاله:

Comprehensive Algorithm for Prediction of Strontium Sulfate (SrSO₄) Solubility in Aqueous Electrolyte Solutions at High Temperatures and Pressures

محل انتشار:

دومین همایش بین المللی نفت، گاز، پتروشیمی و HSE (سال: 1396)

تعداد صفحات اصل مقاله: 45

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خلاصه مقاله:

Precipitation of strontium sulfate (or SrSO₄) has already been distinguished as one of the most costly and critical problems which may occur in process industries especially in oilfield operations. Costs due to scaling and remedial actions that need to be taken afterward are generally high owing to low solubility of SrSO₄ in aqueous solutions. Therefore, a thorough understanding of the SrSO₄ thermodynamic behavior under various operating conditions is vital to predict or even avoid the overall damage caused by scaling. The primary aim of this work is to develop a model based on Least Squares Support Vector Machine (LSSVM) and Coupled Simulated Annealing (CSA) referred to as CSA-LSSVM algorithm to predict strontium sulfate solubility as a function of pressure, temperature and ionic compositions. In this context, we have employed almost 1641 experimental data regarding strontium sulfate solubility to build a comprehensive model and to evaluate its reliability. The results show that the proposed model has a better performance in comparison with pre-existing empirical correlation for predicting SrSO₄ solubility and it is also in well accordance with experimental measurements. Based on the results obtained from this study, developed model could successfully be used in predicting SrSO₄ solubility in aqueous Na-Ca-Mg-Sr-Cl-SO₄-H₂O system over temperature ranges from 2 to 253.5 °C, and pressures from 1 to 568.51 atm

کلمات کلیدی:

Strontium sulfate; Solubility; Aqueous solutions; Least Squares Support Vector Machine; Coupled Simulated Annealing; Pitzer ion interaction

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