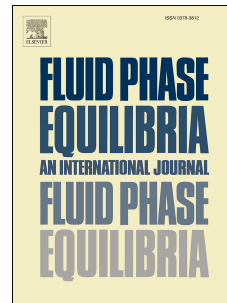


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Measurement of Iron and Lead Sulfide Solubility below 100 °C

Diana Carolina Figueroa Murcia^{1,2}, Philip L. Fosbøl^{1,2}, Erling H. Stenby^{1,3}, Kaj Thomsen^{1,2*}

¹CERE, Center for Energy Resources Engineering,

²Department of Chemical and Biochemical Engineering, Technical University of Denmark, DTU, Søtofts Plads 229, Kgs. Lyngby, Denmark

³Department of Chemistry, Technical University of Denmark, DTU, Kemitorvet, Kgs. Lyngby, Denmark

* Corresponding author: Kaj Thomsen, kth@kt.dtu.dk

Abstract

The solubility of iron sulfide and of lead sulfide in water was determined experimentally in the temperature range from 25 – 80 °C and at atmospheric pressure. The solubility of iron sulfide was determined by bringing precipitated iron sulfide in equilibrium with water and determining the concentration of iron ions and of total sulfur after the equilibration. The same method was used for determining the lead sulfide solubility in water. In both cases, a difference between the concentrations of metal ion and of total sulfur was observed. The concentrations were determined by inductively coupled plasma optical emission spectrometry (ICP-OES). The time required for equilibration was studied. The particle size distribution was examined to select a proper membrane for separating saturated solution from solid material.

Key words: Iron sulfide; Lead sulfide; Solubility in aqueous solutions; Scaling materials.

1. Introduction

The presence of zinc, lead, and iron plus H₂S can trigger the formation of scale materials such as Zinc Sulfide (ZnS), Lead Sulfide (PbS), and Iron Sulfide (FeS). The solubility of these compounds is very low compared to other scaling materials such as CaCO₃ or BaSO₄. H₂S can be naturally occurring or be the result of sulfate-reducing bacteria [1]. The presence of iron can be natural or as the result of corrosion.

The prediction of the occurrence of sulfide scaling materials in oil production or geothermal energy facilities comes as a solution to avoid unnecessary production losses and costly shut downs due to

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