

## Effect of sulfosalicylic acid on iron monosulfide (FeS) oxidative dissolution in aerated acidic solutions

M. I. DUINEA<sup>1\*</sup>, C. E. BADICA<sup>1</sup>, M. L. SCHLEGEL<sup>2</sup>  
AND P. CHIRITA<sup>1</sup>

<sup>1</sup>University of Craiova, Department of Chemistry, Calea Bucuresti 1071, A.I. Cuza, Romania

(\*correspondence: madalina.duinea@gmail.com)

<sup>2</sup>CEA, DEN/DANS/DPC/SEARS//Laboratory for the Engineering of Surfaces and Lasers, F-91191 Gif-sur-Yvette, France (michel.schlegel@cea.fr)

FeS oxidative dissolution is an important source of environmental pollution by producing acid mine drainage (AMD). It is therefore essential to know the factors that control the interaction of FeS with oxidant solutions (pH, temperature, concentration of organic compounds, etc.). This study is aimed at investigating the effect of sulfosalicylic acid (an iron ligand) on the oxidative dissolution of FeS in aerated HCl solutions by using electrochemical methods. The surfaces of initial and reacted FeS were analyzed under optical microscope.

The experiments were performed in a three electrode electrochemical cell (Zahner KMZ3). The working electrode was made of synthetic FeS. The pH of the solutions was 2.5 and the temperature 25°C. The concentration of sulfosalicylic acid (SSA) ranged between 0.1 and 1 mM.

The oxidation current density ( $i_{ox}$ ) in the absence of SSA was 64 A cm<sup>-2</sup>.  $i_{ox}$  increased up to 76 A cm<sup>-2</sup> when the concentration of SSA increased up to 0.5 mM. Increasing SSA concentration up to 1 mM,  $i_{ox}$  decreased down to 59 A cm<sup>-2</sup>. The oxidation potential ( $E_{ox}$ ) slightly varied when the ligand concentration increased from 0 to 1 mM.

The obtained results indicate that at concentrations between 0.1 and 0.5 mM SSA accelerates the transfer of the electrons from FeS to dissolved oxygen. At concentrations greater than 0.5 mM the rates of oxidation decrease, suggesting that in such conditions SSA hinders the contact between oxidant and FeS.

This work was supported by a grant of the Romanian National Authority for Scientific Research, CNDI-UEFISCDI, project number 51/2012.