

Reactions of aqueous Au^{1+} sulfide species with pyrite as a function of pH and temperature

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ABSTRACT

The reactivity of aqueous Au^{1+} sulfides with FeS_2 at $\text{pH} = 3$ and 6 for temperatures of 25 and 90 °C has been investigated using X-ray photoelectron spectroscopy (XPS), scanning electron microscopy with energy dispersive X-ray analysis (SEM/EDXA), and static secondary ion mass spectrometry (SSIMS). The presence of both Au^{1+} and metallic Au are observed upon the FeS_2 surface. We show that Au deposition is increased at elevated pH or temperature; but the amount of Au deposited is far lower than in AuCl_4^- solutions owing to the greater stability of $\text{Au}(\text{SH})_x^{1-x}$ complexes. This is the first evidence of Au^{1+} on pyrite from bisulfide solutions using XPS.