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Transformation of pyrite to pyrrhotite in the presence of Au-Ag alloys at 500 °C

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Abstract

Dry annealing of Au_xAg_{1-x} alloys (x = 0.19, 0.35, 0.56 or of fineness 300, 500, 700‰) and pyrite was used to reveal the solubility of Au (Ag) in FeS_2 and study phase equilibria in the FeS_2-Au_xAg_{1-x} system at 500 °C. Pyrrhotite, acanthite, and uytenbogaardtite and Au-Ag alloys with increased fineness were established at the contacts of pyrite blocks with Au-Ag plates. The obtained results evidence the absence of solubility between FeS_2 and Au (Ag) at 500 °C. The Ag content in alloys influences the stability of pyrite and contributes to its transformation in pyrrhotite and sulfidation and ennobling of Au-Ag alloys. Au-Ag sulfides and pyrrhotite may be present in the sulfide ores of metamorphogene deposits as annealing products of Au-Ag-pyrite-bearing ores.

Keywords: Desulfidation, pyrite, pyrrhotite, visible and "invisible" gold (silver), isomorphism, thermodiffusion, sulfidation, ennobling of Au-Ag alloys, Au-Ag sulfides