

SILVER CEMENTATION WITH ZINC FROM RESIDUAL X-RAY FIXER, EXPERIMENTAL AND THERMOCHEMICAL STUDY

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Abstract

Silver cementation with zinc powder from residual X ray fixers (XRF) was studied. The chemical analysis of XRF showed 5.16 g/l (Ag), 0.56 g/l (Al), 5.24 g/L (K), 7.02 g/L (Na) and 172.56 g/L (S). The cementation process in terms of solution pH was thermodynamically modeled using FactSage by constructing the potential-pH diagram at 298.15 K. This diagram showed that the cementation process leads to metallic silver together residual unreacted zinc. The effects experimentally evaluated were: pH (ranged from 3.0 to 7.0), temperature (ranged from 298.15 to 318.15°K) and Ag/Zn (1:1, 1:2, 1:3, 1:4 and 1:5). The maxim silver cementation (99.93% Ag) was obtained at 30 s of reaction, pH 6.0, 298.15°K and Ag/Zn equal to 1:3. Ag cementation decreases for pH values of 3.0 and 4.0 and temperature values of 303.15 to 318.15°K. The X-Ray and SEM-EDS results showed that the cementation product is formed by Ag and Zn.

Keywords: Silver cementation, X ray fixer, Thermochemistry

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