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Recovery of Silver from Cyanide Leach Solutions by Precipitation using Trimercapto-*s*-triazine (TMT)

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Abstract

Cyanide leaching is the most common method used for production of silver from gold/silver ores. Silver (and gold) can be recovered from pregnant leach solutions (PLSs) using Merrill-Crowe process (zinc cementation) and activated carbon adsorption. Due to their inherent limitations and paucity of selectivity, development of alternative processes for selective recovery of silver from PLSs is of great interest. In the current study, selective recovery of silver by precipitation from cyanide solutions using an environmentally friendly organic reagent i.e. Trimercapto-*s*-triazine ($C_3N_3S_3$; TMT) was investigated. The results have shown that precipitation of silver by TMT is a rapid process in that 87.9% of silver could be precipitated at the initial period of 5 min. Response surface methodology (i.e. central composite design) was adopted to examine the main and interaction effects of [TMT]/[Ag] ratio (0.09-36.52), [CN]/[Ag] ratio (3-10) and initial concentration of silver (1-40 mg/L Ag) on the precipitation of silver in five levels. The statistical analysis of the experimental data revealed that ratio of [TMT]/[Ag] (i.e. concentration of TMT) was the key parameter exerting a profound effect on the precipitation of silver. However, effects of [CN]/[Ag] ratio and Ag concentration appeared to be statistically insignificant. Complete precipitation of silver was found to be readily achieved under suitable conditions. The precipitation process was proved