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COMPARATIVE ADSORPTION OF PRECIOUS AND NON-PRECIOUS METALS FROM REAL REFINERY WASTEWATER USING COAL AND COCONUT BASED ACTIVATED CARBONS

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Abstract

This study investigates the recovery of precious metals from wastewater generated by a precious metal refining plant using adsorption techniques with coal-based activated carbon (Coal-AC) and coconut-based activated carbon (Coconut-AC). The research focuses on the recovery of precious metals at varying pH levels and different dosages of activated carbon. Additionally, since non-precious metals (non-PMs) are also present in the wastewater, their removal was examined under the optimal conditions identified. The Coal-AC and Coconut-AC used in this study were characterized using SEM-EDX, FTIR, and BET analyses. Coconut-AC exhibited a higher carbon content but a lower oxygen content compared to Coal-AC. The highest adsorption of precious metals was observed at pH 3 for Coal-AC and pH 1 for Coconut-AC. Both adsorbents achieved maximum adsorption capacity at an activated carbon dosage of 6 g/L. Notably, Coal-AC demonstrated superior adsorption performance for precious metals compared to Coconut-AC. The determined adsorption capacities for silver (Ag), gold (Au), palladium (Pd), and platinum (Pt) using Coal-AC were 1.262 mg/g, 0.558 mg/g, 0.847 mg/g, and 1.235 mg/g, respectively. Consequently, the recovery of precious metals from effluent generated by precious metal refining plants through activated carbon through adsorption can be considered a viable alternative method.

Key words: activated carbon, adsorption, precious metals, wastewater

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