Functional novel ligand based palladium(II) separation and recovery from e-waste using solvent-ligand approach

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ABSTRACT

The global e-waste generation is projected to leap tremendously over the following years due to the fast urbanization and increasing population. Inadequate management and uncontrolled disposal may impact significantly to the health and environment. E-waste could become a significant source of precious metals at the end of e-waste life. The recovery of precious metals from e-waste provides a sustainable solution; however, conventional hydrometallurgical approach bears a greater fraction of environmental concerns and energy utilization. In this study, effort has been given to recover palladium (Pd(II)) from ceramic capacitor using solvent-ligand process with a focus on environmental sustainability. The use of 3–(((5–ethoxybenzenethiol)imino)methyl)–salicylic acid as a ligand to recover Pd(II) from ceramic capacitor was investigated. The effects of different variables such as, contact time and reaction temperature, leaching kinetics as well as the environmental assessment of synthesis process were examined. The high purity of Pd(II)was recovered from ceramic capacitor under optimized condition, as evident from XRD and XPS analysis. The formation of [Pd(II)-ligand]$^{n+}$ complexes was attributed to the recovery of pure metallic Pd(II). The environmental assessment measured from Biwer and Heinzle Method (BHM) indicated that the solvent-legend approach for recovering

Pd(II)is associated with the lower impact on the environment compared with the other process. The results open up a sustainable recovery of precious metals contributing to the circular economy.

KEYWORDS

E-waste; Palladium(II) separation and recovery; Sustainability; Precious metals; Ceramic capacitor; Solid-liquid approach

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