

Feasibilities for Recovering of Precious Metals from Printed Circuit Board Waste

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Abstract : Market development of electrical and electronic equipment and a short life cycle is driven by the increasing waste streams. Gold Au, copper Cu, silver Ag and palladium Pd can be found on printed circuit board. These metals make up the largest value of printed circuit board. Therefore, the printed circuit boards scrap is valuable as potential raw material for precious metals recovery. A comparison of Cu, Au, Ag, Pd recovery from waste printed circuit techniques was selected metals leaching of chemical reagents. The study was conducted using the selected multistage technique for Au, Cu, Ag, Pd recovery of printed circuit board. In the first and second metals leaching stages, as the elution reagent, 2M H₂SO₄ and H₂O₂ (35%) was used. In the third stage, leaching of precious metals used solution of 20 g/l of thiourea and 6 g/l of Fe₂(SO₄)₃. Verify the efficiency of the method was carried out the metals leaching test with aqua regia. Based on the experimental study, the leaching efficiency, using the preferred methodology, 60 % of Au and 85,5 % of Cu dissolution was achieved. Metals leaching efficiency after waste mechanical crushing and thermal treatment have been increased by 1,7 times (40 %) for copper, 1,6 times (37 %) for gold and 1,8 times (44 %) for silver. It was noticed that, the Au amount in old (> 20 years) waste is 17 times more, Cu amount - 4 times more, and Ag - 2 times more than in the new (< 1 years) waste. Palladium in the new printed circuit board waste has not been found, however, it was established that from 1 t of old printed circuit board waste can be recovered 1,064 g of Pd (leaching with aqua regia). It was found that from 1 t of old printed circuit board waste can be recovered 1,064 g of Ag. Precious metals recovery in Lithuania was estimated in this study. Given the amounts of generated printed circuit board waste, the limits for recovery of precious metals were identified.

Keywords : leaching efficiency, limits for recovery, precious metals recovery, printed circuit board waste

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