

Amino acid leaching of base and precious metals from printed circuit board waste

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The recovery of metals from waste printed circuit boards, a key component in electronic equipment, is beneficial from both an environmental and economic perspective. Current hydrometallurgical processing routes utilise strong mineral acids and cyanide or halides, which pose environmental hazards. Amino acids have been proposed as alternative lixiviants with a lower environmental impact. This project aimed to evaluate the applicability of the amino acid leaching process for the dissolution of metals from printed circuit board waste, which is a novel approach for this application.

Batch leach tests were performed to determine the rate, extent and selectivity of base and precious metal leaching at different conditions. Both temperature and oxidant type had a significant effect on base metal leaching. Copper dissolution after 22 hours increased from 29.4% to 80.7% as the temperature was increased from 25°C to 60°C. Using pure oxygen as oxidant instead of air increased the copper dissolution at 60°C from 37.2% to 80.7%, due to the increased concentration of dissolved oxygen in the system. The relatively low solubility of copper in the glycine system limited the mass of solids fed per volume of leach solution. Final copper concentrations of 4 – 5 g/L were achieved.

The solid residue from the base metal leach stage was used as feed material for the precious metal leach stage. Hydrogen peroxide, acting as oxidant, was fed continuously. Increasing the temperature, glycine concentration and pH had no significant effect on gold extraction, with less than 5% gold dissolution achieved after 96 hours.