



## Release characteristics and water washing of heavy metals from electroplating sludge during low-temperature drying

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### ABSTRACT

This work demonstrates the electroplating sludge (ES) drying and the control method of heavy metal exhaust during the low-temperature drying process. The drying efficiency of ES has a maximum value at an air volume of  $1.1 \text{ m}^3 \text{ h}^{-1}$  and a drying temperature of  $70^\circ\text{C}$ . The release amounts of heavy metals of the process were measured with inductively coupled plasma. Specifically, the release amounts were 0.009, 0.124, 0.170 and  $2.097 \mu\text{g g}^{-1}$  for Cu, Ni, Mn and Zn without the employment of control methods, respectively, which exceed China's National Standard. Nevertheless, the release amount of heavy metals can meet the National Standard after the exhaust gas was washed by absorption solution with pH above 5. Further, the maximum absorption rates of Cu, Ni, Mn and Zn were 63.97%, 98.79%, 98.16% and 99.24%, respectively at a pH of 13. The absorption rates of Cu, Ni, Mn and Zn were 63.67%, 90.68%, 97.87% and 91.37%, respectively when water was used as the absorption solution with a pH of 7, which was a low-cost method. Dried ES sample was analyzed by X-ray diffraction, X-ray photoelectron spectroscopy and scanning electron microscopy–energy-dispersive X-ray analysis. The released amount of heavy metals increased with the increase of the content of heavy metals in ES. Electroplating enterprises will save 46.3% disposal cost by drying electroplating sludge at low-temperature.

*Keywords:* Water washing of heavy metals; Electroplating sludge; Hazardous waste; Low-temperature drying

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