

# VA Application Note No. V - 188

**Title:** Cadmium and lead in polymer materials as part of electrotechnical products

**Summary:** The EU directive on «Restriction of Hazardous Substances» (RoHS) requires the testing of four regulated heavy metals (Pb, Hg, Cd, Cr(VI)) in electrotechnical products. After sample preparation according to IEC 62321 the determination of lead and cadmium in polymer materials can be carried out by anodic stripping voltammetry (ASV) using ammonium oxalate buffer pH 2.

**Sample:** Polymer materials

**Sample preparation:** Approx. 0.2 g of the ground sample is mineralized by dry ashing as described in IEC 62321.

## Analysis of Cd, Pb

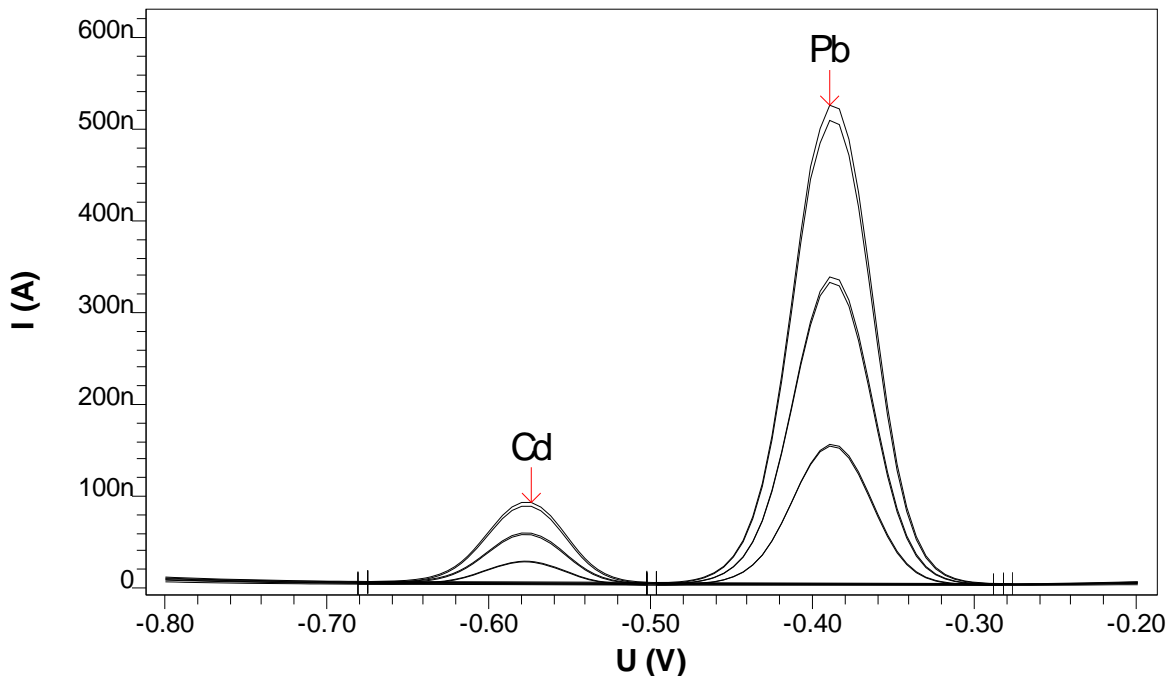
<b>Electrolyte</b>	Ammonium oxalate buffer pH 2 c(ammonium oxalate) = 0.1 mol/L	
<b>Measuring solution</b>	10 mL	ultrapure water
	+ 1 mL	ammonium oxalate buffer pH 2
	+ 0.5 mL	digested sample solution (equals approx. 2 mg of ground sample)
<b>Working electrode (WE)</b>	<b>MME</b> (Multi Mode Electrode)	6.1246.020
	With silanized capillary	6.1226.050
<b>Auxiliary electrode (AE)</b>	<b>Pt</b>	6.0343.000
<b>Reference electrode (RE)</b>	Reference system: Ag/AgCl/KCl (3 mol/L)	6.0728.020
	Intermediate electrolyte: c(KCl) = 3 mol/L	6.1245.010

<b>Parameters</b>	Working electrode	HMDE
	Stirrer speed	2000 rpm
	Mode	DP
	Purge time	300 s
	Deposition potential	-0.85 V
	Deposition time	30 s
	Equilibration time	10 s
	Pulse amplitude	0.05 V
	Start potential	-0.8 V
	End potential	-0.2 V
	Voltage step	0.006 V

Voltage step time	0.6 s
Sweep rate	0.01 V/s
Peak potential Cd	-0.6 V
Peak potential Pb	-0.4 V

<b>Results:</b>	Cd	Pb
	102.2 mg/kg	1043.8 mg/kg

### Determination of Cd and Pb



**Cd**  
 $c = 102.229 \text{ mg/kg}$   
 $\pm 3.024 \text{ mg/kg (2.96\%)}$

**Pb**  
 $c = 1043.753 \text{ mg/kg}$   
 $\pm 20.916 \text{ mg/kg (2.00\%)}$

