VA Application Note No. V - 191

Title:	**Cadmium and lead in metalic 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 metalic materials can be carried out by anodic stripping voltammetry (ASV) using ammonium oxalate buffer pH 2.

Sample:	Metalic materials
Sample preparation:	Approx. 1 g of sample is dissolved in a mixture of nitric acid and hydrofluoric acid as described in IEC 62321.

Analysis of Cd, Pb

Electrolyte
Ammonium oxalate buffer pH 2
c(ammonium oxalate) = 0.1 mol/L

Measuring solution

10 mL	ultrapure water	
+ 1 mL	ammonium oxalate buffer pH 2	
+ 0.25 mL	digested sample solution (equals approx. 2.5 mg of sample)	

Working electrode (WE)

MME (Multi Mode Electrode)	6.1246.020
With silanized capillary	6.1226.050

Auxiliary electrode (AE)
Pt 6.0343.000

Reference electrode (RE)

Reference system: Ag/AgCl/KCl (3 mol/L)	6.0728.020
Intermediate electrolyte: c(KCl) = 3 mol/L	6.1245.010

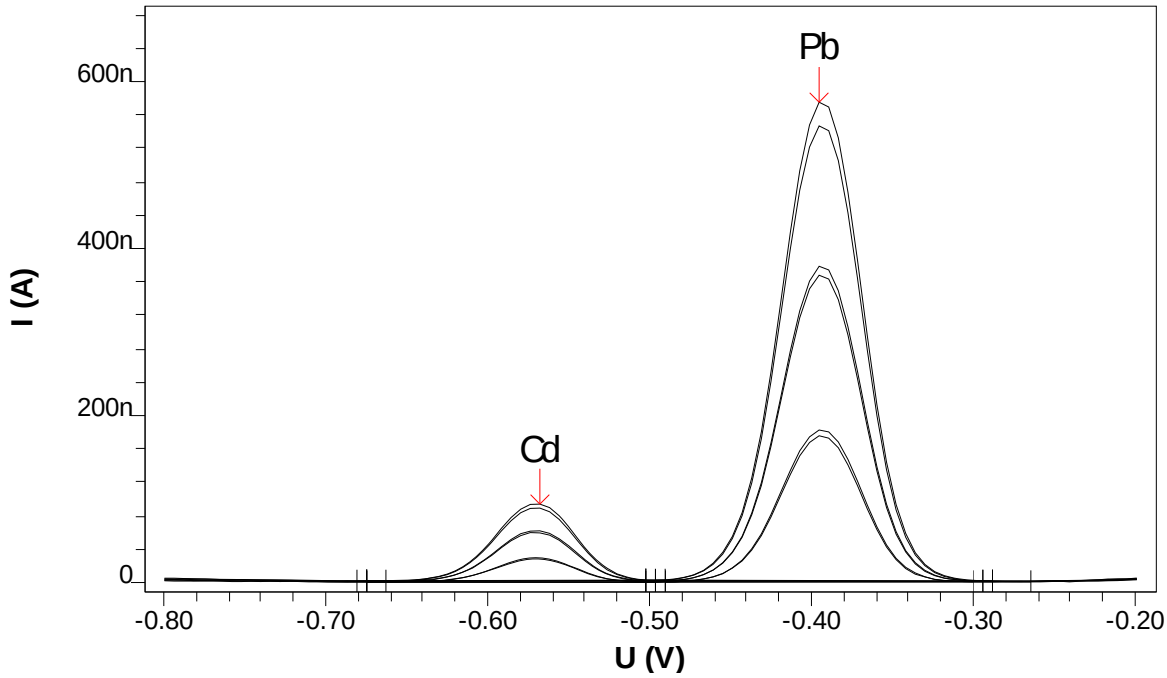
Parameters

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

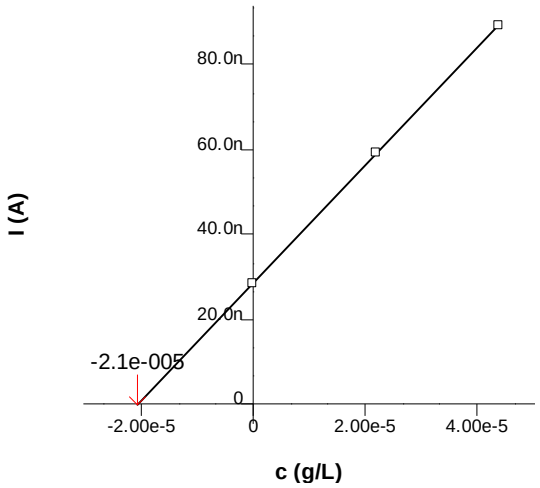
	Voltage step time	0.6 s
	Sweep rate	0.01 V/s
	Peak potential Cd	-0.6 V
	Peak potential Pb	-0.4 V

Results:	Cd	Pb
	92.4 mg/kg	923.5 mg/kg

Determination of Cd and Pb



Cd
c = 92.427 mg/kg
+/- 3.996 mg/kg (4.32%)



Pb
c = 923.545 mg/kg
+/- 36.713 mg/kg (3.98%)