

VA Application Note No. V - 193

Title:	Mercury in metallic materials as part of electrotechnical products
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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 mercury in metallic materials can be carried out by anodic stripping voltammetry (ASV) at a gold rotating disk electrode (Au-RDE).
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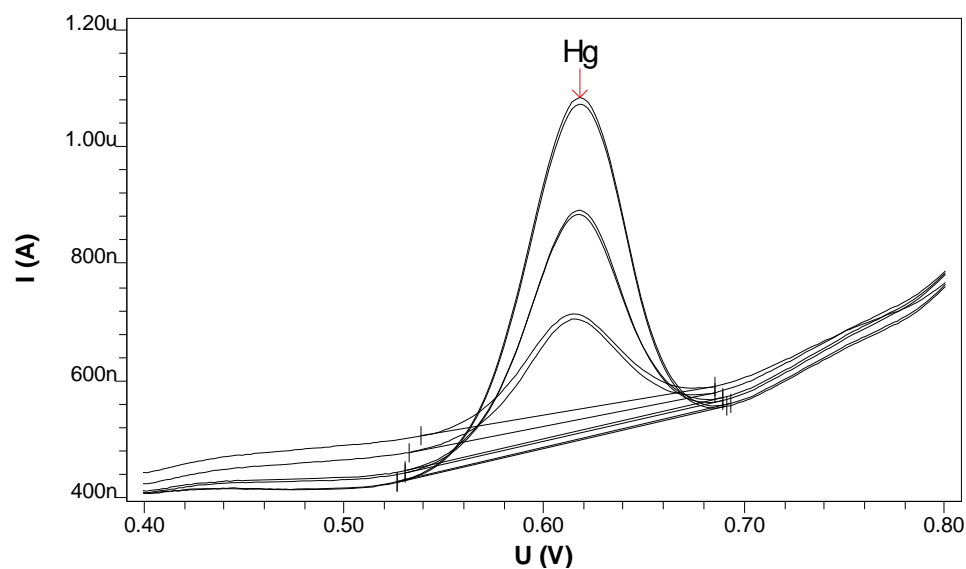
Sample:	Metallic materials
Sample preparation:	Approx. 1 g of sample is digested with aqua regia as described in IEC 62321.

Analysis of Hg															
Electrolyte	<i>Perchloric acid electrolyte</i> $c(\text{HClO}_4) = 0.22 \text{ mol/L}$ $c(\text{EDTA}) = 4 \text{ mmol/L}$ $c(\text{NaCl}) = 6 \text{ mmol/L}$														
Measuring solution	10 mL ultrapure water + 10 mL perchloric acid electrolyte + 0.05 mL digested sample solution (equals approx. 0.2 mg of sample)														
Working electrode (WE)	Au-RDE Gold electrode tip 6.1204.140 Driving axle 6.1204.210														
Auxiliary electrode (AE)	GC Glassy carbon rod 6.1247.000 Electrode holder 6.1241.020														
Reference electrode (RE)	Reference system: Ag/AgCl/KCl (3 mol/L) 6.0728.020 Intermediate electrolyte: $c(\text{NaCl}) = 3 \text{ mol/L}$ 6.1245.010														
Parameters	<table border="1"> <tr> <td>Working electrode</td><td>RDE</td></tr> <tr> <td>Stirrer speed</td><td>2000 rpm</td></tr> <tr> <td>Mode</td><td>DP</td></tr> <tr> <td>Purge time</td><td>300 s</td></tr> <tr> <td>Cleaning potential</td><td>+1.3 V</td></tr> <tr> <td>Cleaning time</td><td>30 s</td></tr> <tr> <td>Deposition potential</td><td>+0.37 V</td></tr> </table>	Working electrode	RDE	Stirrer speed	2000 rpm	Mode	DP	Purge time	300 s	Cleaning potential	+1.3 V	Cleaning time	30 s	Deposition potential	+0.37 V
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Deposition time	30 s
Equilibration time	10 s
Pulse amplitude	0.05 V
Start potential	+0.4 V
End potential	+0.8 V
Voltage step	0.002 V
Voltage step time	0.1 s
Sweep rate	0.02 V/s
Peak potential Hg	+0.64 V

Results:	Hg
	1025.2 mg/kg

Determination of Hg



Hg
 $c = 1025.238 \text{ mg/kg}$
 $\pm 35.952 \text{ mg/kg (3.51\%)}$

