

# VA Application Note No. V-105

<b>Title:</b>	<b>Thallium besides excess of cadmium in zinc plant electrolytes (concentrated ZnSO<sub>4</sub> solutions)</b>
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<b>Summary:</b>	Thallium and cadmium can be determined by anodic stripping voltammetry (ASV) at the HMDE (Tl) and polarography at the DME (Cd), respectively using aqueous hydrochloric acid as supporting electrolyte. Since Cd is present in high excess and would therefore interfere with the determination of thallium, a post electrolysis procedure is applied to remove the codeposited metal from the mercury drop.
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<b>Sample:</b>	Zinc plant electrolyte (concentrated ZnSO <sub>4</sub> solution)
<b>Sample preparation:</b>	none

<b>Determination of thallium</b>																									
<b>Electrolyte</b>	Hydrochloric acid: w(HCl) = 30%, suprapur																								
<b>Measuring solution</b>	100 µL sample + 10 mL ultrapure water + 1 mL hydrochloric acid																								
<b>Auxiliary electrode (AE)</b>	Pt																								
<b>Reference electrode (RE)</b>	Ag/AgCl/KCl (3 mol/L)																								
<b>Parameters</b>	<table border="1"> <tr> <td>Working electrode</td> <td>HMDE</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>Deposition potential</td> <td>-700 mV</td> </tr> <tr> <td>Deposition time</td> <td>60 s</td> </tr> <tr> <td>Post electrolysis potential</td> <td>-540 mV</td> </tr> <tr> <td>Post electrolysis time</td> <td>30 s</td> </tr> <tr> <td>Equilibration time</td> <td>10 s</td> </tr> <tr> <td>Pulse amplitude</td> <td>50 mV</td> </tr> <tr> <td>Start potential</td> <td>-600 mV</td> </tr> <tr> <td>End potential</td> <td>-300 mV</td> </tr> </table>	Working electrode	HMDE	Stirrer speed	2000 rpm	Mode	DP	Purge time	300 s	Deposition potential	-700 mV	Deposition time	60 s	Post electrolysis potential	-540 mV	Post electrolysis time	30 s	Equilibration time	10 s	Pulse amplitude	50 mV	Start potential	-600 mV	End potential	-300 mV
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Voltage step	6 mV
Voltage step time	0.3 s
Sweep rate	20 mV/s
Peak potential Tl	-460 mV

### Determination of cadmium

**Electrolyte** Hydrochloric acid:  
w(HCl) = 30%, suprapur

**Measuring solution** 100 µL sample  
+ 10 mL ultrapure water  
+ 1 mL hydrochloric acid  
[analysis solution from the determination of Tl]

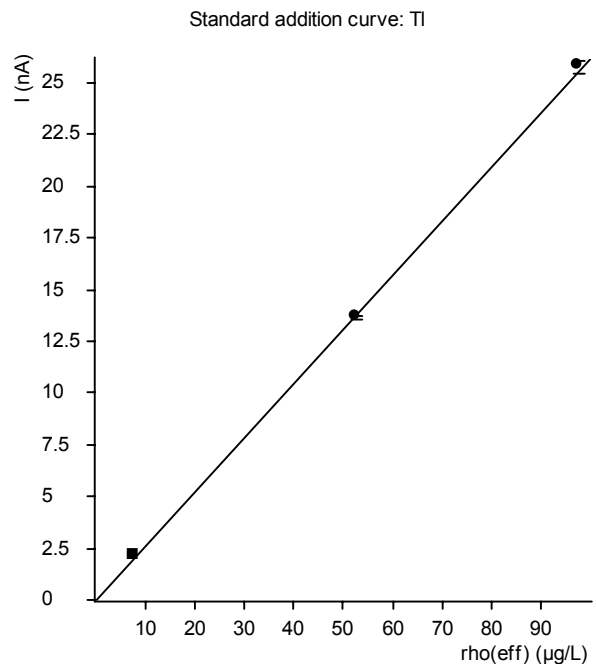
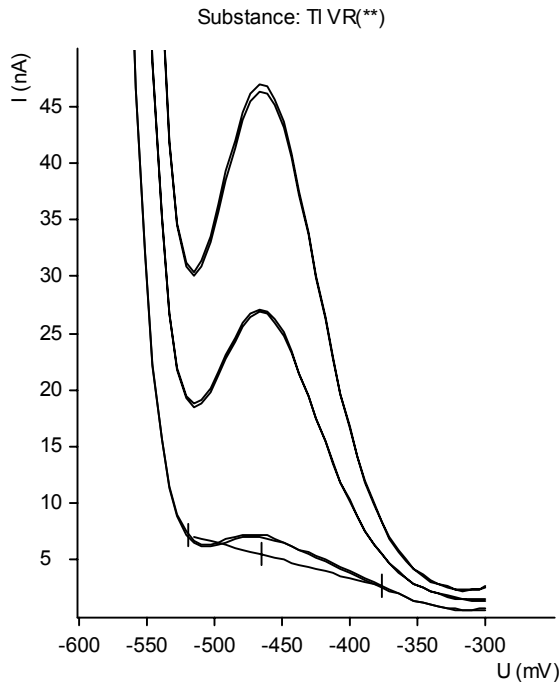
**Auxiliary electrode (AE)** Pt

**Reference electrode (RE)** Ag/AgCl/KCl (3 mol/L)

<b>Parameters</b>	Working electrode	DME
	Stirrer speed	2000 rpm
	Mode	DP
	Purge time	300 s
	Equilibration time	10 s
	Pulse amplitude	50 mV
	Start potential	-450 mV
	End potential	-750 mV
	Voltage step	6 mV
	Voltage step time	0.4 s
	Sweep rate	15 mV/s
	Peak potential Cd	-610 mV

<b>Results:</b>	Tl	Cd
	0.85 mg/L	479 mg/L

### Determination of TI



### Determination of Cd

