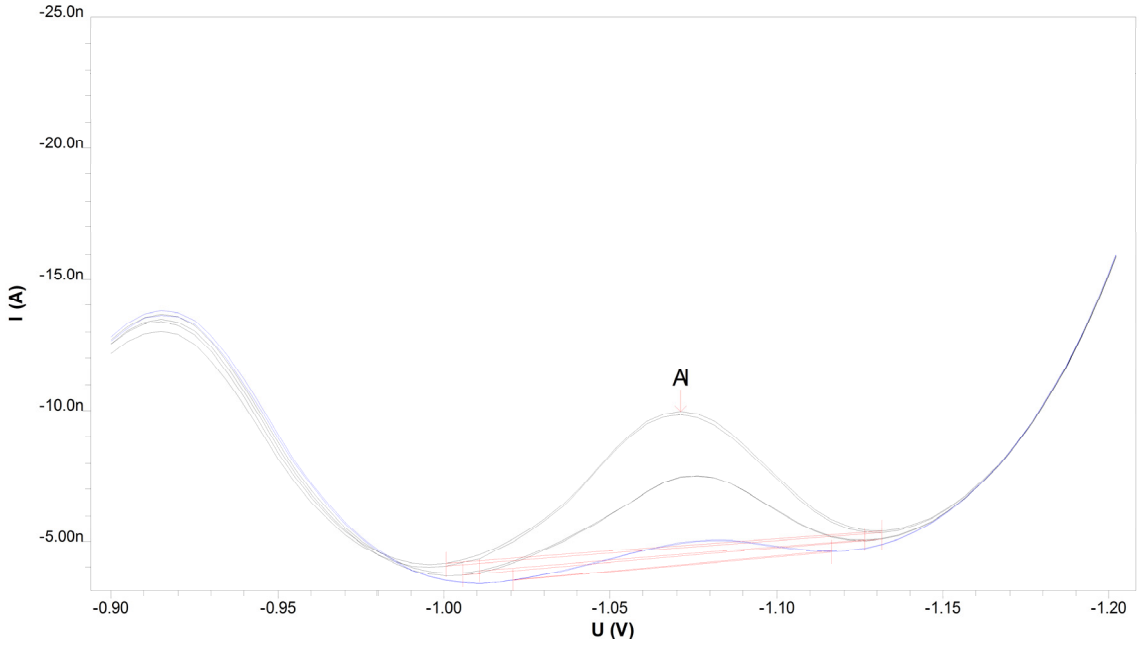
VA Application Note V–198

Aluminum in drinking water by adsorptive stripping voltammetry using alizarin red S (DASA) as complexing agent



Aluminum can be determined in drinking water by adsorptive stripping voltammetry at the HMDE using alizarin red S (DASA) as complexing agent. The method is linear up to 35 µg/L. The detection limit for this method is β(Al) = 1 µg/L, the limit of quantification is β(Al) = 3 µg/L. The sensitivity of the method cannot be increased by deposition.

Results

Al in drinking water
4.0 µg/L

Metrohm

Method description

Sample

- Tap water

Instrument

797 VA Computrace

Electrodes

Working electrode (WE)	6.1246.020 MME (Multi-Mode Electrode) with 6.1226.050 silanized glass capillary
Reference electrode (RE)	6.0728.000 reference electrode (Ag/AgCl/ c(KCl) = 3 mol/L) with 6.1245.000 glass electrolyte vessel filled with intermediate electrolyte c(KCl) = 3 mol/L
Auxiliary electrode (AE)	6.0343.000 platinum electrode

Reagents

HNO_3	Nitric acid, suprapur, $w(HNO_3)$ = 65 %
Ca solution	Commercial Ca standard stock solution, $\beta(Ca)$ = 1 g/L
NH_4Cl	Ammonium chloride, suprapur, NH_4Cl
NaOH	Sodium hydroxide solution, suprapur, w(NaOH) = 30 %
KBrO3	Potassium bromate, analytical grade
DASA	Alizarin red S sodium salt (DASA, 3,4-Dihydroxy-9,10-dioxo-2-anthracenesulfonic acid sodium salt, $C_{14}H_7NaO_7S$, CAS 130-22-3)
Al standard stock solution	$\beta(Al^{3+})$ = 1 g/L

Solutions

Ammonia buffer	$c(NH_4Cl)$ = 1.0 mol/L, adjusted to pH= 9.2 with NaOH
$KBrO_3$ solution	$c(KBrO_3)$ = 0.1 mol/L
DASA solution	c(DASA) = 5.26 mmol/L in water
Al standard addition solution	$\beta(Al^{3+})$ = 1 mg/L, acidified with 1 mL/L HNO_3

Analysis

Measuring solution	10 mL sample + 0.1 mL Ca solution + 1 mL ammonia buffer + 1 mL $KBrO_3$ solution + 0.1 mL DASA solution

Parameters

Working electrode	HMDE
Drop size	4
Stirrer speed	2000 rpm
Mode	DP
Initial purge time	300 s
Addition purge time	120 s
Deposition potential	0 V
Deposition time	0 s
Equilibration time	5 s
Pulse amplitude	0.05 V
Start potential	-0.9 V
End potential	-1.2 V
Voltage step	0.005 V
Voltage step time	0.2 s
Sweep rate	0.025 V/s
Peak potential Al	-1.07 V

Metrohm