Titration Application Note T–120

Automated determination of manganese in aqueous solution using the Cu ISE



Manganese in aqueous solutions can be analyzed by back-titration in alkaline solution. The ion-selective copper electrode is used as indicator electrode.



Method description

Sample

Aqueous solution of manganese

Sample preparation

Strongly acidic sample solutions (e.g., from acid digestions) are pre-neutralized to pH = 3...4 with ammonia.

Configuration

907 Titrando	2.907.0010
815 Robotic USB Sample Processor XL	2.815.0020
786 Swing head	2.786.0040
Swing arm	6.1462.070
Titration head	6.1458.010
Sample rack $28 \times 200 \text{ mL}$	6.2041.830
800 Dosino, 5 \times	2.800.0010
802 Stirrer	2.802.0020
10 mL Dosing unit, 3 $ imes$	6.3032.210
20 mL Dosing unit	6.3032.220
50 mL Dosing unit	6.3032.250
Disposable PP sample beakers, 200 mL, 1000 pieces	6.1459.310
Cu ISE	6.0502.140
LL ISE Reference	6.0750.100

Analysis

Pipet a sample volume containing no more than 45 mg Mn^{2+} into the titration vessel and dilute with 50 mL deion. H₂O. Add 10.00 mL c(EDTA) = 0.1 mol/L and 5 mL buffer solution pH = 10. Back-titrate the EDTA excess with c(CuSO₄) = 0.1 mol/L until after the first equivalence point.

Parameters

Mode	MET U
Pause	30 s
Stirring rate	8
Signal drift	50 mV/min
Min. waiting time	5 s
Max. waiting time	26 s
Volume increment	0.05 mL
Stop EP	1
Volume after EP	1 mL
EP criterion	30 mV
EP recognition	greatest

Results

Mean results (n = 4)	
Mn content / (g/L)	0.926
s(rel) / %	0.33

Solutions

Titrant	$c(CuSO_4) = 0.1 \text{ mol/L}$ If possible this solution should be bought from a supplier.
EDTA solution	c(EDTA) = 0.1 mol/L If possible this solution should be bought from a supplier.
Buffer solution pH = 10	54 g NH ₄ Cl is weighed into a 1 L volumetric flask and dissolved in deionized water. 350 mL w(NH ₃) = 25% is added and the mixture made up to 1 L with deionized water.

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