

Iodimetric titration of Tin (Sn(II))

Determination of tin as Sn(II) in catalyst by iodimetric redox titration with iodine (KI/KIO₃) and a DM140 Pt-ring electrode.

Sample	Stannous octate catalyst, 0.04 - 0.05 g	Preparation and Procedures <u>Sample preparation:</u> 1.) Add 50 mL conc. hydrochloric acid and 90 mL deionized water. 2.) Add dry ice (i.e. solid CO ₂) or let CO ₂ gas bubbling for 2 minutes. 3.) Weigh 0.04-0.05 g of catalyst into a 250 mL glass titration beaker. 4.) Under continuous CO ₂ -atmosphere the sample solution is boiled during 3 min. Tin(IV) is reduced to Tin(II). The oxygen-free atmosphere avoids oxidation of Sn(II) by air. 5.) Add dry ice to cool down the boiling solution. 6.) Titrate immediately with KI/KIO ₃ solution.
Substance	Tin, Sn M = 118.71 g/mol , z = 1	
Chemicals	90 mL deionised water, 50 mL conc. HCl (see preparation)	
Titrant	Iodide/iodate solution, KI/KIO ₃ c(KI/KIO ₃) = 0.0078 mol/L (1/128)	
Standard	As ₂ O ₃ (see application M016)	
Instruments	DL50Graphix, DL5x, DL7x Analytical balance, printer	
Accessories	250 mL glass beaker, ME-23515 1 DV1020 burette	
Indication	DM140-SC	Remarks 1) Whenever possible, use CO ₂ gas for bubbling in order to insure an oxygen-free atmosphere. 2) A blank value could be necessary. 3) Iodine is generated in the strongly acidic solution by using a potassium iodide/iodate solution as a titrant. These solutions are commercially available from chemical producers.
Chemistry	$I_2 + Sn^{2+} = 2 I^- + Sn^{4+}$ Iodine is generated in the beaker: $KIO_3 + 5KI + 6HCl = 3I_2 + 6KCl + 3H_2O$	
Calculation	$R1 = Q1 \cdot C1 / m, \%$ $C1 = M / (10 \cdot z)$	
Waste disposal	Neutralize the sample before final disposal as metal ion solution.	
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Results

METTLER DL77 Titrator V3.1 Mettler-Toledo AG
114 Market Support Laboratory

Method Sn²⁺ Determination of Sn²⁺ 25-Jul-1995 17:49
User
Measured 25-Jul-1995 18:17

RESULTS

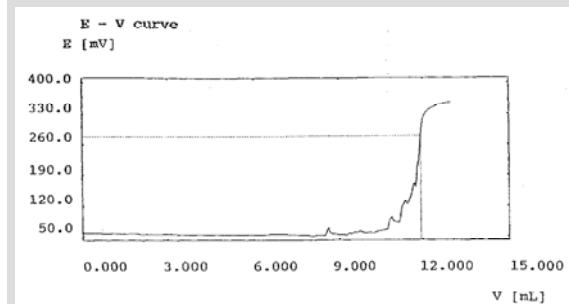
No	ID1	ID2	Sample amount and results	
1/1	Sn2+		0.04656 g	Weight m
			R1 = 10.321 %	
1/2	Sn2+		0.0378 g	Weight m
			R1 = 10.630 %	
1/3	Sn2+		0.04975 g	Weight m
			R1 = 11.094 %	

STATISTICS

Number results	R1	n = 3	
Mean value		x = 10.682	%
Standard deviation		s = 0.389048	%
Rel. standard deviation		srel = 3.642	%
Outlier test: no outliers!			

Table of measured values

Titration curve



Method

Method	Sn ²⁺ Version	Determination of Sn ²⁺ 25-Jul-1995 17:49
Title		
Method ID	Sn ²⁺	
Title	Determination of Sn ²⁺	
Date/time	25-Jul-1995 17:49	
Sample		
Number samples	1	
Titration stand	Stand 1	
Entry type	Weight m	
Lower limit [mL]	0.015	
Upper limit [mL]	0.05	
ID 1	Sn ²⁺	
Molar mass M	118.69	
Equivalent number z	1	
Stir		
Speed [%]	70	
Time [s]	10	
Titration		
Titrant	KI/KIO ₃	
Concentration [mol/L]	0.0078	
Sensor	DM140-SC	
Unit of meas.	mV	
Titration mode	EQP	
Predispensing 1	mL	
Volume [mL]	7.0	
Titrant addition	DYN	
dE(set) [mV]	8.0	
Limits dV	Absolute	
dV(min) [mL]	0.06	
dV(max) [mL]	0.1	
Measure mode	EQU	
dE [mV]	0.5	
dt [s]	1.0	
t(min) [s]	3.0	
t(max) [s]	10.0	
Threshold	400.0	
Maximum volume [mL]	13.0	
Evaluation procedure	Standard	
Steepest jump only	Yes	
Calculation		
Result name		
Formula	R=Q*C/m	
Constant	C=M/(10*z)	
Result unit	%	
Decimal places	3	
Record		
Output unit	Printer	
Raw result last sample	Yes	
Table of values	Yes	
E - V curve	Yes	
Statistics		
Ri (i=index)	R1	
Standard deviation s	Yes	
Rel. standard deviation srel	Yes	
Outlier test	Yes	
Record		
Output unit	Printer	
All results	Yes	