Determination of Selenite SeO_3^{2-}

Description

The determination of the Selenium - content is done by reaction of the Selenite with Potassium iodide and titration with Sodium thiosulfate solution 0.1 mol/l.

$$SeO_3^{2-} + 4\ I^- \rightarrow Se + 2\ I_2$$

This determination is not always easy because the elemental selenium precipitates out of the solution and can pollute the electrode. For this reason, polyvinyl alcohol must be added as a dispersant. The calculation is done as% selenium.

Instruments

Titrator	TL 7000 or higher
Exchangeable head	WA 50
Electrode	Pt 62 oder Pt 61
Cable	L 1 A
Stirrer	Magnetic stirrer TM 235
Lab accessory	Glass beaker 150 ml
	Magnetic stirrer bar 30 mm

Reagents

1	Sodium thiosulfate 0.1 mol/l
2	Potassium Iodide
3	Hydrochloric acid ~25%
4	Polyvinylalkohol – solution 0.5%
5	Distilled Water
6	Electrolyt solution L300
All reagents should be of analytical grade or better.	

Titration procedure

Reagents

The titer determination of the $Na_2S_2O_3$ - solution is carried out as described in the application report "Titer determination of $Na_2S_2O_3$".

Polyvinyl alcohol - solution 0.5%
0.5 g of polyvinyl alcohol are dissolved in 100 ml of distilled water with heating.

Cleaning of the electrode

The electrode is rinsed with distilled water. The electrolyte solution L300 is suitable for storage.

Sample preparation

The sample is weighed into a 150 ml beaker and made up to about 70 ml with distilled water and 5 ml of HCl 25% are added. For basic samples, more HCl may be needed. After dissolving the sample, 1 ml of the polyvinyl alcohol solution and 1-1.5 g of KI are added. The solution turns reddish-brown and becomes cloudy. Then it is titrated with sodium thiosulfate 0.1 mol / l. The consumption should be about 10 - 40 ml.

The amount of sample should be adjusted to the selenium content.

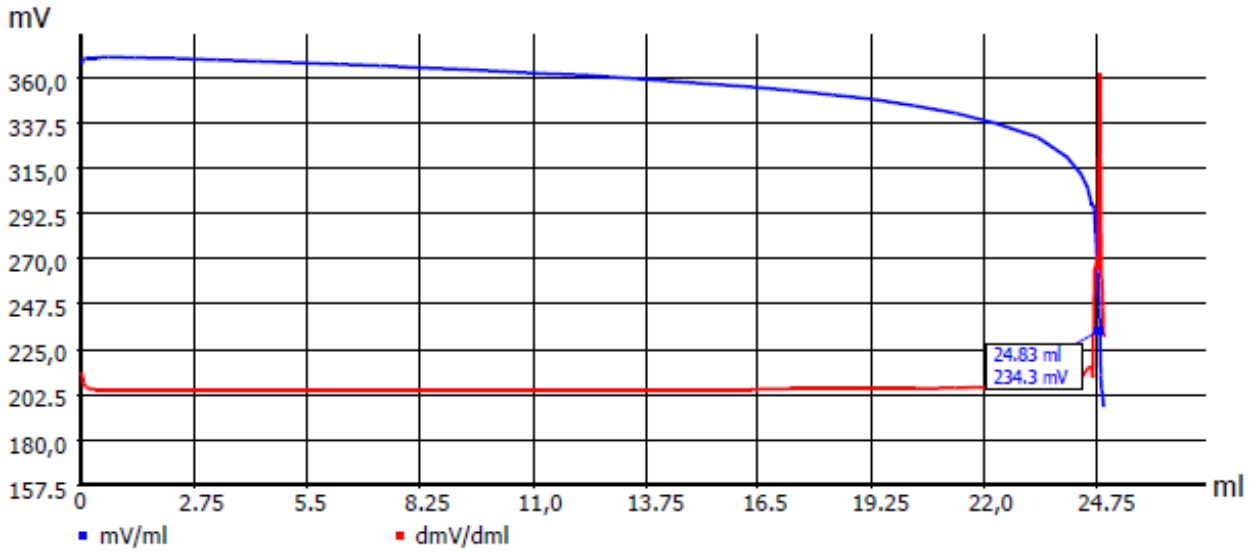
Selenium content [% Se]	Sample [g]
~ 50%	0,1 – 0,15
~ 5%	0,8-1,2g

For inhomogeneous samples, e.g. mixtures of solid Sodium selenite with fillers, it may be necessary to dissolve a larger amount of sample and titrate an aliquot of it.

If the electrode is rapidly polluted by precipitated selenium and the titration curve becomes more noisy, it may be better to dilute the sample more strongly.

Titration parameter

Sample titration



Default method	-		
Method type	Automatic titration		
Modus	Dynamic		
Measured value	mV		
Measuring speed / drift	User defined	Minimum holding time	5 s
		Maximum holding time	15 s
		Measuring time	3 s
		Drift	8 mV/min
Initial waiting time	0 s		
Dynamic	average	Max step size	1.0 ml
		Slope max ml	10
		Min. step size	0.02 ml
		Slope min. ml	120
Damping	none	Titration direction	increase
Pretitration	off	Delay time	0 s
End value	off		
EQ	On (1)	Slope value	700
Max. titration volume	50 ml		
Dosing speed	100%	Filling speed	30 s

Calculation:

$$Result\ [\%\ Se] = \frac{(B - EQ1) * T * M * F1}{W * F2}$$

B	0	Blank value
EQ1		Consumption of titrant at first Equivalence point
T	WA	Actual concentration of the titrant
M	78.97	Molecular weight
W	man	sample weight in g
F1	0.1	Conversion factor
F2	4	Conversion factor

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