Iodometric titrations

Description

Iodometry is a good method for determining oxidants such as peroxides, chlorine, hypochlorite, potassium permanganate and many others. The sample is acidified and potassium iodide is added in excess. The potassium iodide is oxidized to iodine by the oxidising agent contained in the sample, the iodine is titrated with sodium thiosulfate.

Example: Determination of peroxides.

$$H_2O_2 + 2\ I^- + 2\ H^+ \rightarrow I_2 + 2\ H_2O$$
$$I_2 + 2\ S_2O_3^{2-} \rightarrow 2\ I^- + S_4O_6^{2-}$$

Instruments

Titrator	TL 5000, TL 7000, TL 7750, TL 7800
Exchange unit	WA 10, WA 20, WA 50
Electrode	Pt 62, Pt 62 RG, Pt 61 oder similar
Cable	L1A
Lab accessory	Magnetic stirrer TM 235 or similar
	Glass beaker 150 ml

Reagents

1	Sodium thiosulfate 0.1 mol/L
2	Potassium Iodide
3	Sulfuric acid ~25%
4	Distilled Water
All reagents should be of analytical grade or better.	

Titration procedure

Reagents

Sodium thiosulfate solution
Sodium thiosulfate is available as a ready-to-use solution.
The titer determination of the $Na_2S_2O_3$ solution is carried out as described in the application note "Titer determination $Na_2S_2O_3$".

Sulfuric acid 25%
Sulfuric acid 25% is available as a ready-to-use solution.

Cleaning of the electrode

The electrode is rinsed with distilled water. The electrolyte solution L300 is suitable for storage. For Pt 62 RG dist. Water is suitable for storage.

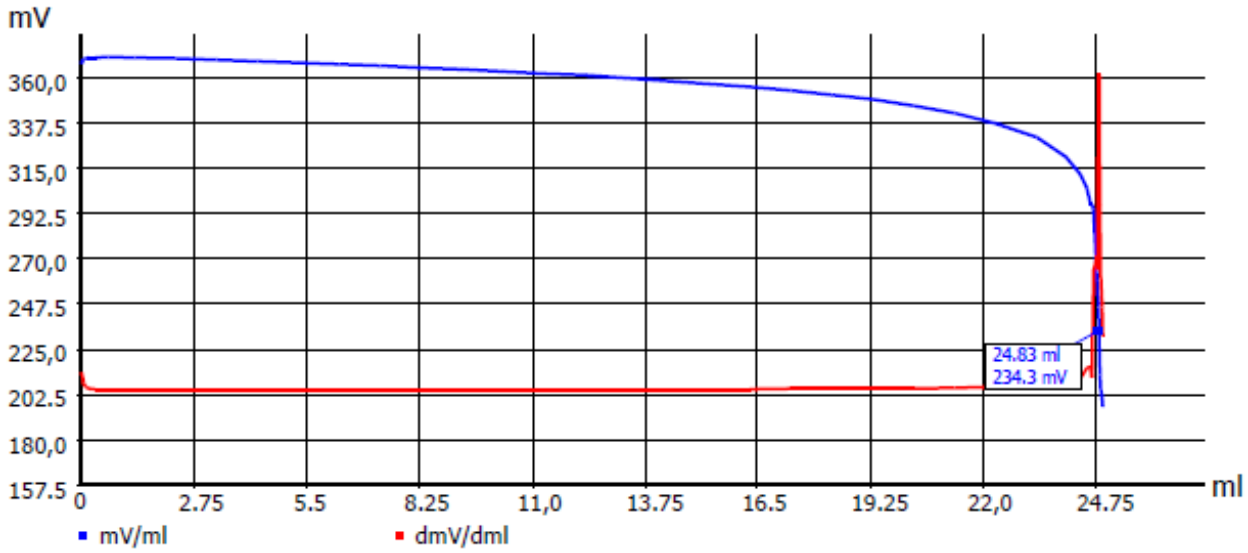
Sample preparation

The sample is weighed into a 150 ml beaker and made up to about 70 ml with distilled water and 5 mL of H_2SO_4 25% are added. For alkaline samples, more H_2SO_4 may be needed. After dissolving the sample, 1-1.5 g of KI are added. The solution turns reddish-brown. Then it is titrated with Sodium thiosulfate 0.1 mol/L to an Equivalence point (EQ).

The amount of sample should be adjusted so that the consumption at EQ is about 20 – 90% of the burette volume.

Titration parameter

Sample titration



Default method	Iodometry (back)		
Method type	Automatic titration		
Modus	Dynamic		
Measured value	mV		
Measuring speed / drift	User defined	Minimum holding time	3 s
		Maximum holding time	15 s
		Measuring time	3 s
		Drift	10 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	decrease
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

If electrodes with glass reference are used (Pt 62 RG), the titration direction is increase.

Calculation:

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

B	0	Blank value
EQ1		Consumption of titrant at first Equivalence point
T	WA	Actual concentration of the titrant
M	1	Molecular weight
W	man	sample weight in g
F1	1	Conversion factor 1
F2	2	Conversion factor 2

The calculation refers to the determination of peroxides. The result is calculated in mol/kg. For other samples, the factors F1 and F2 may have to be adjusted. If the result should not be calculated in mol/kg, the factors F1, F2 and M must be adjusted.

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