

Titer determination of Ammonium iron (II) sulfat

Description

This application report describes the general procedure for the titer determination of Ammonium iron (II) sulfate solutions.

The titer is a dimensionless number about 1 for correcting the indicated concentration. In the software of the titration devices and application reports from SI Analytics®, the term “Titer“ describes the exact concentration in mol/L and not the dimensionless factor.

Instruments

Titration	TL 5000, TL 7000 or higher
Exchangeable Unit	WA 20 (only for TL 7000 or higher)
Electrode	Pt 62, Pt 62 RG
Cable	L 1 A
Stirrer	TM 50, TM 235
Lab accessoires	Glas beaker 150 ml
	Magnetic stirrer bar 30 mm

Reagents

1	Ammonium iron (II) sulfate solution from which the titer is to be determined
2	Potassium dichromate volumetric reference material
3	Sulfuric acid conc.
4	Electrolyte solution L300 (if Pt 62 is used)
5	Distilled Water
All reagents should be of analytical grade or better.	

Titration procedure

Reagents

Potassium dichromate volumetric reference material is dried as described in the corresponding certificate of analysis.

Ammonium iron (II) sulfate – solution 0.1 mol/L

47,1g $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \times 6 \text{H}_2\text{O}$ are dissolved in about 750 mL dist. Water and 20 mL conc. H_2SO_4 are added. After cooling down it is made up to 1.0 L.

Ammonium iron (II) sulfate – solution 0.1 mol/L is also available as ready-to-use solution.

Cleaning and storage of the electrode

The electrode is rinsed with distilled water. The electrolyte solution L300 is suitable for storage of the Pt 62.

Sample preparation

The amount of volumetric standard depends on the size of the burette and the concentration of the Ammonium iron (II) sulfate – solution. The amount should be chosen so that about half of the burette volume is consumed. The most common is the 20 mL burette. The required quantity of Potassium dichromate can be estimated according to this rule of thumb:

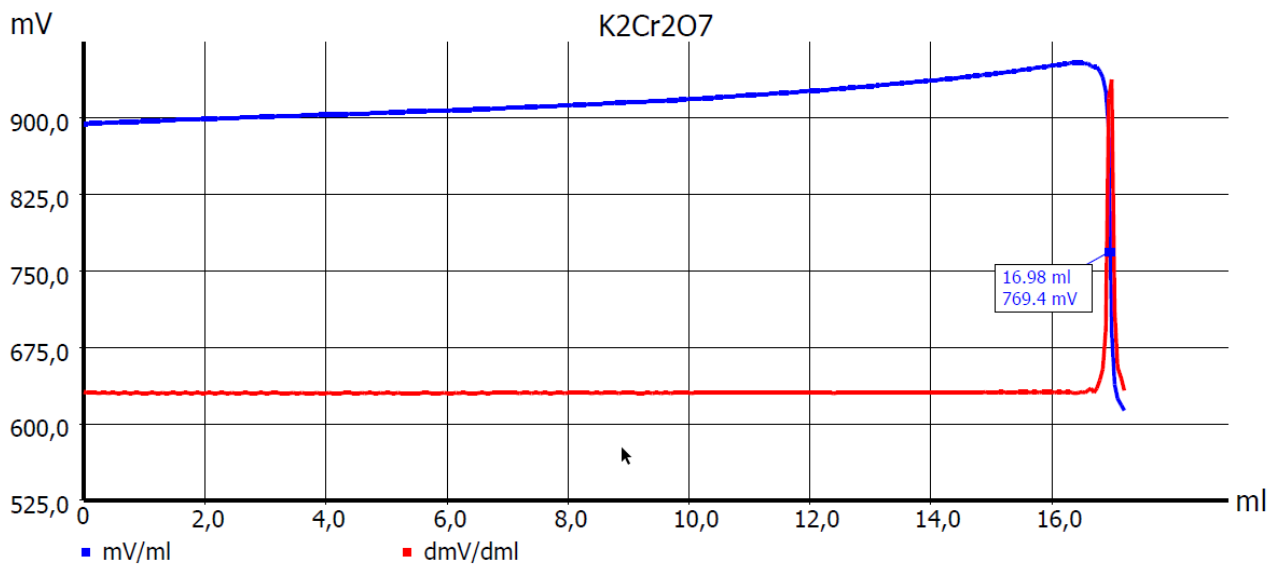
$$W [g] = 0,5 * \text{Concentration}[mol/L]$$

To determine the titer of a 0.1 mol/l Ammonium iron (II) sulfate – solution, about 0.05 g Potassium dichromate volumetric standard are weighed into a 150 mL beaker, dissolved in about 60ml distilled water and 10 mL conc. H_2SO_4 are added. The titration is done with the Ammonium iron (II) sulfate - solution to an equivalence point. The consumption should be about 5 - 15 mL.

If the specified assay of the volumetric standard is significantly different from 100%, the weight for calculating the concentration must be corrected:

$$W = \frac{\text{Weight} * \text{specified assay \%}}{100}$$

Titration parameter



Default method	---		
Method type	Automatic titration		
Modus	Linear		
Measured value	mV		
Measuring speed / drift	Individual	Minimum holding time	1 s
		Maximum holding time	10 s
		Measuring time	1 s
		Drift	50 mV/min
Initial waiting time	5 s		
Linear steps	0.05 mL		
Damping	none	Titration direction	increase
Pretitration	8 mL	Delay time	0 s
End value	off		
EQ	On (1)	Slope value	1000
Max. titration volume	20 mL		
Dosing speed	100%	Filling speed	30 s

* if necessary, the pretitration volume must be adjusted. The pre-titrated volume should be calculated in such a way that at least 1 ml is titrated linearly before EQ.

Calculation:

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

B	0	Blank value
W	man	Weight of the sample [g]
F2	6000	Conversion factor
EQ1		Consumption of titrant until first Equivalence point
M	294,19	Molecular mass of Iron(II) ethylenediammonium sulfate
F1	1	Conversion factor

We recommend to write the exact concentration T to the Exchangable Unit (WA) automatically.