Determination of Lanthan

Description

The determination of lanthanum, other lanthanides and yttrium can be done with the OptiLine 6 and a color indicator.

With the method described here, the sample is titrated at pH 5 - 6 with EDTA 0.1 mol / l. Xylene orange is a suitable indicator, the optical sensor OptiLine 6 is used for detection.
The color change in xylene orange is only weak, however, so that the detected jump in intensity is only weak. Murexide and Eriochrome Black T are also suitable as indicators and show a clearer color change.

Instruments

Titrator	TL 7000 or higher
Exchangeable head	WA 10
Electrode	Optiline 6
Cable	---
Stirrer	Magnetic stirrer TM 235
Lab accessory	Beaker 150 mL
	Magnetic stirrer bar 30 mm

Reagents

1	EDTA – solution 0,1 mol/L
2	Urotropine (Hexamethylentetraamine)
3	Xylene orange
4	Eriochrome black T trituration with NaCl
5	Murexide trituration with NaCl
6	Distilled water
All reagents should be of analytical grade or better.	

Titration procedure

Reagents

EDTA-solution 0.1 mol/L

Na_2EDTA solution 0.1 mol / L is available as a ready-to-use solution.

Urotropine-buffer solution pH 5-6

140.2 g Urotropine are dissolved in dist. water and made up to 1.0 L with dist. water.

Xylene orange solution 2g/l

0.2 g Xylene orange are dissolved in dist. water and made up to 100 mL with dist. water.

Eriochrome black T trituration

1.0g Eriochrome Black T and 49.0g NaCl are rubbed in a mortar until a homogeneous mixture is obtained.

Murexide trituration

1.0g Murexide and 49.0g NaCl are rubbed in a mortar until a homogeneous mixture is obtained.

Cleaning and storage of the electrode

The Optiline 6 is cleaned with distilled water. It is stored dry and clean.

Sample preparation

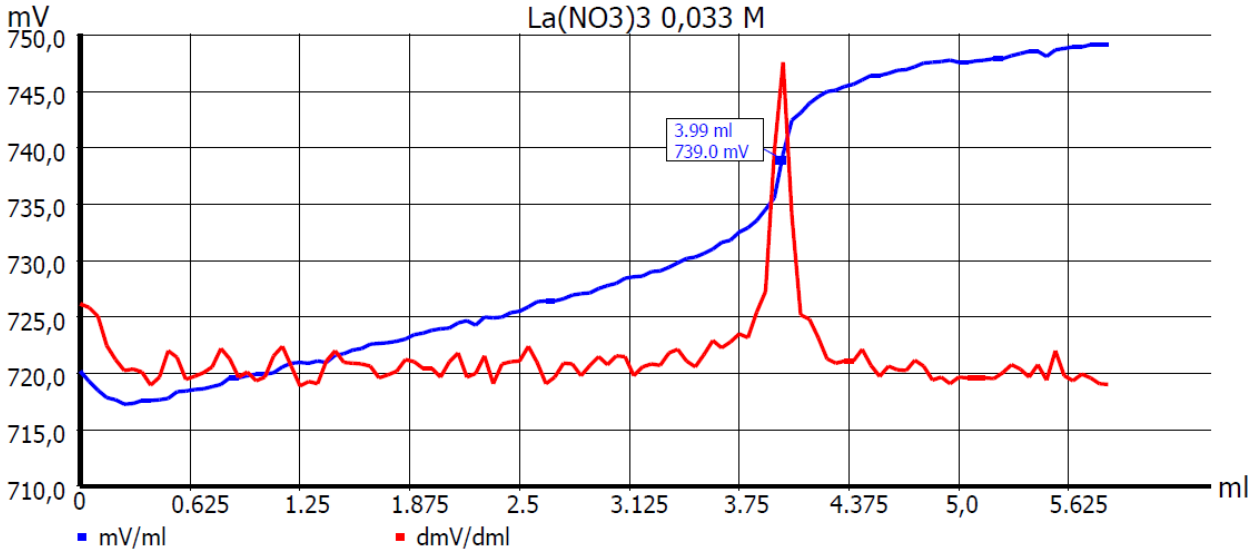
The sample is pipetted into a 150 mL beaker, 5 mL Urotropin buffer solution pH 5-6 are added made up to approx. 80 mL with dist. Water. Then 0.5 mL Xylene orange solution is added and the mixture is titrated with EDTA solution 0.1 mol/L up to the 1st equivalence point (color change, Optiline 6, wavelength 470 nm). Instead of Xylene orange, approx. 50 mg Eriochrome Black T or Murexide trituration can be used.

In the case of strongly acidic or basic samples, the sample must be adjusted to pH 5 - 7 with diluted HCl or NaOH before the buffer is added.

The required sample amount can be estimated according to this rule of thumb:

$$V(ml) = \frac{1380 * Titer\ [\frac{mol}{L}]}{expected\ La - content\ [g/L]}$$

Titration parameter



Default method	---		
Method type	Automatic titration		
Modus	Dynamic		
Measured value	mV(E)		
Measuring speed / drift	Individual	Fixed delay time	5 s
Optiline 6 settings		Wave length	470 nm
		Intensity	50
		Smoothing	average
Initial waiting time	5 s		
Linear Steps	0.05 mL		
Damping	-	Titration direction	increase
Pretitration	off	Delay time	0 s
End value	off		
EQ	On (1)	Slope value	150
Max. titration volume	20 ml		
Dosing speed	100%	Filling speed	30 s

Calculation:

$$La\ [g/L] = \frac{(EQ1 - B) * T * M * F1}{V * F2}$$

EQ1		Consumption of titrant at first Equivalence point
B	0	Blank value
T	WA	Actual concentration of the titrant
M	138.9	Molecular weight La
V	man	sample volume [mL]
F1	1	Conversion factor
F2	1	Conversion factor

When determining other lanthanides, the molar mass in the calculation must be adjusted accordingly.

Xylem Analytics Germany Sales GmbH & Co. KG,
SI Analytics
Erich-Dombrowski-Straße 4 • 55127 Mainz, Germany

Tel+ 49 6131 894-5111
TechInfo.xags@xylem.com
xylemanalytics.com

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Let's Solve Water