xylem

Application Note

YSI, a Xylem Brand • XA00154

Determination of Lanthanum

CHEMICAL SERIES

Introduction

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.

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Instrument
TL 7000 or higher
Magnetic stirrer TM 235 or similar

Electrode, Cable, and Electrolyte
Optiline 6 Electrode

Lab Accessories
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 in 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

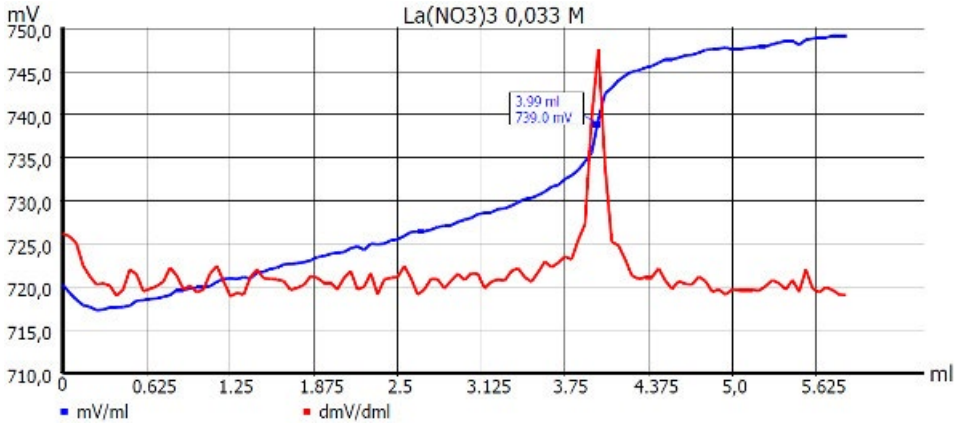
The sample is pipetted into a 150 mL beaker, 5 mL Urotropin buffer solution pH 5-6 are added made up to approx. 80 mL with dist. water. Then 0.5 mL Xylene orange solution is added and the mixture is titrated with EDTA solution 0.1 mol/L up to the 1st equivalence point (color change, Optiline 6, wavelength 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:

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

Titration parameter



Default Method			
Method type	Automatic Titration		
Mode	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: $La\ [g/L] = \frac{(EQ1 - B) * T * M * F1}{V * F2}$

B	0	Blank value
EQ1		Consumption of Titrant until First Equivalence Point
T	WA	Actual Concentration of the Titrant
M	138.9	Molecular weight La
V	man	Sample Volume in mL
F1	1	Conversion Factor
F2	1	Conversion Factor

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

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