

Nonferrous  
Metal

## Boric Acid in Electrolyte

Acid-base titration by  
Automatic Potentiometric Titrator

Standard	JIS	K 8863
	ISO	6353-3

### 1. Abstract

Boric acid in Electrolyte solution is quantified according to JIS K 8863-2007 Boric Acid (Reagent).

After Mannitol and pure water are added to the sample, it is titrated with 0.1mol/L Sodium hydroxide up to the endpoint. The endpoint is the maximum inflexion point on titration curve.

The concentration of Boric acid is calculated from titration volume.

### 2. Reference

- 1) JIS K 8863-2007 Boric Acid (Reagent)
- 2) ISO 6353-3:1987 Reagents for chemical analysis -- Part 3: Specifications -- Second series
- 3) Experiment and Calculation for Quantitative Analysis Vol.2 by Seiji Takagi from Kyoritsu Publication

### 3. Cautions in measurement

- 1) Handle with care when you work on chemicals.

## 4. Post-measurement care

Clean the electrode with pure water, and keep it dipped in water for use in next measurement.

## 5. Test equipment

Main unit : Automatic potentiometric titrator (Standard preamplifier: STD-)

Electrode :  pH glass electrode

Ceramic type reference electrode

## 6. Reagent

Titrant : 0.1 mol/L Sodium hydroxide (f=1.004)

Solvent : Pure water, Mannitol

## 7. Measurement procedure

—Measurement—

- 1) Deliver 2.0mL sample in a 200mL beaker, and add 100mL of pure water.
- 2) Add 5g of Mannitol.
- 3) Titrate with 0.1mol/L Sodium hydroxide to obtain concentration of boric acid.

## 8. Formula

Concentration (g/L) = (EP1 - BL1) × FA1 × C1 × K1 / SIZE

EP1 : Titration volume (mL)

BL1 : Blank level (0.00mL)

FA1 : Factor of titrant (1.004)

C1 : Concentration conversion coefficient (6.18mg/mL)  
(0.1mol/L NaOH 1mL ≡ 6.18mg H<sub>3</sub>BO<sub>3</sub>)

K1 : Unit conversion coefficient (1)

SIZE : Sample size (mL)

## 9. Example of measurement

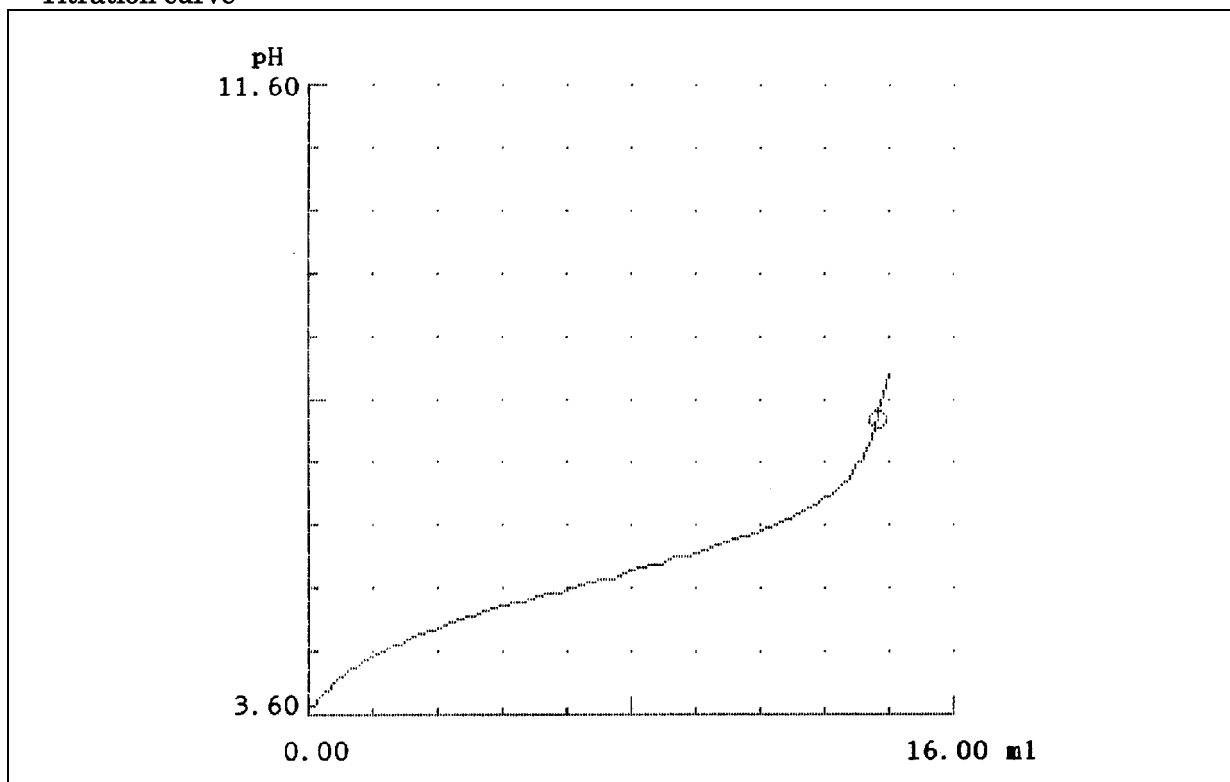
— Ambient condition —

Room temperature : 25 °C	Humidity : 50 %	Weather : Fair
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- Titration parameter -

[Titration parameter]			
Titration mode	: Auto control	Preamplifier unit	: pH
Titration form	: EP Stop	Max. volume of burette	: 20.0mL
Titration burette	: 01	Auto stirrer	: Off
Reagent name	: NaOH	Wait time before titration	: 0s
Detector number	: 1	Titration direction	: Auto
[Control parameter]			
Number of EP	: 1	Control speed	: 2.0
Auto EP redetection	: Off	Data sampling potential	: 4.0mV
End sense (Potential)	: 50.0	Data sampling volume	: 0.5mL
End sense (Differential)	: 100.0	Separate potential setup	: Off
Over-titration	: 0.0mL	Separate potential	: 0.0pH
Gain	: 1	EP potential setup	: Off
		EP potential	: 0.0pH

-Titration curve-



(The above printout data are obtained from titration by AT-410)

—Measurement results—

n	Sample (mL)	Concentration (g/L)
1	2.0	43.976
2		44.658
3		44.469

Concentration of boric acid	
Mean	44.368 g/L
SD	0.352 g/L
RSD	0.794 %

\* The above results were obtained by 3 tests of the same sample.

## 10. Summary

Electrolyte Solution is an electric conductive solution made of ionic substance dissolved in polar solvent like water. It is also called Ionic solution. In the narrow sense of word, it means Electrolyte solution for battery or electric plating bath.

Boric acid is expressed by chemical formula  $H_3BO_3$  with molecular mass 61.8.

The sample measurement shows a good repeatability with 0.8% relative standard deviation. Precise and reliable measurement is assured by the automated potentiometry.