

Inorganic
Chemical

Quantification of Sodium Chloride

Precipitation titration by
Automatic Potentiometric Titrator

Standard

JIS K 8150

1. Abstract

Quantification of Sodium chloride is made by titration with 0.1mol/L Silver nitrate according to JIS K 8150-2006 Sodium Chloride (Reagent) up to the endpoint, which is the maximum inflexion point on titration curve.

Concentration of Sodium chloride is calculated from titration volume of Silver nitrate.

2. Reference

- 1) JIS K 8150-2006 Sodium Chloride (Reagent)
- 2) "Experiment and Calculation for Quantitative Analysis" –Vol.2 by Seiji Takagi from Kyoritsu Publishing Company
- 3) Japanese Pharmacopoeia codex 17 "Quantitative Method for Sodium Chloride"

3. Cautions in measurement

- 1) When the test sample contains a small amount of chlorine, it is necessary to titrate in alcoholic solvent not aqueous solvent to raise sensitivity of electrode.
- 2) Add nitric acid if titration liquid before titration with silver nitrate does not show acidity.

4. Post-measurement care

Polish sensor element of silver electrode with supplied polishing paper (for electrode).

5. Test equipment

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

Electrode : Silver electrode

Mercury sulfate reference electrode

6. Reagent

Titrant : 0.1mol/L Silver nitrate solution (f=1.001)

Solvent : Pure water

7. Measurement procedure

—Measurement—

- 1) Deliver 10.0mL sample into a 200mL beaker.
- 2) Add 100mL pure water.
- 3) Titrate with 0.1mol/L Silver nitrate to obtain concentration of Sodium chloride.

8. Formula

Concentration of NaCl (mol/L) = (EP1 - BLK) × F × C1 × K1 / Size

EP1 : Titration volume (mL)

BLK : Blank level (0.00mL)

F : Factor of titrant (1.001)

C1 : Concentration conversion coefficient (0.1)

(1mL of 0.1mol/L AgNO₃ ≡ 0.1mmol NaCl)

K1 : Unit conversion coefficient (1)

Size : Sample size (mL)

9. Example of measurement

— Ambient condition —

Room temperature : 23 °C	Humidity : 38 %	Weather : Fair
--------------------------	-----------------	----------------

- Titration parameter -

Model : AT-500	
Method No. : 02	
Titr.mode : Auto	
Intermit	
Titr.form : EP	
[Titration parameter]	
Titr.Form : EP	
Buret No. : 1	
Preamp : STD	
Detector No. : 2	
Unit : mV	
Max. Volume : 20.0mL	
Titr. Wait : 0s	
Direction : Auto	
[Control parameter]	
End Point No. : 1	
Gain : 1	
Ctrl Speed : Medium	
End sense : Auto	
Sampling mV : 4.0mV	
Sampling mL : 0.5mL	
<Calculation>	
Sample Measurement	
Conc. 1	
Calculation No. : 03	
End Point No. : 1	
Unit : [mol/L]	
Coefficient1 : 0.1	
Blank1 : 0.0mL	
Factor1 : 1.001	
EP Data : Epn-Blank	

- Titration curve -

*** Result ***	
Sample No. : 02-01	
Date : 1997/03/12 15:55	
Sample ID :	
Method No. : 02	
<Auto Intermit Titr.>	
Method Name :	
I.Level : 195.3mV	
F.Level : -43.7mV	
Titr. Time : 00:10:48	
Size : <u>10.0mL</u>	
Conc-1 : <u>0.10017mol/L</u>	
EP-1 : <u>10.0073mL</u>	
	47.0mV

(The above printout data are obtained from titration by AT-500)

<p>«Titration parameter»</p> <p>Form: of titration / APB No. the burette used in titration / Unit No.: APB Unit File number</p> <p>Detector No.: the detector used in titration/ Unit of potential / Max Volume: of titration</p> <p>Wait Time: before titration starts/ Direction.: of titration</p> <p>«Control parameter»</p> <p>End Point No.: number of EPs / Gain: sensitivity of detection signal / Ctrl Speed: of titration</p> <p>End sense: of EP detection / Sampling mV: of data sampling potential/ Sampling mL: of data sampling volume</p> <p>«Calculation parameter»</p> <p>Calcu No.: of concentration formula 1/ End Point No.: EP number of concentration calculation</p> <p>Unit: conversion unit / Coefficient1: conversion 1 / Blank1: blank level</p> <p>Factor1 of titrant / EP Data: calculation method of titration volume</p>
--

–Measurement results–

n	Sample (mL)	Titration (mL)	NaCl (mol/L)
1	<u>10.0</u>	<u>10.0073</u>	<u>0.10017</u>
2		10.0023	0.10012
3		10.0389	0.10049
4		10.0362	0.10046
5		10.0312	0.10041

Concentration of Sodium chloride	
Mean	0.10037 mol/L
SD	0.00013 mol/L
RSD	0.12766 %

- * The above results were obtained by 3 tests of the same sample.
- * Red underline shows the data from page 3/4.

10. Summary

Sodium chloride (NaCl) is an ionic substance.

The test result shows a good repeatability with 0.13% relative standard deviation. Precise and reliable measurement is assured by the automated potentiometry.