KEM **Application Note** №TIJ-97004

Paint, Adhesive

Chlorine of Dyestuff

Precipitation titration by
Automatic Potentiometric Titrator

Standard	JIS K 8150	

1.Abstract

Chlorine ion of dyestuff（Cl^-）is measured by potentiometric titration with 0.01mol/L silver nitrate solution. When concentration of chlorine is of trace, it is measured by addition method with barium chloride.

Chlorine ion concentration is calculated from titration volume of silver nitrate. The added barium chloride is deducted from previously obtained result.

2.Reference

1) JIS K 8150-2006 Sodium Chloride（Reagent）
2) “Experiment and Calculation in Quantitative Analysis ” –Vol.2 by Seiji Takagi from Kyoritsu Publishing Company
3) Japanese Pharmacopoeia codex 15 “Quantitative Method for Sodium Chloride

3.Cautions in measurement

1) Add nitric acid if the liquid doe not show acidity before titration.

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：Option Silver electrode
Option Mercury sulfate reference electrode

6.Reagent

Titrant : 0.01mol/L Silver nitrate solution（f＝1.00）
Additive : Pure water, 0.01mol/L Barium chloride solution

7.Measurement procedure

—Pretreatment—
1) Add 50mL pure water to 5.0mL of 0.01mol/L barium chloride.
2) Titrate with 0.01mol/L silver nitrate, and obtain titration volume of silver nitrate for 5.0mL of 0.01mol/L barium chloride.（0.01mol/L $BaCl_2$ 5mL≡0.01mol/L $AgNO_3$ 10.790mL）

—Measurement—
1) Deliver 0.5g ample to a 100mL beaker.
2) Add 50mL pure water and 5.0mL of 0.01mol/L barium chloride.
3) Titrate with 0.01mol/L silver nitrate to obtain chlorine.

8.Formula

Chlorine (ppm) = (EP1 － BL1) × FA1 × C1 × K1 / SIZE

EP1 : Titration volume (mL)
BL1 : Blank level (10.790mL)
FA1 : Factor of titrant (1.00)
C1 : Concentration conversion coefficient (0.355 mg/mL)
(Chorine in mg equivalent to 1mL of 0.01mol/L $AgNO_3$)
K1 : Coefficient (1000)
SIZE : Sample size (g)

9.Example of measurement

－Ambient condition－

Room temperature : 22 ℃	Humidity : 44 %	Weather : Cloudy

- Titration parameter -

Model : AT-400
Method No. : 10
Titr.mode : Auto Intermit
Titr.form : EP Stop

[TITR. PARA]

Form	:	EP Stop
Buret No.	:	1
Preamp	:	STD
Detector No.	:	2
Dimension	:	mV
Max.Vol	:	20.0mL
W.Time	:	0s
Direction	:	Auto

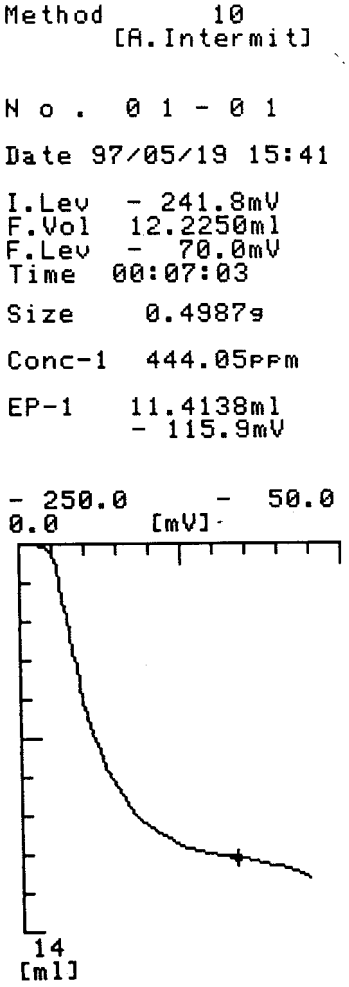
[CTRL. PARA]

End Point No.	:	1
S(dE)	:	50
S(E/mL)	:	50
O.Titr	:	0mL
Gain	:	1
S.Pot	:	4.0mV
Stab.	:	0.5mV/s
Delay Time	:	1s
L.Time	:	30s
M.Unit	:	0.5mL
Separation	:	Off
A.Simulation	:	Off

[CALCU. PARA]

Sample Measurement
Conc1 CalcuNo. 2
Conc1 Dim. [ppm]
Conc1 EP Position 1
Data [f(EP2-Blank)]
T.Type [Normal]
Data [f(T.Vol)]
Local Blank
Blank 10.790mL
Common T.Factor
K1 1000
C1 0.355mg/mL
Temp.Comp. [Off]

- Titration curve -



(The above printout data are obtained from titration by AT-400)

≪TITR. PARA:Titration parameter≫
Form: of titration / Buret No.: the burette used in titration / Detector No.: the detector used in titration
Dimension: potential unit/ Max Volume: of titration /Wait Time: before titration starts /Direction.: of titration
≪CTRL. PARA:Control parameter≫
End Point No. number of EPs detected / S(dE): EP potential (difference) / S(E/mL): EP potential (differential)
O Titr.: over-titration volume /Gain: sensitivity of detection signal/ S.Pot.: potential changes of sampling signal
Separation: of potential / Stab.: stability sense/ Delay Time: before stability check
L.Time: time for stability check/M.Unit.: titration for sampling signal / A.Simulation: redetection of EP
≪CALCU. PARA Result parameter≫
Calc.No.: of formula / Conc.1: formula 1 / Dim: unit of result/Conc1EP Position. EP at concentration 1
Data: calculation of titration / T.Type: titration type (normal or back)/K1: unit conversion coefficient
Blank : blank level /Commmon T.Factor: factor of titrant registered
C1(mg/mL): concentration conversion of EP1/ Temp.Comp. temperature compensation

－Measurement results－

N	Sample (g)	Titration (mL)	Concentration (ppm)
1	0.4987	11.4138	444.05
2	0.4890	11.3892	435.00
3	0.5039	11.4201	443.91

Batch processed Chlorine concentration	
Mean	440.99 ppm
SD	5.19 ppm
RSD	1.18 %

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

10.Summary

Dyestuff is colored substance, which is used to dye fabrics or paper usually by dissolving in solvent (typically water). Those not dissolved in solvent and dispersed in medium are called colorant or pigment.

Chlorine is an element of atomic number 17 with chemical symbol Cl, and is one of halogen family.

The test result shows a good repeatability with less than 1.2% relative standard deviation.

Precise and reliable measurement is assured by the automated potentiometry.

The analysis of chlorine in dyestuff can be perfectly made by any of the following titration systems manufactured by Kyoto Electronics (KEM).

【AT-610】

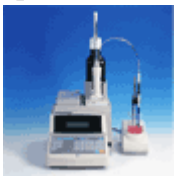
Awarded Product of Supreme Technology from Kyoto City

- Easy key entry by touch panel of large color LCD（8-inch wide）
- Simultaneous titration in parallel
- Both potentiometric and Karl Fischer moisture titration (coulometric・volumetric) can be performed at a time.

【AT-510】

- Compact and cost performance model
- PC card expands data memory for convenience and versatility.

【AT-500N-1】



- Low cost and high performance
- Easy view with back light LCD
- GLP/GMP conformed model

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