

Nonferrous
Metal

Nickel Sulfate of Electrolytic Colorant

Chelatometric titration by
Automatic Potentiometric Titrator

Standard

1. Abstract

The concentration of Nickel sulfate in electrolytic colorant is measured by chelatometric titration with 0.1mol/L EDTA after adding pure water and 28% Ammonia water to the sample. The inflexion point by color change of indicator on titration curve is defined as the endpoint.

The concentration of Nickel sulfate is calculated from titration volume of EDTA.

2. Reference

- 1) "Plating Manual" compiled by Electroplating Study Group published by Nikkan Kogyo Press
- 2) "Chelatometry" by Kagehira Ueno from Nankodo
- 3) Experiment and Calculation for Quantitative Analysis –Vol.2 by Seiji Takagi from Kyoritsu Publishing Company

3. Cautions in measurement

- 1) Handle with care when you work on chemicals. Work in a well ventilated room or use a draft.
- 2) Optimize pH since reactivity of sample and titrant changes during chelatometric titration.

4. Post-measurement care

Clean the photo sensor with ethanol and then with pure water.

5. Test equipment

Main unit : Automatic potentiometric titrator
(Option Photometric preamplifier PTA-)
Electrode : Option Photo sensor (Filter:630nm)

6. Reagent

Titrant : 0.1mol/L EDTA (f=1.003)
Additive : Pure water, 28% Ammonia water
Indicator : MX

7. Measurement procedure

—Measurement—

- 1) Deliver 10.0mL sample to a 200mL beaker, and add 100mL water.
- 2) Add 10.0mL of 28% Ammonia water.
- 3) Add 0.02g of MX indicator.
- 4) Titrate with 0.1mol/L EDTA to obtain concentration of Nickel sulfate.

8. Formula

Nickel sulfate (g/L) = (EP1 - BL1) × FA1 × C1 × K1 / SIZE
EP1 : Titration volume (mL)
BL1 : Blank level (0.00mL)
FA1 : Factor of titrant (1.003)
C1 : Concentration conversion coefficient (26.2718mg/mL)
(1mL of 0.1mol/L EDTA ≡ 26.2718mg NiSO₄·6H₂O)
K1 : Unit conversion coefficient (1)
SIZE : Sample size (mL)

9.Example of measurement

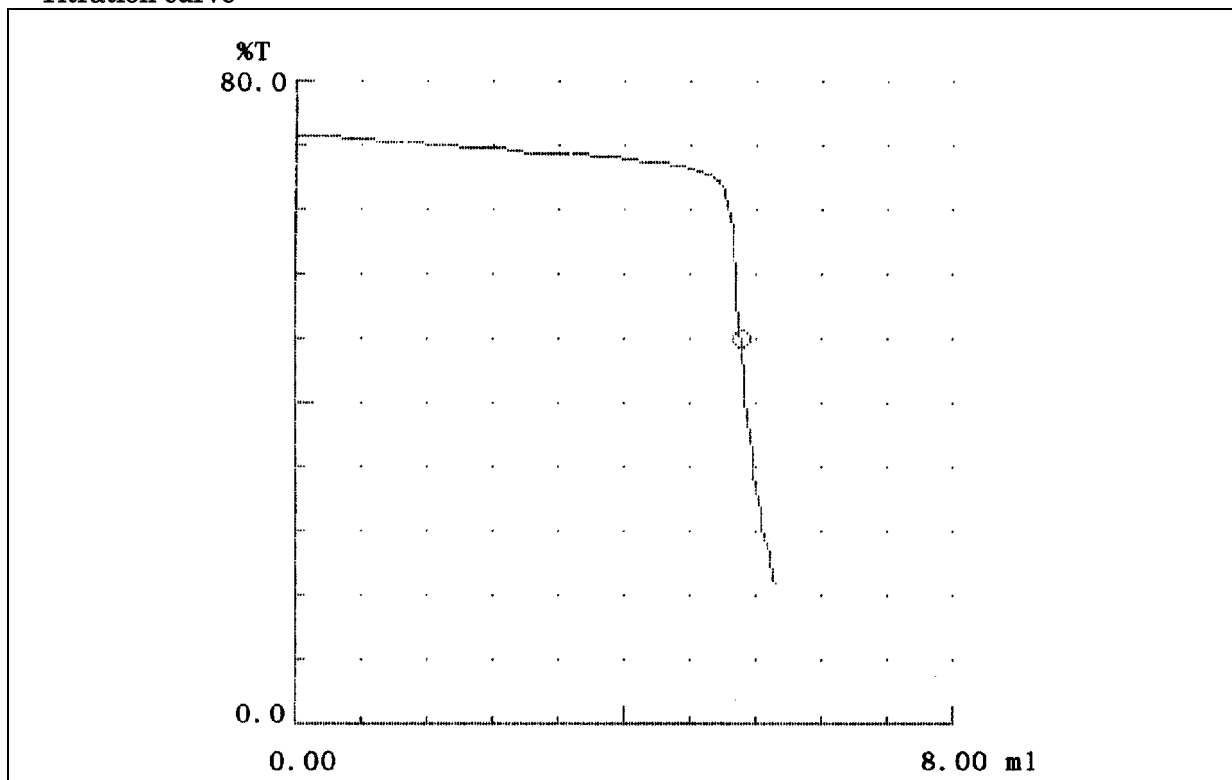
—Ambient condition—

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

[Titration parameter]			
Titration mode	: Auto cut-off	Preamplifier unit	: %T
Titration form	: EP Stop	Max. titration volume	: 20.0mL
Titration burette	: 01	Auto stirrer	: Off
Reagent name	: EDTA	Wait time before titration	: 0s
Detector number	: 3	Titration direction	: Auto
[Control parameter]			
Number of EPs	: 1	Data sampling potential	: 4.0mV
Simulation	: Off	Limit time of stability check	: 1s
EP sense (Potential)	: 50.0	Data sampling volume	: 0.1mL
EP sense (Differential)	: 100.0	Separate potential setup	: Off
Over-titration	: 0.0mL	Separate potential	: 0.0%T
Gain	: 1	EP potential setup	: Off
		EP potential	: 0.0%T

-Titration curve-



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

—Measurement results—

n	Sample (mL)	Nickel sulfate (g/L)
1	10.0	143.44
2		142.22
3		141.85

Concentration of Nickel sulfate	
Mean	142.50 g/L
SD	0.83 g/L
RSD	0.58 %

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

10. Summary

Electrolyte Solution is conductive electrically made by dissolving in the ionic substance in polar solvent like water. It is also called Ionic solution. In narrow sense of term, it means Electrolytic solution for battery or electro plating.

Nickel sulfate (NiSO_4) is the ionic compound of Nickel ion and Sulfate ion. Sexto hydrate is green solid needle.

The sample measurement shows a good repeatability with 0.6% relative standard deviation. Precise and reliable measurement is assured by the automated potentiometry.