

Nonferrous
Metal

Nickel of Plating Solution

Chelatometric titration by
Automatic Potentiometric Titrator

Standard

1. Abstract

Quantification of Nickel in plating solution is performed by chelatometric titration with 0.1mol/L EDTA after adding pure water and buffer to the sample. The inflexion point by color change of indicator on titration curve is defined as the endpoint. The concentration of Nickel 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 Publisher
- 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

6. Reagent

Titrant : 0.1mol/L EDTA (f=1.00)

Additive : Pure water, Buffer (Ammonium chloride, Ammonia water)

Indicator : MX

7. Measurement procedure

—Pretreatment—

- 1) Mix 140g Ammonium chloride and 95mL Ammonia water with 1800mL pure water to make it for buffer.

—Measurement—

- 1) Deliver 1.0mL sample to a 100mL beaker.
- 2) Add 50.0mL of pure water.
- 3) Add 24mL of buffer.
- 4) Add MX indicator.
- 5) Titrate with 0.1mol/L EDTA to obtain concentration of Nickel.

8. Formula

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

EP1 : Titration volume (mL)

BL1 : Blank level (0.00mL)

FA1 : Factor of titrant (1.00)

C1 : Concentration conversion coefficient (5.87mg/mL)

K1 : Unit conversion coefficient (1)

SIZE : Sample size (mL)

9.Example of measurement

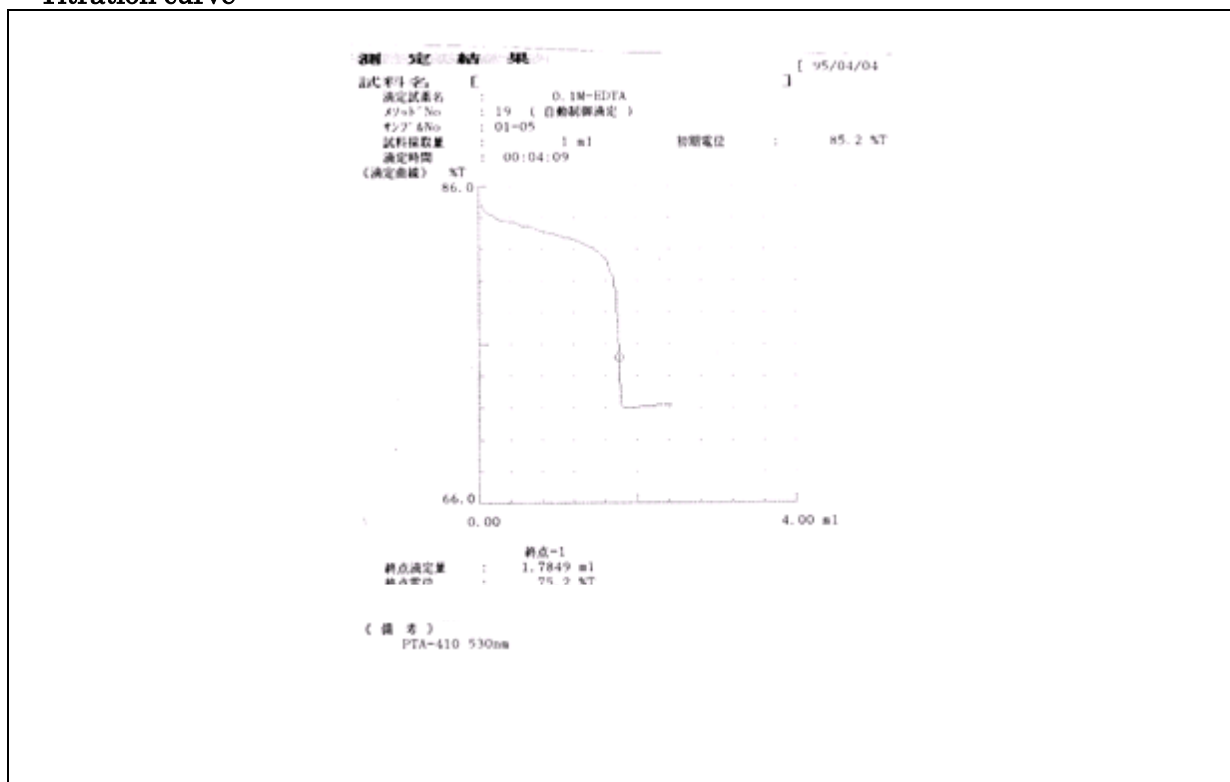
—Ambient condition—

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

-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	: 2.0mV
Simulation	: Off	Data sampling volume	: 0.1mL
EP sense (Potential)	: 30.0	Separate potential setup	: Off
EP sense (Differential)	: 100.0	Separate potential	: 0.0%T
Over-titration	: 0.0mL	EP potential setup	: Off
Gain	: 1	EP potential	: 0.0%T

-Titration curve-



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

—Measurement result—

n	Sample (mL)	Nickel concentration (g/L)
1	1.0	10.477

* The above test result was obtained by a single test of the same sample.

10. Summary

Plating means metal surface processing by cladding film or its technique. Plating solution is the liquid for plating metallic materials.

Nickel is a metallic material of chemical symbol Ni with atomic number 28, which is highly corrosive resistant and used in plating. It is also used in making stainless steel and coins.

The sample measurement shows a clear color change by indicator on titration curve. Reliable measurement is assured by the automated potentiometry.