

Sheet No.

GT200-PS019

Chromic Anhydride Analysis of Chromium Plating Solution

1/3

Method : Oxidation-reduction titration
Apparatus : Automatic Titrator GT-200
Electrode: Double junction reference electrode, platinum detection electrode
Reference electrode inner solution: 1 mol/L potassium chloride solution
Reference electrode outer solution: 1 mol/L potassium nitrate solution
Titration mode : INF, Detection: mV
Related standard : Plating Textbook, Nikkan Kogyo Shimbun, Ltd. JIS K5633 Etching Primer

*This sheet is provided as information. It is not to guarantee the analysis values. Please use under the ideal conditions considering external factors including the analysis environment and properties of the sample.

Outline

Chromium plating is mainly used for industrial and decorative purposes, including automobile parts, chains, and metal fittings. Since the concentration of bath components constantly varies, analysis needs to be carried out to maintain within the appropriate concentration ranges. Chromic anhydride of chromium plating solution is measured by oxidation-reduction titration using platinum detection electrode.

Reagents

[Titrant]

■0.1 mol/L sodium thiosulfate solution (for volumetric analysis)

[Reagents]

■Ammonium acid fluoride (special grade)

■Potassium iodide (special grade)

■3 mol/L (6N) sulfuric acid: Slowly add 17 ml of sulfuric acid into pure water while cooling down, and volume up to 100 ml using pure water.

Analytical Procedure

- (1) Place 2 ml of sample into a 100-ml beaker using a volumetric pipette, and volume up to 100 ml using pure water. This is the sample solution.
- (2) Place 10 ml of sample solution into a 200-ml beaker using a volumetric pipette.
- (3) Add about 125 ml of pure water.
- (4) Add 2 g of ammonium acid fluoride and 2 g of potassium iodide and stir.
- (5) Add 15 ml of 3 mol/L (6N) sulfuric acid solution into the beaker using a volumetric pipette.
- (6) Titrate using 0.1 mol/L sodium thiosulfate solution.

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[Equation]

$$\text{Chromicanhydride (g/L)} = A1 \times M \times E \times f \times FW \times R$$

A1 : Titer of 0.1 mol/L sodium thiosulfate solution to the end point (ml)

M : Molarity of 0.1 mol/L sodium thiosulfate solution

E : Valence of 0.1 mol/L sodium thiosulfate solution (1)

f : Factor of 0.1 mol/L sodium thiosulfate solution (0.999)

FW : Weight of chromic anhydride equivalent to 1 ml of 0.1 mol/L sodium thiosulfate solution (mg) (3.334)

R : Dilution rate (50)

Other Requirements

- Handle measurement reagents with care after reading through and understanding their labels and safety data sheets.
- Wear personal protective equipment such as protective goggles and gloves when handling the reagents.

Measurement Results

	Sample amount (g)	Titer (ml)	Measurement value (%)
1	0.4040	21.0721	100.3
2	0.4034	21.0161	100.2
3	0.4059	21.1606	100.3

Number of data	(n)	3
Average		100.3
Standard deviation	(SD)	0.0594
Relative standard deviation	(RSD%)	0.0592

Chromic anhydride of chromium plating solution was measured using GT-200. Average over 3 measurements was 204.2 g/L. Relative standard deviation (RSD%) was 0.0069%, exhibiting measurement with relatively high reproducibility.

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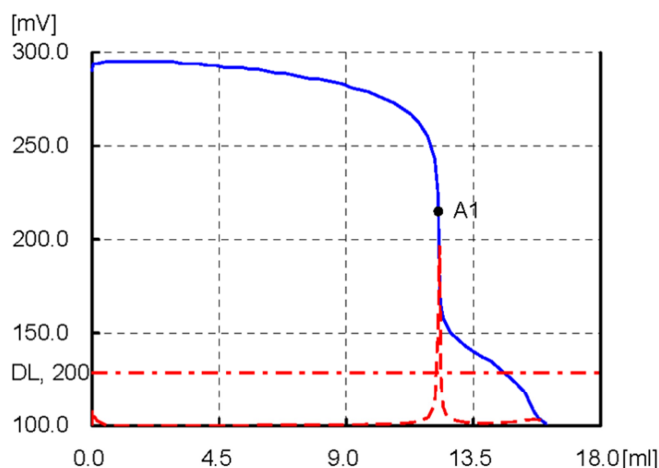
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ID No.: 2 GT No.1

User: GT-200

Measurement date : 2013/10/18 17:06
Sample name : Chromium plating solution

Measurement type : Sample Titr
Sample size (S) : 10 [ml]



C1: 204.236 [g/l]

A1: 12.264 [ml] 215 [mV]

Pi : 290 [mV]
Start : 0 [ml] 290 [mV]
End : 16.074 [ml] 101 [mV] Time: 4' 31"

Run File No. : 11

Titration File No.: 34 Chromic anhydride of chromium plating solution

Mode : INF End1 End1 Width: 200 [mV] \pm 500 [mV]

Detect : mV1

BRT No. : 1

Reagent : 4

WTint : 10 [sec]

Vup : 300 [μ l]Vlow : 20 [μ l]

dE : 2 [mV]

dT : 3 [sec]

DL : 200 [mV/ml]

DetCnt : 15

C1: A1*M*E*f*FW*R

Vmax : 30 [ml]

Vover : 1 [ml]

[g/l]

Reag : 0.1M Na₂S₂O₃ E : 1 M : 0.1 [Mol/l]

f : 0.999

FW : 3.334 R : 50

Buret Injection Speed: 500 [μ l/sec]