



Analysis of thallium in gold plating solution (flame method)

Because of its excellent corrosion resistance, conductivity and other properties, gold plating is frequently used in electronics and mobile telephones, as well as in jewelry, etc. Thallium (TI) is sometimes added to gold plating solution as a crystal regulator to obtain stable precipitates in the solution for bonding use. Stable quality can be maintained by controlling the TI concentration in the plating solution. ZA3000, which features the polarized Zeeman background correction method, can make precise quantitative determinations that correct for background without being affected by materials coexisting in the plating solution.



Model ZA3000 Atomic Absorption Spectrophotometer

Analysis of TI in gold plating solution

- ✓ Plating solution was measured.
- ✓ A reference solution was prepared by diluting a standard solution made by Kanto Chemical Co., Inc. with 0.1% nitric acid.
- ✓ 1 mg/L thallium was added to the plating solution. Good results of 104% and 105% were obtained from recovery testing.

Measurement conditions

Table 1 - TI equipment conditions

Element	TI	Atomizer	STD Burner
Instrument	ZA3000	Flame	Air - C ₂ H ₂
Atomization	Flame	Fuel (C ₂ H ₂)	2.0 L/min
Wavelength	276.8 nm	Oxidant (Air)	160 kPa
Lamp Current	6.0 mA		15.0 L/min
Slit Width	1.3 nm	Burner Height	7.5 mm

Table 2 - TI measurement conditions

Meas. Mode	Working Curve
Signal Mode	BKG Corrected
Curve Order	Linear
Calculation	Integration
Time Constant	5.0 s
Calculation Time	5.0 s
Delay Time	5 s

Measurement results

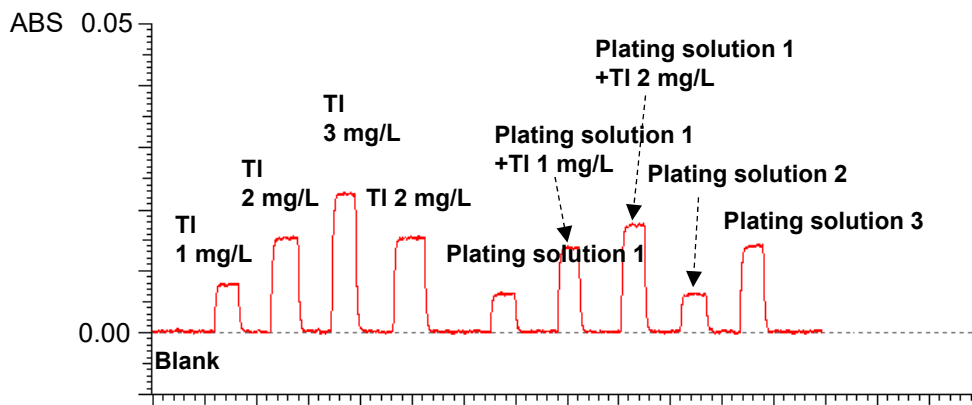


Figure 1 - TI atomic absorption signal profile

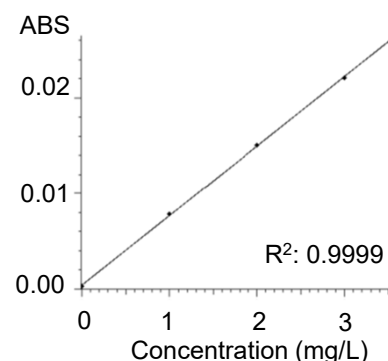


Figure 2 - TI calibration curve

Table 3 - Concentration and absorbance of each sample

ID	Sample name	Concentration (mg/L)	Absorbance
STD 1	Blank	0.00	0.0003
STD 2	TI 1 mg/L	1.00	0.0078
STD 3	TI 2 mg/L	2.00	0.0151
STD 4	TI 3 mg/L	3.00	0.0221
UNK 1	TI 2 mg/L	2.01	0.0150
UNK 2	Plating solution 1	0.82	0.0064
UNK 3	Plating solution 1 + TI 1 mg/L	1.87	0.0140
UNK 4	Plating solution 1 + TI 2 mg/L	2.89	0.0214
UNK 5	Plating solution 2	0.82	0.0064
UNK 6	Plating solution 3	1.91	0.0143

Table 4 - Measurement results of TI in plating solution

Sample name	Measurement result (mg/L)	Recovery rate
TI 2 mg/L	2.01	—
Plating solution 1	0.82	—
Plating solution 1 + TI 1 mg/L	1.87	105%
Plating solution 1 + TI 2 mg/L	2.89	104%
Plating solution 2	0.82	—
Plating solution 3	1.91	—

[KEY WORDS]

material/fabricated material, industrial chemicals, plating solution, thallium, TI, AA, ZA3000, flame, material

