

Measurement of Metal Ion in Plating Solution by Flame Atomic Absorption

Instrument: [Perkin Elmer SIMAA 6000 with Spectrometer](#)

Introduction

To ensure that the quality of metal plating is maintained at a high level, it is important to manage the concentration of metal ions in the plating solution. Flame atomic absorption spectroscopy and ICP emission spectroscopy can be used to quickly analyze metallic ions over a wide range of concentrations, from principal component to trace constituent levels. Here, using actual examples of analysis using the Atomic Absorption Spectrophotometer, we introduce factors to be considered in the analysis of metal ions in plating solution by flame atomic absorption.

Sample preparation

Preparation typically requires dilution only. If precipitation of the components occurs due to saturation, etc., steps must be taken to homogenize the sample solution. Adequately before collection for analysis. As the appropriate concentration range of the instrument is on the order of mg/L for principal components at high concentrations ranging from several g/L to tens of g/L, the sample stock solution should be diluted from several hundred times to several tens of thousands of times as necessary when measuring principal components. Because the scale of this dilution factor is so large, extreme care must be taken to avoid dilution errors. On the other hand, the concentrations of trace constituents typically range from just a few mg/L to tens of mg/L, requiring dilution from a few to several tens of times.

Table 1 Recommended Measurement Range and Lower Limit of Quantitation for Each Element (Burner Angle 0°)

Element	Analysis Wavelength nm	Appropriate Concentration Range (0.05 - 0.5 Abs)	Lower Limit of Quantitation (0.005 Abs)
Au	242.8	1 - 10 mg/L	0.1
Bi	223.1	2 - 20 mg/L	0.2
Cd	228.8	0.07 - 0.7 mg/L	0.007
Co	240.7	0.5 - 5 mg/L	0.05
Cr	357.9	0.5 - 5 mg/L	0.05
Cu	324.7	0.3 - 3 mg/L	0.03
Fe	248.3	0.5 - 5 mg/L	0.05
Ni	232.0	0.4 - 4 mg/L	0.04
Pb	283.3	2 - 20 mg/L	0.2
	217.0	0.8 - 8 mg/L	0.1
Pd	244.8	1 - 10 mg/L	0.1
	247.6	1 - 10 mg/L	0.1
Rh	343.5	1 - 10 mg/L	0.1
Sn	224.6	20 - 200 mg/L	2
	286.3	40 - 400 mg/L	4
Sb	217.6	2 - 20 mg/L	0.2
Zn	213.8	0.08 - 0.8 mg/L	0.008



Table 3 Standard Solutions for Standard Addition Method

	Collected Plating Solution Volume	Spiked Volume of Pd 10 ppm Std. Solution	Spiked Volume of Distilled Water	Total Volume
Unspiked	5 mL	0 mL	5 mL	10 mL
Spiked at 1 ppm	5 mL	1 mL	4 mL	10 mL
Spiked at 2 ppm	5 mL	2 mL	3 mL	10 mL

Reference: <http://www2.shimadzu.com/applications/Atomic%20Absorption/LAAN-A-AA-E036.pdf>