

SEMI P15-92 (Reapproved 1104) DETERMINATION OF SODIUM AND POTASSIUM IN POSITIVE PHOTORESIST METAL ION FREE (MIF) DEVELOPERS BY ATOMIC ABSORPTION SPECTROSCOPY

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1 Scope

1.1 This procedure is a flame atomic absorption analytical method for sodium and potassium analysis in photoresist MIF developers. The applicable concentration range is 20 to 1000 ppb.

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2 Referenced Standards

2.1 None.

3 Terminology

3.1 None.

4 Instrument Conditions

4.1 *Atomic Absorption Spectrometer* — The analytical wavelength for sodium is 589 nm and for potassium is 766 nm. The instrument conditions (i.e., slit width, burner gas flow rates) should be set according to the manufacturer's manual. Optimize the nebulizer and lamp alignment to maximize the absorbance of the 1 ppm standard.

5 Standards

5.1 The standards should be weight/weight (mg/kg) and should be diluted weight/weight since results will be expressed in mg/kg.

5.2 The standards are prepared by diluting a concentrated stock. For example, a 500 ppm standard of sodium is diluted to 50 ppm with de-ionized water. This solution is then diluted to 1 ppm.

6 Procedure

6.1 No sample preparation nor dilution is required.

6.2 Set the absorbance reading to zero with the flame ignited and no sample aspirating. Measure the absorbance of the 1 ppm standards and samples. The absorbance of the standard should be in the range of 0.2 absorbance. Duplicate sample and standard readings should be within 0.01 absorbance. The effect of viscosity on delivery to the burner can be determined by adding 2 ppm of a potassium internal standard to the sample and checking the absorbance versus an external 2 ppm potassium standard. The potassium level in the developer, if any, should be subtracted.

7 Calculation

$$\text{ppm (mg/kg)} = \frac{\text{Abs. Sample} \times \text{ppm Standard} \times R}{\text{Abs. Standard}}$$

R = Recovery factor due to sample viscosity if applicable.



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