

METHOD #: 258.1 Approved for NPDES (Editorial Revision 1974)

TITLE: Potassium (AA, Direct Aspiration)

ANALYTE: CAS # K Potassium 7440-09-7

INSTRUMENTATION: AA

STORET No. Total 00937
Dissolved 00935
Suspended 00936

Optimum Concentration Range: 0.1-2 mg/L using a wavelength of 766.5 nm

Sensitivity: 0.04 mg/L

Detection Limit: 0.01 mg/L

1.0 Preparation of Standard Solution

- 1.1 Stock Solution: Dissolve 0.1907 g of KCl (analytical reagent grade), dried at 110°C, in deionized distilled water and make up to 1 liter. 1 mL = 0.10 mg K (100 mg/L).
- 1.2 Prepare dilutions of the stock solution to be used as calibration standards at the time of analysis. The calibration standards should be prepared using the same type of acid and at the same concentration as will result in the sample to be analyzed either directly or after processing.

2.0 Sample Preservation

- 2.1 For sample handling and preservation, see part 4.1 of the Atomic Absorption Methods section of this manual.

3.0 Sample Preparation

- 3.1 For the analysis of total potassium in domestic and industrial effluents, the procedures for the determination of total metals as given in parts 4.1.3 and 4.1.4 of the Atomic Absorption Methods section of this manual have been found to be satisfactory.
- 3.2 For ambient waters, a representative aliquot of a well mixed sample may also be used directly for analysis. If suspended solids are present in sufficient amounts to clog the nebulizer, the sample may be allowed to settle and the supernatant liquid analyzed directly.

4.0 Instrumental Parameters (General)

- 4.1 Potassium hollow cathode lamp
- 4.2 Wavelength: 766.5 nm
- 4.3 Fuel: Acetylene
- 4.4 Oxidant: Air

4.5 Type of flame: Slightly oxidizing

5.0 Analysis Procedure

5.1 For the analysis procedure and the calculation, see "Direct Aspiration", part 9.1 of the Atomic Absorption Methods section of this manual.

6.0 Notes

6.1 In air-acetylene or other high temperature flames ($> 2800^{\circ}\text{C}$), potassium can experience partial ionization which indirectly affects absorption sensitivity. The presence of other alkali salts in the sample can reduce this ionization and thereby enhance analytical results. The ionization suppressive effect of sodium is small if the ratio of Na to K is under 10. Any enhancement due to sodium can be stabilized by adding excess sodium ($1000\ \mu\text{g}/\text{mL}$) to both sample and standard solutions. If more stringent control of ionization is required, the addition of cesium should be considered. Reagent blanks should be analyzed to correct for potassium impurities in the buffer stock.

6.2 The 404.4 nm line may also be used. This line has a relative sensitivity of 500.

6.3 To cover the range of potassium values normally observed in surface waters (0.1-20 mg/L), it is suggested that the burner head be rotated. A 90 degree rotation of the burner head provides approximately one-eighth the normal sensitivity.

6.4 The flame photometric or colorimetric methods may also be used (Standard Methods, 14th Edition, p 234 & 235).

6.5 Data to be entered into STORET must be reported as mg/L.

7.0 Precision and Accuracy

7.1 In a single laboratory (EMSL), using distilled water samples spiked at concentrations of 1.6 and 6.3 mg K/L. The standard deviations were ± 0.2 and ± 0.5 , respectively. Recoveries at these levels were 103% and 102%, respectively.