O·I·Analytical

Methodology

Potassium by Flame Emission Spectrometry and Continuous Flow Analysis (CFA)

(Cartridge Part #A001334)

1.0 Scope and Application

1.1 This method describes the configuration, calibration, and operation of the Flow Solution® IV system equipped with a flame photometer, which is used for the analysis of potassium in drinking water, surface water, saline water, and domestic and industrial wastes. For detailed information on the flame photometer, refer to the operator's manual provided with the instrument.

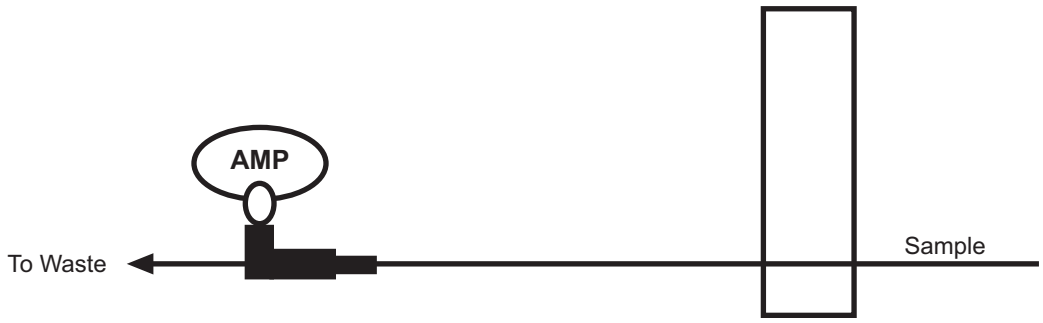
1.2 The Method Detection Limit (MDL) of this method is 0.1 mg/L potassium. The applicable range of the method is 0.5–200 mg/L potassium. The range may be extended to analyze higher concentrations by sample dilution.

2.0 Summary of Method

2.1 This method uses the technique of flame emission spectrometry. A high temperature flame is produced by burning natural gas, manufactured gas, or propane combined with compressed air to create a stoichiometric flame. The sample solution is aspirated directly into the highly stable flame where it is broken down to its ground state elements and excited. Light emitted from the desired element (potassium) passes through a transmission filter and is detected by a photodiode. The output of the photometer is collected, processed, and displayed via WinFLOW™ software.

2.2 The quality of the analysis is assured through reproducible calibration and testing of the Continous Flow Analysis (CFA) system, as well as the use of Laboratory Control Samples (LCSs).

2.3 A general flow diagram of the CFA system is shown below (see Sections 17.0 and 18.0 for a detailed flow diagram and system assembly instructions).



3.0 Definitions

Definitions for terms used in this method are provided in Section 16.0, "Glossary of Definitions and Purposes."

4.0 Interferences

4.1 Interference from high concentrations of rubidium, calcium, strontium, and lanthanum may occur.

4.2 Filter or centrifuge turbid samples prior to analysis to prevent clogging of the nebulizer.

5.0 Safety

5.1 The toxicity or carcinogenicity of each compound or reagent used in this method has not been fully established. Each chemical should be treated as a potential health hazard. Exposure to these chemicals should be reduced to the lowest possible level.

5.2 For reference purposes, a file of Material Safety Data Sheets (MSDS) for each chemical used in this method should be available to all personnel involved in this chemical analysis. The preparation of a formal safety plan is also advisable.

5.3 The following chemicals used in this method may be highly toxic or hazardous and should be handled with extreme caution at all times. Consult the appropriate MSDS before handling.

5.3.1 Compressed Air, Oil- and Water-free

5.3.2 Nitric Acid, concentrated, HNO_3 (FW 63.01)

5.3.3 Potassium Chloride, KCl (FW 74.56)

5.3.4 Propane

5.4 Gaseous propane is highly explosive. Exercise caution during its use.

5.5 The waste loop leading from the torch body to the waste collector in the back of the photometer must be filled with water at all times. Failure to do this can cause a propane buildup outside the instrument, leading to an explosion that can result in damage to the equipment and injury to personnel.

5.6 Carbon monoxide (CO), a hazardous gas, may be generated in the photometer as a by-product of propane burning while the instrument is in use. Proper ventilation must be available or injury can occur.

5.7 Unknown samples may be potentially hazardous and should be handled with extreme caution at all times.

5.8 Proper personal protective equipment (PPE) should be used when handling or working in the presence of chemicals.

5.9 This method does not address all safety issues associated with its use. The laboratory is responsible for maintaining a safe work environment and a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method.

6.0 Apparatus, Equipment, and Supplies

6.1 Continous Flow Analysis (CFA) System (OI Analytical Flow Solution IV) consisting of the following:

6.1.1 Model 502 Multichannel Peristaltic Pump

6.1.2 Random Access (RA) Autosampler

6.1.3 Flame Photometer (Part #A001262)

6.1.4 Data Acquisition System (PC or Notebook PC) with WinFLOW software

6.1.5 Potassium by Flame Emission Spectrometry Cartridge (Part #A001334)

6.2 Sampling equipment—Sample bottle, amber glass, with polytetrafluoroethylene (PTFE)-lined cap. Clean by washing with detergent and water, rinsing with two aliquots of reagent water, and drying by baking at 110°–150°C for a minimum of one hour.

6.3 Standard laboratory equipment including volumetric flasks, pipettes, syringes, etc. should all be cleaned, rinsed, and dried per bottle cleaning procedure in Section 6.2.

7.0 Reagents and Calibrants

7.1 Raw Materials

7.1.1 Deionized Water (ASTM Type II)

7.1.2 Nitric Acid, concentrated, HNO_3 (FW 63.01)

7.1.3 Potassium Chloride, KCl (FW 74.56)