

Flow Solution™ FS 3700 Automated Chemistry Analyzer

Potassium by Flame Emission Spectrometry and Continuous Flow Analysis (CFA) Cartridge Part Number 331681CT

Scope and Application

This method describes the configuration, calibration, and operation of the Flow Solution® 3700 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.

The Method Detection Limit (MDL) of this method is 0.039 mg/L potassium. The applicable range of the method is 0.5-100 mg/L potassium. The range may be extended to analyze higher concentrations by sample dilution.

Method Performance

Range	0.5 - 20 mg/L 1.0 - 100 mg/L
Rate	36 samples/hour
Precision	2.5% RSD at 0.5 mg/L 0.8% RSD at 10 mg/L
Method Detection Limit (MDL)	0.039 mg/L (0.5 - 20 mg/L) .231 mg/L (1.0 - 100 mg/L)

Summary of Method

- This method uses the technique of flame emission spectrometry¹. 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 Flow View® software.
- The quality of the analysis is assured through reproducible calibration and testing of the Continuous Flow Analysis (CFA) system, as well as, the use of Laboratory Control Samples (LCSs).
- A general flow diagram of the SFA system is shown in Figure 1.



Figure 1.

Reagents and Calibrants

Chemical Name	CAS#	Chemical Formula	Part Number	Used in Prep Guide
Deionized Water (ASTM Type II)				Appendix A
Nitric Acid, concentrated	7697-37-2	HNO ₃		
Potassium Chloride	7440-09-7	KCl		

Flame Photometer Requirements

Compressed Air

- Compressed air rated at 14 – 30 psi at 6 L/min.
- If the compressed air is delivered via tank or cylinder, it should have a minimum capacity of about 200 cubic feet to provide about 20 hours of operation. The tank should be equipped with a two-stage regulator having an output gauge calibrated to read in 1 – 5 psi intervals in the range between 14 – 30 psi.
- If compressed air is piped into the facility at an operating pressure of 30 – 250 psi, a pressure regulator must be installed.
- Connect tubing between the pressure regulator and the fitting labeled AIR on the back of the flame photometer.

Gas

- Propane or butane regulated to 10 – 15 inches of water column, or natural gas at a main pressure of 3 – 10 inches of water column.
- Propane is delivered to the flame photometer at a pressure of approximately 12 inches of water column using a reducer as described below. If the propane is to be supplied from a tank, the tank must be provided with a two-stage propane regulator. The propane regulator should include an outlet pressure gauge to allow precise settings at 10 – 15 inches of water column. Do not use a needle valve at the outlet of the propane regulator.
- Connect the tubing (supplied 60-inches, black) between the propane regulator and the fitting labeled GAS on the back of the flame photometer.
- Tanks containing propane must be held upright so that liquid does not enter the regulator.

Interferences

- Interference from high concentrations of rubidium, calcium, strontium, and lanthanum may occur.
- Filter or centrifuge turbid samples prior to analysis to prevent clogging of the nebulizer.

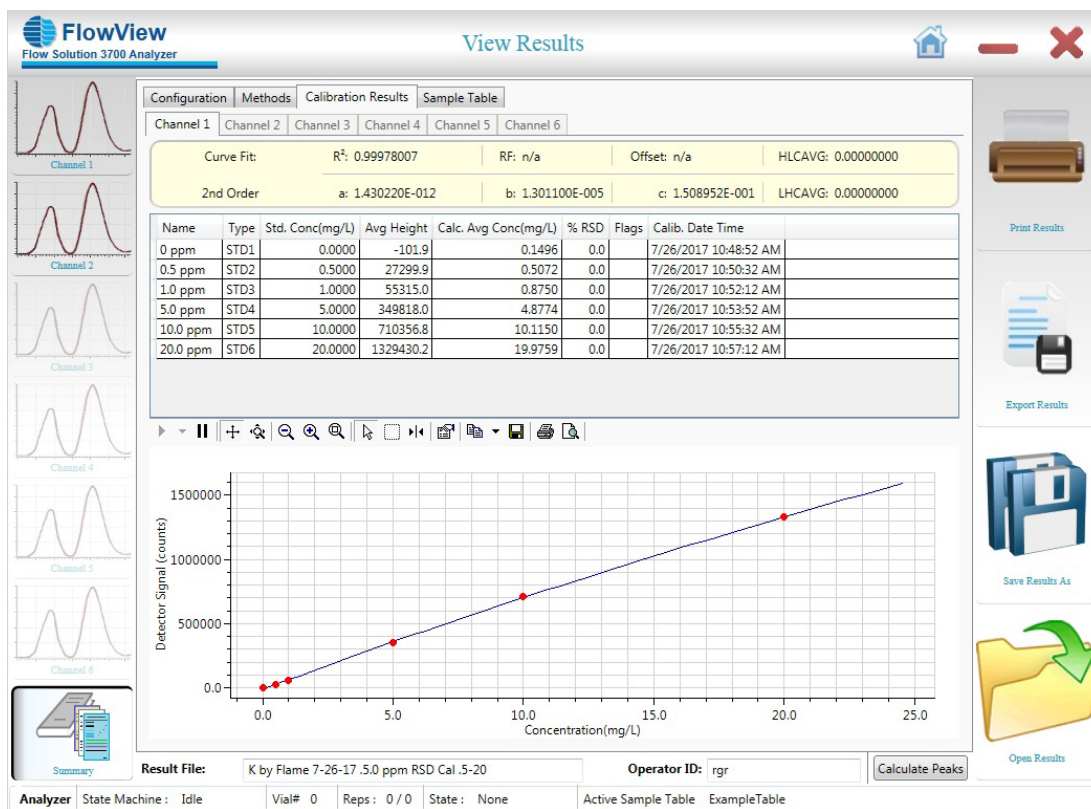


Figure 3. Potassium by Flame Emission Spectrometry and Continuous Flow Analysis (CFA) (0-20 mg/L)

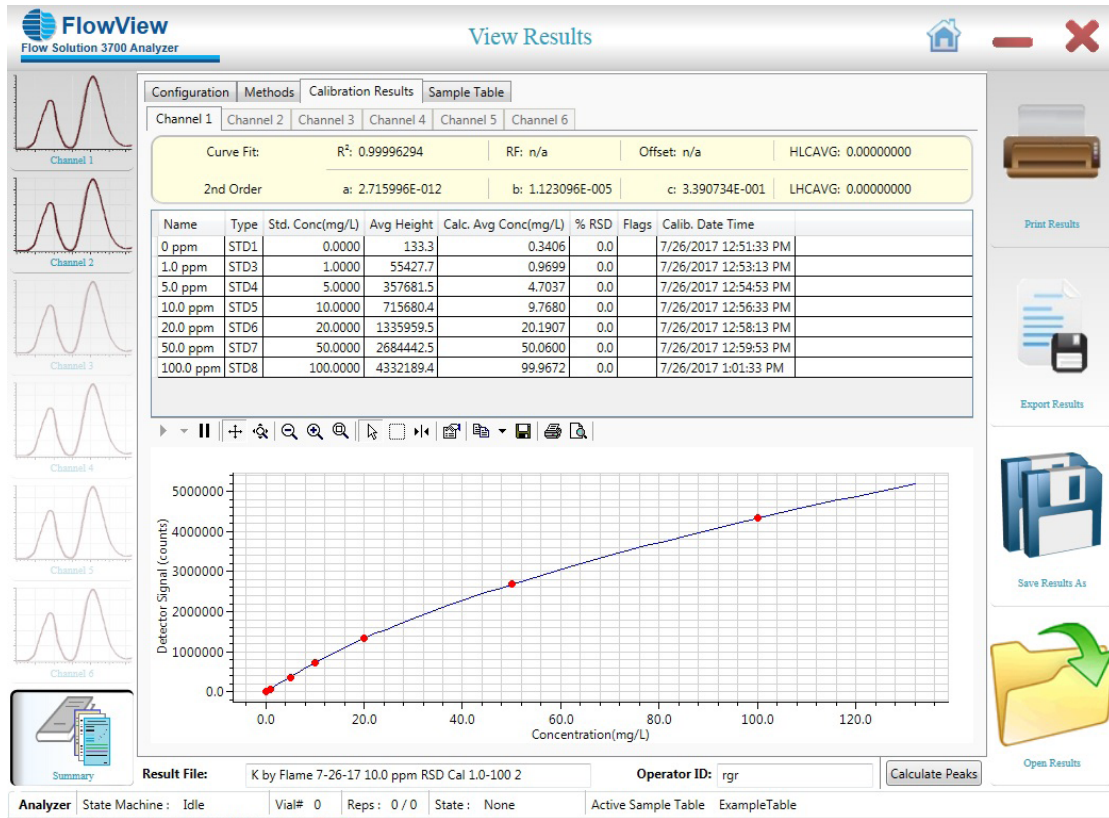


Figure 4. Potassium by Flame Emission Spectrometry and Continuous Flow Analysis (CFA) (0-100 mg/L)

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151 Graham Road
 P.O. Box 9010
 College Station, Texas
 77842-9010
 (979) 690-1711
 (800) 653-1711 USA/Canada
 (979) 690-0440 Fax
 www.oico.com
 E-mail: oi-info@xylem.com