



Model 410 Flame photometer

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The Sherwood Model 410 Flame photometer directly measures Alkali and Alkaline Earth metals Sodium (Na), Potassium (K), Lithium (Li), Calcium (Ca), Barium (Ba), Caesium (Cs), Rubidium (Rb) and Strontium (Sr) by means of a low temperature flame using propane, butane or Natural gas. The measurement on the Model 410 Clinical Flame Photometer can be semi automated by means of the Model 805 Clinical Diluter and for clinical samples the ease of use is enhanced by the Lineariser Option which enables results in the clinically significant concentrations to be displayed directly on the Model 410 Clinical Flame Photometer in mmol/l without the need to prepare a standard curve. The Model 805 Clinical Diluter is ideal for diluting such samples and the dilution ratios are 200:1 for serum Na and K and 50:1 for Lithium

The principles of flame emission spectroscopy were first investigated by Kirchoff and Bunsen (1860s). In the 1920s Lundengardh refined the technique by incorporating a nebuliser and electro optical detector which paved the way to modern quantitative analysis.

Our predecessor company Evans ElectroSelenium Ltd (EEL) developed the first Model 100 Flame photometer in the late 1940s and the Model 410 Flame Photometer is the latest single channel Flame Photometer in that line.

KEY APPLICATION AREAS

Flame Photometry is the technique of choice for the measurement of Na, K and Ca in all sample types in:

- Beverage
- Chemical Manufacture
- Clinical samples for Sodium, Potassium & Lithium
- Fertiliser
- Food
- Mineral Extraction
- Oil industry
- Paper industry
- Pharmaceuticals
- Soil analysis
- Utilities

Sherwood Scientific has a "Guide to Flame Photometric Analysis" and a library of applications for all these areas

System Requirements

A source of clean dry pulse-free compressed air at a pressure of 12-15 psi is essential for the Model 410 Flame Photometer. Sherwood recommends the Model 851 Compressor. For areas

of high temperature and humidity the Model 855 incorporating a moisture trap is available as an accessory.

The Model 410 Flame Photometer will run on Butane, Propane, or a mixture of the two, and Natural gas. A Primary Regulator at the gas source is required and can be supplied by Sherwood. The secondary regulator is built-in to the Model 410 Flame Photometer

The Sherwood Advantage

- 45 years of design expertise in Flame Photometry
 - Sherwood Air Compressors and Diluter gives operator- independent reliability of results
 - Application expertise, Method library and "Guide to Flame Photometry"
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Specification of the Model 410 Flame Photometer:

- **Sensitivity :** To display minimum of 100 units, Na <0.5 ppm, K <0.5 ppm, Li 5 ppm, Ca 5 ppm, Ba 200 ppm
- **Specificity:** For Na, K, Li interference is less than 0.5% of the concentration of Na, K, Li, Ca or Ba, equal to the concentration under analysis
- **Linearity:** Better than 2% mid range with Na=3ppm, K=3ppm, or Li=5ppm
- **Drift:** (To be measured after 30 mins warm up): Zero Drift better than 2% per hour when calibrated with Na=10ppm
- **Reproducibility:** < 1 % CV from the same Bulk sample for 20 determinations at Na and K=10ppm .
- **Limit of Detection:** <20 ppb Na and K
- **Time to Stability:** Aspirate for 20 secs.
- **Aspiration Rate:** Variable 2-6 mls /min

Model 420 Dual Channel Flame Photometer



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The Model 420 has been developed with the objective of improving the productivity and analytical performance of the laboratory when measuring sodium and potassium.

The time taken to set up and calibrate the instrument is much reduced, this is achieved by the automatic ignition and optimisation of the flame conditions.

In dual mode both sodium and potassium results are obtained simultaneously halving the measuring time.

The analytical performance is improved by the use of a Lithium Internal Standard signal which reduces any fluctuation in flame conditions, drift, and dilution errors.

The readings on both channels are linear over the working range of the Model 420.

There are several monitoring and control functions included in the software driving the Model 420, eg. measurements can only be made after Blanking and Calibration.

The Model 420 can operate in continuous or peak mode. In peak mode the Model 420 automatically detects a stable reading for transmission to a printer or computer. In Continuous Mode the display is real time and can be sent to the analogue output with or without ratioing to the Internal Standard Reference, or printed to the printer or a computer.

The date of analysis is printed at each calibration and the time is printed for each sample, QC and repeat samples are identified on the printout.

Sample dilution and presentation to the Model 420 of Clinical samples can be made automatically by the Sherwood Model 805 Diluter. No predilution of urine samples required for potassium.

Specification

Measured Ranges

Clinical Sample	Element		Industrial
Serum	Na	100.0-199.9 mmol/l	0-199.9
	K	1.00-9.99 mmol/l	0-199.9

Urine	Na	100.0-199.9 mmol/l	
	K	40.0-120.0 mmol/l	
Linearity	Na & K	2% over Full Range	
	Li	10% over Full Range	

Reproducibility: less than or equal to 1% CV 20 replicate samples (Above specification using butane or propane and after 30 mins instrument warm up)

Dilution Ratios

Clinical			Industrial
Serum and Urine	Na & K	1:200	Final concentration
using blank solution	Li	1:50	Na < 40 ppm
			K & Li < 20 ppm

Minimal sample volume

Minimal Dilution	10 Microlitre
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Sherwood proudly announces a further two new products:

The Model 425 Flame Photometer

The World's Latest Flame Photometer with Dual Channel Capability which can measure up to four elements, now including calcium. The Model 425 Flame Photometer builds on the great success of the Model 420 Flame photometer with its Lithium Internal Standard and fully automatic ignition and optimisation which gives true ease of use and reproducible conditions for high precision measurement. The versatile Model 425 Flame Photometer reinforces Sherwood Scientific as the Leader in Flame Photometry,

The Model 860 Autosampler

Both the Model 425 Flame Photometer and the existing Model 420 Flame Photometer can work with the new Model 860 Autosampler, which gives a fully intergrated system capable of measuring 60 samples an hour of two elements chosen from (Calcium for Model 425), potassium and sodium. The Model 860 Autosampler has on-board positions for a blank solution, calibration standard and 40 samples. The Model 860 with Model 420 or Model 425 Flame Photometer can work together with the new Flame Data Collection Excel spreadsheet Macro which arrays the data directly in a form for further data manipulation. Each reading is time stamped.



Model 425 Flame Photometer with Model 860 Autosampler and printer