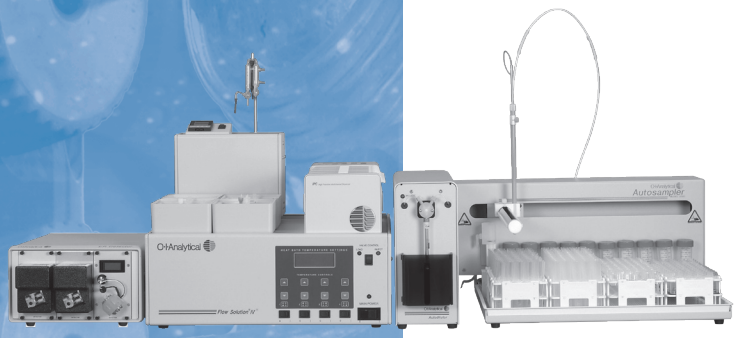
Flow Solution® FS IV⊕

Automated Chemistry Analyzer



- Performs both flow injection analysis (FIA) and segmented flow analysis (SFA) methods
- Basic platform is configurable for simultaneous operation of 2 or 3 analytical channels and is expandable for up to 6 channels
- Optional modules perform autodilution and on-line sample preparation techniques including distillation, extraction, UV digestion, and membrane separation
- Expanded Range™ Detector supports analyte measurements over a large dynamic range (3–4 orders of magnitude)

Principal Applications

- Drinking water
- Wastewater
- Groundwater
- Surface water
- Seawater
- Soil extracts and digests
- Plant tissue extracts and digests
- Tobacco
- Fertilizers
- Detergents
- Foodstuffs
- Wine and Beer

Methods

- USEPA
- ASTM
- Standard Methods
- DIN
- ISO

Description and Function

The Flow Solution® IV⊕ (FS IV⊕) is a powerful automated chemistry analyzer for performing high throughput continuous flow ion analysis methods. The FS IV⊕ supports and performs two types of continuous flow analysis techniques: segmented flow analysis (SFA) and flow injection analysis (FIA).

The FS IV⊕ consists of a 360-position autosampler, a 24-channel peristaltic pump, a power base module (with 4 independent heater controllers and 4 positions for analytical cartridges), and a detector module equipped with 1 to 3 detectors and flow cells depending upon analytical requirements.

The FS IV⊕ can be configured for simultaneous operation of 2 or 3 analytical channels and is expandable for up to 6 analytical channels when equipped with an additional power base and detector module. Optional modules are available to perform automatic dilutions and sample preparation techniques, including: on-line distillation or extraction, UV digestion, and membrane separation.

Operating Principle

In SFA applications, a segmented sample stream is formed as the X-Y-Z autosampler aspirates and introduces sample into a carrier air stream. The resulting bubble segmentation minimizes dispersion as the sample mixes and reacts with reagents before photometric or electrochemical measurement of the analyte.

In FIA applications, a precise volume of sample is injected into the carrier stream, mixes, and reacts with reagents under continuous flow conditions before photometric or electrochemical measurement of the analyte.

Signals generated by the detector are processed by the WinFLOW™ software package for analysis and final report generation.

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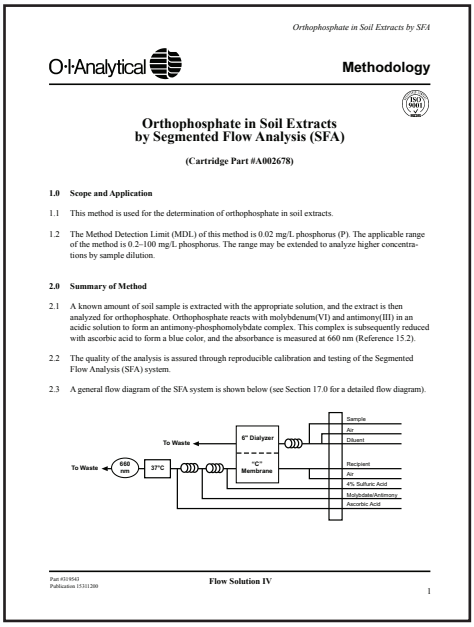
Specifications

FS IV⊕ System Dimensions	Autosampler, Pump, Detectors, and Power Base
With a 360-Position Autosampler	33 cm H x 135 cm W x 53.3 cm D (13” H x 54” W x 21” D)
With an Optional 90-Position Autosampler	33 cm H x 122 cm W x 53.3 cm D (13” H x 48” W x 21” D)
Autosampler	360 or 90 positions
360-Position Autosampler	360 positions, XYZ, 360 samples, 10 bulk standards
Optional 90-Position Autosampler	90 positions, XYZ, 90 samples, 9 bulk standards
Detectors	Photometric (420–880 nm), Amperometric @ 0.00 V vs. Ag/AgCl, or Ion Selective Electrode
Photometric Detector Flowcell	5-mm path length (optional 10-mm path length), PEEK®
Amperometric Detector Flowcell	Silver working electrode, silver/silver chloride reference, stainless steel counter electrode
Ion Selective Electrode (ISE) Flowcell	Low dead volume, wall-jet design
Power Base	Houses up to 4 analytical cartridges, 4 heater positions with a large LCD touchpad for temperature adjustment and display
Heater Controller	4 independently controlled heaters, programmable from ambient to 100 °C ±0.5 °C
Power Supply	110 ±10 % V_{AC}, 60 Hz; 220 ±10 % V_{AC}, 50 Hz
Pump	24-channel peristaltic pump, variable speed, digital control, RS-232
Dimensions	13 cm H x 17.5 cm W x 38 cm D (5.1” H x 6.9” W x 15” D)
PC Specifications	IBM compatible, 1 GB RAM, 3 GHz, CD-ROM, RS-232, Windows® XP Pro
System Software	WinFLOW; Windows® software-based system control, analysis, and data handling software
Optional Modules	Autodilutor, Distillation Module, PC, Power Supply, System Software, Digestion Module
Autodilutor	High resolution stepper-motor driven syringe pump, 24,000 steps equipped with a 2.5-mL volume syringe (other syringe volumes available)
Distillation Module	Operating temperature range of 25–200 °C
UV Digestion Module	Single- or dual-channel operation, 312 nm/8 W or 254 nm/8 W lamps, Teflon® or quartz coils; UV lamps 312 nm/8 W or 254 nm/8 W
Warranty	12 months on parts and labor

Analytical Methods

Methods supplied with the FS IV⊕ provide all information necessary to perform continuous flow ion analysis for specific analytes and sample matrices, including method performance data.



Orthophosphate in Soil Extracts by SFA

O·I·Analytical **Methodology**

Orthophosphate in Soil Extracts by Segmented Flow Analysis (SFA)

(Cartridge Part #A002678)

1.0 Scope and Application

1.1 This method is used for the determination of orthophosphate in soil extracts.

1.2 The Method Detection Limit (MDL) of this method is 0.02 mg/L phosphorus (P). The applicable range of the method is 0.2–100 mg/L phosphorus. The range may be extended to analyze higher concentrations by sample dilution.

2.0 Summary of Method

2.1 A known amount of soil sample is extracted with the appropriate solution, and the extract is then analyzed for orthophosphate. Orthophosphate reacts with molybdenum(VI) and antimony(III) in an acidic solution to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue color, and the absorbance is measured at 660 nm (Reference 15.2).

2.2 The quality of the analysis is assured through reproducible calibration and testing of the Segmented Flow Analysis (SFA) system.

2.3 A general flow diagram of the SFA system is shown below (see Section 17.0 for a detailed flow diagram).

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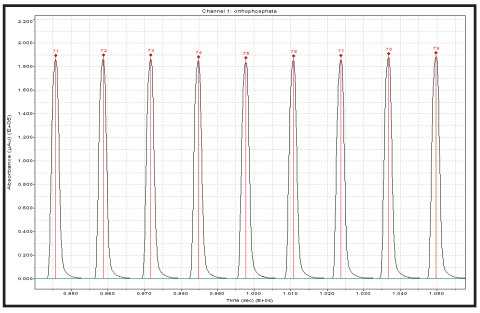

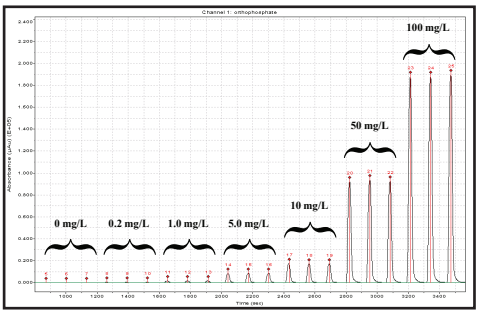

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