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miniSIA-1

Miniaturized Sequential Injection Analyzer

Powerful, flexible, versatile automation

The Global FIA miniSIA-1 represents a new generation of instrumentation for the proven Sequential Injection technique. It combines sampling frequency and speed of response of FIA with robustness and reagent economy of SIA. The key to this new capability is the marrying of the Global FIA milliGAT pump with flow programming. The concept was first described by Ruzicka in the FIA Tutorial¹.

The system is equipped with a milliGAT pump coupled to a heating coil and Chem-on-Valve™ (COV) monolithic manifold (see Figure 1). An extra measure of modularity is built into the COV by making the detector flow cell a bolt-on piece. This means that the same manifold can be configured with a short or long path length absorbance cell, fluorescence cell, chemiluminescence cell, and one of a host of different electrochemical detectors. External instruments such as Atomic Absorption, Inductively Coupled Plasma and Electrospray MS are compatible with miniSIA-1 since the milliGAT pump provides a wide range (6nL/sec to 170 µL/sec) of highly reproducible flow rates over long periods of time.

For spectrophotometry the standard 10 mm uv/vis absorbance cell uses fiber optic (f.o.) cables to pipe light to and from the flow cell. A white LED and a

W-Xe lamp are provided as light sources. The spectrometer is an Ocean Optics USB-4000.

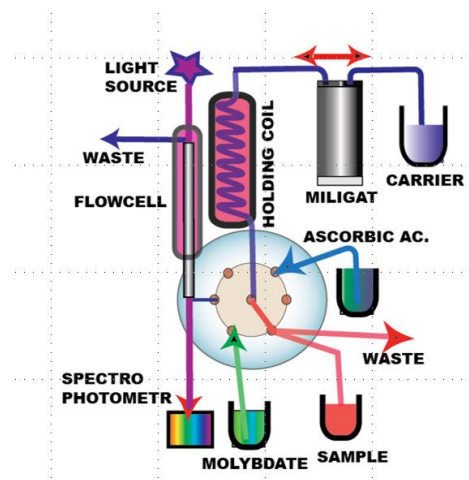


Figure 1: miniSIA-1 flow diagram

The sample port has an inlet and outlet which meet on the face of the COV rotor. Thus the sample can be primed to the valve without drawing sample into the rest of the manifold where it can be a source of carryover. The sample port can also be primed with the next sample while the present measurement is underway, either manually or by a miniaturized metering pump.

miniSIA mode of operation

The unique feature of the new generation of miniaturized instrument is the combination of

¹ <http://www.flowinjectiontutorial.com/> see § 2.3.3

milliGAT pump with microfluidic manifold mounted on multi position valve and FloZF software designed to allow precise flow programming, data collection and processing. SIA provides a way for a wide range of reagent based assays to be automated. Calibration is built into the software thus allowing the device to be used for serial assays or for continuous monitoring.

Principle of Sequential Injection.

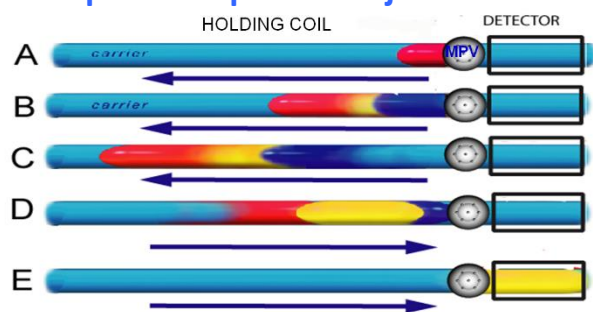


Figure 2: Event sequence of SIA Assay cycle

Sample (red) is aspirated by flow reversal into holding coil (A), followed by reagent (B). As these zones move upstream (C) the product (yellow) is formed at the interface. Then the flow is reversed (D) and the reaction product is transported into flow cell (E). While all other flow based methods use continuous flow of reagents, the miniSIA technique uses DI water as a carrier, volumes of injected sample and reagent are 50 to 100 μ L per assays and the flow is discontinued to minimize waste generation.

Reaction rate and flushing of the COV manifold are programmed to suit the assay and recycle analysis time

Applications

Agriculture and Environmental - Serial assay of phosphate, nitrate, nitrite, ammonia, and sulfate in milli and micro molar range (Figure 1 and Figure 3).

Oceanography - Iron, aluminum, manganese, zinc in nano- and subnano- molar range. Phosphate, silicate, nitrate, ammonia in micro and nanomolar range.

Biochemistry and Biotechnology - Enzymatic assay of substrates, nutrients, proteins.

Research - Method development. Dissolution and permeation studies. Monitoring of bio and

environmental processes. The FloZF - Excel interface provides a powerful means of experimental design for system optimization.

Software

The device control and data acquisition software is called FloZF™ and provides a convenient drag-and-drop means of setting up nested device control sequences. The software is also equipped with powerful data acquisition, calibration and data evaluation.

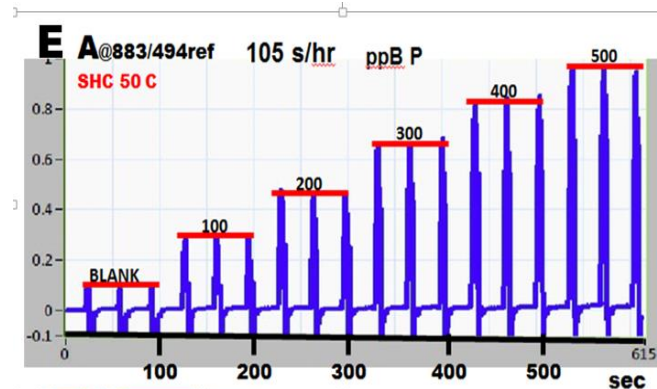


Figure 3: Serial assay of phosphate with miniSIA

Wetted materials

The Selection valve and COV wetted materials are COV – Acrylic or Ultem, rotor – Valcon M. Pump wetted materials include PPS, a Teflon, carbon and PEEK composite, Teflon piston tips and a ceramic pump chamber. Tubing is made from PEEK or PFA.

Physical Specifications

Size: 200 mm x 300 mm x 250mm

Weight: 7.5kg

Power: 110-250VAC, 2.5 A

Communication: USB

Pricing

Call for price dependent on configuration

Accessories and spares

1. Fluorescence flow cell with LED excitation \$650
2. Chemiluminescence flow cell \$650
3. Photon counter \$2,375
4. SI-Chrom Kit \$call
5. Fittings kit \$450
6. Heated 10 cm light path flow cell \$call

Technical Point of Contact

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