

QuikChem 8500 Series 2 FIA System

Frequently Asked Questions

What is flow injection analysis?

Flow injection analysis, or FIA, is a continuous flow method for rapidly processing samples. The peristaltic pump draws sample from the sampler into the injection valve. Simultaneously, reagents are continuously pumped through the system. The sample is loaded into the sample loop of one or more injection valves. The injection valve is then switched to connect the sample loop in line with the carrier stream. This sweeps the sample out of the sample loop and onto the manifold. The sample and reagents then merge in the manifold (reaction module) where the sample can be diluted, dialyzed, extracted, incubated and derivatized. Mixing occurs in the narrow bore tubing under laminar flow conditions. For each method, the operating parameters are optimized to address high sample throughput, high precision and high accuracy.

What is the QuikChem 8500 Series 2 Automated Ion Analyzer?

The QuikChem 8500 Series 2 is a design concept that ensures seamless field-upgradability of systems in order to protect your initial investment and to address evolving technical requirements. When you purchase even the most basic QuikChem system, it comes with all the parts necessary to allow the system to be upgraded in the field as required. For example, a QuikChem 8500 Series 2 with one channel of flow injection analysis and no autosampler, is fully field-upgradable to the most sophisticated configuration including an XYZ sampler, Precision Dilutor System (PDS 200), multiple channels of flow injection analysis and even ion chromatographic capability.

Why purchase FIA rather than Segmented Flow Analysis (SFA)?

FIA has several fundamental advantages over SFA because of the absence of air bubbles in the FIA analytical stream.

Faster startup: Since FIA does not require the use of air bubbles, it is not necessary to precondition the manifold with a surfactant, pump in the reagents and wait until a bubble pattern is established.

Shorter analysis times: Because FIA has both highly precise sample volumes and analysis times, each standard and sample are exposed to the same analytical conditions. As a result, the reaction does not need to be brought to a steady state as it does with SFA.

Less carryover: Due to the excellent inter-sample washout characteristic of FIA, there is no significant carryover between samples. In contrast, carryover is an integral part of SFA requiring post-run data processing before a final, accurate concentration result can be calculated.

Faster shutdown: Again, due to the absence of air bubbles as well as higher flow velocities and lower manifold rinsed volumes, an FIA manifold can be washed out in less than five minutes versus 15 minutes for SFA.

Faster method switching: Because of the combined short startup and shutdown times of FIA, the user can change over from one method to another very rapidly, typically in less than 10 minutes. Rapid method changeover is not practical with SFA.

Closed-loop data quality control: Due to the short analysis times of FIA, it operates very near real-time. Therefore, data quality can be monitored and corrective action taken as required. This is not possible with SFA since it operates between 5 and 15 minutes out of phase with real-time and requires a blank to be run after the sample of interest to determine a final baseline measurement.

How do you select between FIA and IC?

FIA and IC are instrumental techniques for determining ionic species. However, due to their operating characteristics, they are complementary rather than competitive techniques. In fact, the same laboratory may have use for both.

FIA is obviously selected for methods that cannot be run on IC. These include ammonia, cyanide, phenolics, total Kjeldahl nitrogen, total phosphorus, alkalinity and hardness. FIA is also generally selected when a large number of samples need to be determined for three or four analytes. For example, if 50 samples need to be determined for ammonia, nitrate, nitrite and phosphate, FIA is the technique of choice.

IC is selected when several species of the same ionic class need to be determined in only a few samples. For example, if chloride, fluoride, nitrate, nitrite, phosphate and sulfate need to be determined in 10 drinking water samples, IC is the obvious choice. Also, IC is the appropriate method for determining the disinfection byproducts (DBPs): bromate, chlorate and chlorite and the bromate precursor, bromide, in drinking water samples.

What is the typical sample throughput with FIA?

Lachat offers FIA methods that process up to 120 samples per hour. However, sample throughput is not the only consideration when determining overall productivity of an analyzer. Other important parameters include startup and shutdown times, time spent doing data quality monitoring, method changeover times and troubleshooting. In all cases, FIA has significantly better operating characteristics than SFA.

What are the differences between the XYZ samplers (ASX410/ASX520)?

The major difference is that the ASX520 sampler has more sample positions (360 versus 60) and has a separate rack with 16 positions for bulk calibration/QA standards. Both systems have true random access capabilities as they can access any sample or standard position at any time during a tray run.

Can I trade-in my old QuikChem 8500, AE or IV system when I upgrade to the QuikChem 8500 Series 2 FIA+?

Yes. If you own a QuikChem IV system we will give a credit allowance, depending on the age of the system and the number of channels. XYZ samplers and pumps on the QuikChem AE, QuikChem 8000, and QuikChem 8500 systems can be upgraded to be used on the new QuikChem 8500 Series 2 system. Omnion 3.0 can also be upgraded as part of the new system. We will also take the complete system as a trade-in.

What components of an old QuikChem system can be used for an upgrade to the QuikChem 8500 Series 2 FIA+?

XYZ (8000 and AE only) samplers can be refurbished as part of the upgrade. The same is true for pumps on either QuikChem IV, AE or 8000 systems.

Chemistry manifolds are exchangeable from the AE and 8000 to the QuikChem 8500 platform, but not from the QuikChem IV. Please note, however, that AE users wishing to use their original manifolds will need to purchase new interference filters.

How many analytes can you determine simultaneously on the QuikChem 8500 Series 2?

Up to eight chemistries can be run simultaneously using two core units (5 channel maximum per core). Please note, however, that it is only practical to run chemistries with a common matrix at the same time. It is not necessary to dedicate individual channels to one chemistry. By using FIA, chemistry changeovers are very easy and fast (approximately 10 minutes). This allows several chemistries to be run efficiently on a few channels.

How do you handle off-scale samples?

First, we define "off-scale" as "having a concentration of 10% higher than that of the highest calibration standard". If the peak is still detectable, an estimated concentration is given. Additionally, with the intelligent autodilutor feature, the estimated concentration is used to 'trigger' an autodilution which will return the sample's concentration to below that of the high standard. In flow injection analysis, all peaks enjoy superior washout characteristics. This is because no more sample is injected than is needed, unlike in segmented flow analyzers. And, even if the previous peak has a tail into the next peak, the software, as in chromatography, measures the next peak's area from the increase in area above the previous peak's tail to correct for any carry-over effect.

What dilution ratios can you accommodate?

Dilutions can be performed automatically from a ratio of 1.6 to 1,000-fold dilutions.

Can your instrument prepare the calibration standards automatically?

Yes. If you supply a stock, high calibration standard, dilutions of this stock can be made between 1.6 and 1,000 using the PDS 200 Dilutor.

How many methods do you have?

Over 500 QuikChem methods have been developed for more than 40 analytes in a wide variety of matrices.

Are your methods USEPA-approved?

Many of our methods are approved for use with NPDES and NPDWR compliance monitoring. Additionally, many more Lachat methods are Equivalent to Approved NPDES methods under the USEPA's Method Update

Rule. Ask for our QuikChem Methods List for a comprehensive overview of what we offer.

Why aren't your USEPA-Approved methods in Table 1B of the CFR40, Part 136?

Only completely unprecedented methods that have needed a complete alternate test procedure (ATP) process appear in this table. Our USEPA-Approved methods are "optionally approved" methods. They have been subjected to a preliminary screening in the ATP process known as the "two-column comparison", and have been found to differ insignificantly from the corresponding methods in Table 1B. Lachat can supply copies of letters from the USEPA documenting this.

Is your software LIMS compatible?

Most modern LIMS (Laboratory Information Management Systems) work on the basis of distributed processing in which the data, in a high-level format, is obtained by the terminal from the actual instrument during real-time, and then reviewed and uploaded to the LIMS server at the analyst's convenience. There are two aspects of LIMS - instrument interface: importing or downloading a worklist to the instrument, and exporting or uploading data from the instrument. Our software allows both to occur via user-configurable ASCII files; the import worklist feature is called "Import Tray" and the data export-uploading feature is called "Export Data". The Help system has more details about these powerful features.

We are working with a software consultant to develop a LIMS (Laboratory Information Management System). Can you call the consultant and explain how your system can be interfaced?

Yes. We do this routinely! Some services we can offer to your LIMS consultant are: samples of imported and exported files, free documentation, free demo copies of our software, phone consultation, and advice based on our experience with hundreds of laboratories in similar situations.

Can I import worklists?

Yes. There is a feature called "Import Tray" which allows you to create comma-separated ASCII worklists for Omnion 3.0.

Can you run your software under different Windows Operating Systems?

Our Omnion 3.0 version is compatible with Windows 2000, XP and Vista Operating Systems.

Who installs the systems?

ATS Scientific factory trained service engineers install all systems. System installation includes setup, testing and a short orientation. A typical installation will take four to five hours to complete.

Instrument training

ATS Scientific provides a full day of hands on training at the time of installation. An optional 2-day course for two operators at Hach's factory-based training center is also available. Classes are small, usually no more than five trainees, and regularly scheduled. Contact ATS Scientific for further details.

Do you offer service contracts?

Yes. ATS Scientific Inc. offers on site Preventative Maintenance Visits & Block hour service.