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How to optimize your ICP-OES methods

9 tips to make you more efficient (and get the right results)

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With the increasing sophistication of instrument software, it can be difficult to keep up with all the powerful functionality that's built in–functionality that could be making your life easier.

Here are the top 9 functions you should know about. Most of them are available on all manufacturers' current ICP-OES instruments.

1 Use dynamic rinse times to slash sample-to-sample run time

Setting the rinse time in a method can be tricky. If the sample rinse time in your method is too short, you risk introducing carryover. Residual liquid from the previous sample will impact the accuracy and precision of the next sample. Conversely, if the sample rinse time is too long, then you are wasting time and rinse solution.

Use a dynamic rinse control function that automatically adjusts the rinse time to suit the concentration of each sample. Typically, these functions monitor the signal to detect when all the sample has been rinsed out. When it reaches a user-defined threshold, the instrument moves to the next sample.

2 Create shortcuts for common methods

Labs often run only a limited number of methods on each ICP-OES. You can save time when switching between methods by using functionality that creates shortcuts to those methods. Analysts can then load a method and be ready for analysis with just one click.

3 Install a switching valve to run more samples with higher accuracy

Most ICP-OES instruments can be fitted with a switching valve positioned between the peristaltic pump and the spray chamber. This multiport valve allows sample to be loaded while the rinse solution is pumped into the sample introduction system. Using a switching valve eliminates delays between rinsing and sample measurement, saving time and gas and improving precision, and stability. There are even models with extra ports to enable online addition of internal standards. A fully integrated switching valve is the best choice as it can then be controlled within the instrument method.

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4 Reproduce the torch position—each time

If you have multiple analysts using the same ICP-OES, consistent torch alignment may be a problem. The process of removing a torch and getting the replacement one back in the same position can be tricky. With torch alignment having a big impact on instrument performance, it's important to get it right. Most instruments have an auto-alignment feature that makes torch positioning easy and reliable. Some even have a plug-and-play torch design that eliminates the need for alignment completely.

5 Identify unexpected interferences before they impact results

If you are receiving samples from new customers, or new sources, they may contain unexpected interferences, which can cause major headaches. Identifying and correcting for interferences is critical for ensuring accuracy—but it often requires the skills of an experienced spectroscopist. Look for functionality in your instrument software that manages interferences by dynamically adjusting background correction points. Typically, this is based on a spectrum of the sample, which highlights any potential interferences.

6 Troubleshoot erroneous results without re-analysis

Figuring out what went wrong when you get an inaccurate analytical result can be challenging. Fortunately, there are software functions available that take a snapshot of each sample scan during the analysis. You can quickly review a sample scan to see what might have caused the error—the problem might be interference from another element or elements at unexpectedly high concentrations. Sometimes, you can reprocess the data from that sample scan to deliver a correct result, without rerunning the sample.

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7 Use a secondary wavelength to confirm sample results

Most instruments allow you to choose an extra wavelength to the primary emission line for each element you've selected for analysis. This function is a lifesaver when you have high-matrix samples with substantial interferences, as it gives you confidence that you can use data from another wavelength if things don't work out with the primary one. Collecting data from multiple wavelengths per element is also useful for routine samples. You can use the data from each line to compare the reported concentration of the element. If the concentrations match up, you're assured that the result is correct.

8 Use the instrument test tools

Occasionally a run has been going for some time when you notice a decrease in sensitivity. Many instruments have built-in diagnostic tests to help identify what might be going wrong. Simply stop the run, run the tests, and use the results to guide you in troubleshooting the problem.

9 Increase the dynamic range

Hitting the top of your calibration range can force you to dilute and rerun samples. There's functionality available that allows you to monitor two or more wavelengths of different sensitivities for each element. If you suffer an overrange result using the most sensitive wavelength, the instrument will automatically measure using the less sensitive wavelength, ensuring all your results stay within the calibration range. Often, this process can be completely automated.

Learn more

About the Agilent 5110 ICP-OES:
www.agilent.com/chem/5110icpoes

About ICP-OES supplies:
www.agilent.com/chem/icp-oes-supplies

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