Calibration troubleshooting checklist

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Trusted Answers

Having to restart an analysis, including preparing new standards and generating a new calibration, could cost you considerable time and money, especially if your calibration involves multiple standards. Often, lower than expected sensitivity and a poor fit on your calibration graph are the first signs of trouble.

Listed below are some common sources of error associated with the manual preparation of calibration standards. Ensure that your lab SOPs include steps to minimize or eliminate these potential sources of calibration error:

- ☑ Pipettes that are out of calibration
- ☑ Contaminated glassware from inadequate cleaning/soaking
- ☑ Cross-contamination between stock solutions of different elements due to poor analytical practice (e.g., double-dipping a previously used pipette)
- ☑ Accidental selection of the wrong stock solution when preparing a multi element standard from single-element stock solutions
- ☑ Missing or doubling up on a required element in a multi element standard
- ☑ Stock solutions that are past their expiry date
- ☑ Degradation of stock solutions or standards due to incorrect storage
- ☑ Poor reagent quality
- ☑ Instruments that are out of wavelength calibration
- ☑ Incorrect acid used to stabilize a standard solution (e.g., H_2SO_4 should not be used for Pb standards)

Compare the costs: Manual standard preparation vs. an automated solution

If you've been trying to replace the manual labor associated with preparing calibration standards and diluting samples, this simple cost calculator can help you make your business case. The worksheet is designed to help you quantify the true cost of manual calibrations over a year.
For any values you don't know accurately, enter a reasonable estimate.

	Parameter		Enter values here	
A	What hourly rate do you typically associate with staff time?		»	$ per hour
B	How long does it take to make a set of ICP-OES calibration standards, QC standards, and interference check solutions for an environmental analysis method?		»	hours
C	How many sets of standards are made for the different environmental analyses each month?		»	
D	Monthly cost for calibration prep:	A x B x C	$	
E	What is your monthly cost for bulk stock solutions or commercial standards?		»	$
F	What is your monthly cost for consumables used in standard preparation (e.g., pipette tips)?		»	$
G	What is your monthly cost for acids and other reagents?		»	$
H	Monthly cost of calibration consumables:	E + F + G	$	
I	How many times per month are incorrectly made standards the source of calibration error?		»	per month
J	How many samples have to be rerun after recalibration?		»	samples
K	What is your cost-per-sample?		»	$ per sample
L	Monthly cost of calibration errors:	(A x B) x I + (J x K) x I	$	
M	Your total monthly calibration cost:	D + H + L	$ **0**	
N	Total amount that manual calibrations cost your lab each year:	12 x M	$	

If your annual cost of manual calibrations is more than half of the cost of an autodilutor, you have an excellent business case to buy one.
With a payback period of two years or less, an autodilutor would also improve your productivity and reduce errors.

Using commercial preprepared multi element standards may also prove to be cost effective, compared to using single-element bulk standards.
The business case will be particularly strong if you are doing lots of rework due to contaminated or incorrect standards.

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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