3 Steps to Ensure Your Disinfection Monitoring is Hitting the Mark

Selecting a technology to monitor chlorine residual in drinking water should be fairly straightforward because there are only two mainstream choices: amperometric and colorimetric. Far too many water quality managers, however, select the wrong technology and the consequences may be detrimental.

Amperometric is an electrochemical technique that measures the change in current resulting from chemical reactions. Colorimetric, by comparison, measures intensity of the color.

The biggest mistake water quality managers make is choosing one or the other based on perception. Whether it's a fear of chemistry or desire to avoid regular maintenance, many tend to avoid monitoring equipment that includes reagents (the chemical compounds that need to be added at regular intervals to achieve a chemical reaction revealing chlorine concentration). The latter typically stems from a misunderstanding that being free of reagents is equal to being free from maintenance.

Whether water professionals need new equipment as part of an upgrade or expansion or simply want to replace existing devices for improved performance, conducting an adequate analysis is paramount to achieving optimal long-term results.

Here are the three key steps to take for a proper evaluation of amperometric and colorimetric technologies:

Understand the major performance specifications and identify key differentiators.
How do the basics of each method match your drinking water treatment plant situation?
Amperometric machines provide continuous measurement (translation: fast response to changes in chlorine concentration) and are reagent-less, so there are no reagents in the waste stream. The downside is that readings can be impacted by pH and other factors and calibration is required by the underlying technology.

Colorimetric machines are accurate without calibration and independent of changes in sample pH, chlorine concentration, temperature, flow, and pressure. The downside is that they require routine reagent replacement monthly as well as new tubing every 180 days, on average. Chemicals are also present in the discharge.

Will the equipment be placed in a remote location that's not regularly accessed or is the risk of dropping reagent discharge on the ground too great? If so, amperometric is likely the best fit because you can leave it unattended for a greater length of time in the right application. However, this doesn't mean it is maintenancefree. Over time, the sensor membrane cap and/or electrolyte will need to be replaced and recalibration will be needed.

If the monitoring equipment is being installed at a plant where it's easily accessible and the water system sees significant swings in parameters such as pH, colorimetric technology is likely the better choice. Chlorine concentrations are another factor. A system that routinely handles numbers in a higher or lower range may drive water quality managers to one specific technology and away from the other.

Research instrument specifications to further narrow down the choices.
In digging deeper, what nuances are most desirable for your situation? Here's a comparison of each type of technology embedded in different models from the same manufacturer:

Hach CL10sc (Amperometric)

- Accuracy: +/- 3 percent at pH < 7.2, +/- 10 percent at pH < 8.5 (±0.5 pH unit)
- Limit of detection: 30 ppb (or less)
- Response time: Continuous analysis (T90: 100-140 s)
- Automated cleaning: Yes (optional)

Hach CL17sc (Colorimetric)

- Accuracy: +/- 5 percent or 0.04 mg/L, whichever is greater
- Limit of detection: 30 ppb
- Response time: Batch analysis (150 seconds cycle time)
- Automated cleaning: No

Match your choice against sitespecific factors.
Think you've selected the proper technology for your drinking water treatment plant? Take these final criteria into account just to be certain. Amperometric equipment requires uninterrupted sample flow and uninterrupted power, sample pH stable within 0.5 pH unit from the average value, and chlorine concentration stable within +/- 20 percent from the average value. Colorimetric equipment is dependent on the ability to replace reagents monthly and have a system to manage the waste stream.

If either technology could be appropriate, then the choice should come down to questions such as these: Which is more important, a fast response for process control or accuracy for reporting? What is more problematic for personnel, managing the waste stream or frequently calibrating the analyzer?

The bottom line is that the best choice depends on the specific application as well as the goals of the utility. In some situations, where tight control and accuracy are critical to maintaining quality, it may be beneficial to invest in both types of technology.

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