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Let's Solve Water

Chlorine Measurement: DPD (Colorimetric) vs. Amperometric (Electrode) Method

	DPD (Reagent-based method)	**Amperometric**
Technique	Colorimetric, Reagent-based	Electrochemical, Electrode-based
Description	The standard measurement method of chlorine. This technique uses reagents and a photometer to measure the amount of free or total chlorine in a sample.	Designed for process control using two dissimilar electrodes (anode and cathode) to measure the change in current based on a chemical reaction taking place that is proportional to the amount of chlorine in the sample.
Interferences	Iron causes negative interference at all levels. Manganese causes positive interference at all levels.	Dependent on consistent pH, sample temperature, flow and pressure. Chlorine concentration cannot fluctuate by more than ±20%.
Maintenance	• Replace reagent monthly • Replace tubing every 6 months • Cleaning requirement dependent on application	• Replace membrane and electrolyte every 3-6 months • Membrane conditioning and sensor calibration required after a membrane change • Electrode polishing • Electrode replacement every 6 to 12 months
Calibration	• No calibration required. Factory calibrated (only needs calibrated if required by a regulatory agency). • 1-point calibration adjustment based on a grab sample.	Calibration required once per week due to electrode drift.
Causes of Fouling	Air in sample line, biological growth in measurement cell and sample turbidity >100 NTU.	Iron, manganese and high turbidity can increase calibration and maintenance requirements.
NSF-61 Certified?	No, side stream analyzer.	No, side stream analyzer.

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Advantages & Disadvantages: The DPD method and amperometric method of measuring chlorine in aqueous samples each have their own advantages and disadvantages. The amperometric method does not require reagents like the DPD method but the maintenance schedule is less predictable. The life of electrodes and electrode membranes will depend on process conditions. The overall maintenance is less when using a DPD analyzer as it can operate unattended for over 30 days. The amperometric method can cover a larger measurement range than a DPD analyzer. However, an amperometric electrode cannot measure chlorine accurately if the sample's pH, temperature, sample flow, sample pressure and chlorine levels fluctuate more than 20%. The DPD method's accuracy on the other hand, is not constrained to these conditions. Furthermore, the DPD method wastes less water than the amperometric method.

The 3017M is factory calibrated and does not require regular calibrations unless required by the regulatory agency. This saves time over the amperometric method, which requires weekly calibrations. In addition, unlike the amperometric analyzer the 3017M is not affected by sample variation. The 3017M operates independent of changes in pH, temperature, pressure, flow and chlorine.

Advantages	Disadvantages
DPD Method	
• Easier to install and use • User calibration not required • Minimal sample conditioning • Not affected by changes in pH, chlorine concentration, temperature, pressure or flow • Predictable maintenance schedule	• Uses reagents • Higher maintenance cost • Not NSF-61 rated
Amperometric Method without pH Compensation	
• Reagentless • Higher measuring range	• Affected by changes in 5+ variables • Frequent user calibrations required • Prone to fouling from iron, manganese and high turbidity • Unpredictable maintenance, higher cost of ownership in consumables • Not NSF-61 rated • More waste to drain

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EPA Approved Methodology

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