Chlorine Analyzer Calibration Verification with Portable Colorimeter – Ensuring Confidence in Drinking Water Quality

Introduction

When used together, the Hach[®] CL17 Chlorine Analyzer and Low and High Range DR300 DPD grab sample analyses ensure the most accurate and reliable chlorine monitoring results. The Hach DR300 Pocket Colorimeter may be used to perform low and high range free and total chlorine measurements. The CL17 is an independent system ready from startup with quality reagents delivered from one single source supplier. Additionally, the CL17 may be verified with external standards measured with the DR300. Single sourcing of reagents for each analysis eliminates variability due to reagent quality.



CL17 Chlorine Analyzer

Background

Chlorine and monochloramine are the primary disinfectants used for drinking water disinfection. Maintaining the correct residual concentration of chlorine ensures effective disinfection while avoiding the costs of overdosing, as well as protecting valuable equipment and the environment. The Hach CL17 Chlorine Analyzer and DR300 Pocket Colorimeter provide accurate monitoring of chlorine residuals, confirming that chlorine dosing is sufficient to provide antimicrobial protection.



DR300 Pocket Colorimeter, a Claros-Enabled device. For more information, see page 3.



Figure 1 – Oxidation of N,N-diethyl-p-phenylenediamine

Both the CL17 analyzer and DR300 chlorine analyses use the N,N-diethyl-p-phenylenediamine (DPD) chemistry to measure free and total chlorine. At the pH buffered by the reagents, chlorine oxidizes DPD to produce a magenta colored dye, Figure 1. The intensity of the magenta color is directly proportional to the concentration of chlorine in the sample. The color is measured photometrically at 510 and 520 nm in the CL17 and 528 nm in the DR300. The reagents used for these analyses are all manufactured by Hach at the same facility for both the CL17 and DR300.



Both the CL17 and DR300 utilize a built-in calibration curve. Although rare, instrument response can drift over time due to regular wear and tear. While these issues are addressed through regular maintenance, it is recommended that verification be performed periodically to ensure that accuracy is maintained throughout the maintenance interval. Additionally, the USEPA Surface Water Treatment Rule requires regular calibration of continuous chlorine analyzers. State regulators have primacy in defining calibration or verification requirements.

Calibration Verification

Calibration verification can be performed by analyzing a prepared standard, or by analyzing a grab sample with a different instrument. Each of these techniques is easily performed with the CL17 and DR300. Prepared standards can be analyzed on the CL17 through the "Calibration/Verification" function. Prepared standards measured with the CL17 and grab samples show excellent accuracy and agreement between instruments, Figure 2. If measured values do not correlate to prepared concentrations, the measurement is inaccurate. The source of this inaccuracy must be identified and corrected. Follow troubleshooting instructions in the instrument manual and procedure.



Known Concentration vs. Measured Value

Figure 2 – Prepared Standard Verification



CL17 process samples can be verified by analyzing a grab sample with a DR300 grab sample procedure. Comparison of measured results against prepared standards or between instruments will indicate maintenance issues or poor analytical technique. Standards and samples measured on each instrument show excellent agreement, Figure 3. If inter-instrument measurements do not correlate, one of the measurements is inaccurate. The source of this inaccuracy must be identified and corrected. Follow troubleshooting instructions in the instrument manual and procedure.



CL17 vs. Grab Sample

Figure 3 – Inter-Instrument Verification

Procedure

Detailed instructions for CL17 calibration and verification are given in the **Hach Free and Total Chlorine Analyzer Verification** manual, DOC316.53.01302. This manual, as well as the instrument manuals for the CL17 analyzer and DR300 colorimeter can be found at: **hach.com**.



The DR300 Pocket Colorimeter connects to **Claros**[™], Hach's innovative Water Intelligence System, enabling you to seamlessly connect and manage instruments, data, and process – anywhere, anytime. The result is greater confidence in your data and improved efficiencies in your operations.

To unlock the full potential of **Claros**, insist on **Claros Enabled** instruments.

Find out more at hach.com/claros.

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