

Chlorine (free & total) - DPD Method

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Applications and Industries

Drinking water, wastewater, surface and ground water,
*seawater, industrial process water, pools and spas

Food and Beverage industry

CHEMetrics' Chlorine Vacu-vials® Kits are EPA accepted for the analysis of drinking water and wastewater.

References

APHA Standard Methods, 23rd ed., Method 4500-Cl G - 2000
USEPA Methods for Chemical Analysis of Water and Wastes,
Method 330.5 (1983)

Chemistry

Free chlorine oxidizes DPD (N,N-diethyl-p-phenylenediamine) to form a pink colored species in direct proportion to the chlorine concentration. Total chlorine, the sum of free chlorine and chloramines (combined chlorine), is determined by adding potassium iodide to the sample. Chlorine oxidizes the iodide to iodine, and the iodine then oxidizes DPD to the pink colored species. Results are expressed as ppm (mg/L) Cl₂.

The combined chlorine concentration of a sample can be determined by difference between the total and free results.

*The total chlorine test can be used to determine the concentration of Total Residual Oxidizers (TRO) in seawater.

Sampling Information

Chlorine is not stable in aqueous solution. Exposure of samples to light and sample agitation should be minimized. Chlorine analysis should be performed immediately after sample collection.

Available Analysis Systems

Visual colorimetric: CHEMets®

Instrumental colorimetric: Vacu-vials®

Storage Requirements

Products should be stored in the dark and at room temperature.

Shelf Life

When stored in the dark and at room temperature:

Visual colorimetric:

CHEMets refills, color comparators, Activator Solution:
at least 1 year

Instrumental colorimetric:

Vacu-vials kits: at least 1 year

Interference Information

- During total chlorine analysis, the following oxidizers are measured quantitatively in addition to free and combined chlorine: total bromine, total iodine, ozone, peracetic acid, permanganate, performic acid and chlorine dioxide.
- During free chlorine analysis, the following oxidizers are measured in addition to free chlorine: free bromine, free iodine, permanganate, and chlorine dioxide. Combined halogens other than chloramines (e.g. bromamines) and ozone may interfere positively during free chlorine analysis.
- Chloramines present at concentrations within the test range do not interfere significantly during free chlorine analysis at 1 minute of color development, but are an increasing positive interference beyond 1 minute.
- Chlorine itself and other oxidizers at concentrations significantly above the test range (chlorine above 40 ppm with kits K-2500, K-2504, K-2513, K-2523) may prevent proper color development, causing a false low result.
- At 1 minute of color development, persulfate up to approximately 10 ppm is not expected to interfere during free chlorine analysis, and up to approximately 1.5 ppm can be tolerated during total chlorine analysis. Beyond 1 minute or at higher concentrations, persulfate may interfere positively.
- Sample pHs between 2.5 and 10 are tolerated. Samples with pHs outside this range or that are highly buffered should be adjusted to pHs of approximately 6 - 7 prior to analysis.
- Hydrogen peroxide at concentrations up to approximately 10 ppm does not interfere with the test at 1 minute of color development.
- Ferric iron can be tolerated at concentrations up to 10 ppm.
- Cupric copper up to 10 ppm does not interfere.
- Manganese (II), Mn⁺², at up to at least 100 ppm does not interfere.
- Nitrite at concentrations up to at least 5 ppm does not interfere.
- Chromate may interfere.
- Sample color or turbidity may make a color match difficult during visual colorimetric testing and may cause a false positive result with instrumental colorimetric tests. CHEMetrics' Sample Zeroing Accessory Pack can be used to correct for potential errors during instrumental analysis.

Accuracy Statement

Statements of accuracy are based on laboratory tests performed under ideal testing conditions using standards of known concentration prepared in deionized water.

CHEMets kits:

± 1 color standard increment

Vacu-vials kits:

≤0.10 ppm at 0 ppm (≤0.20 ppm with I-2001 SAM)

±0.12 ppm at 0.40 ppm

±0.25 ppm at 1.25 ppm

±0.38 ppm at 3.75 ppm

Safety Information

Safety Data Sheets (SDS) are available upon request and at www.chemetrics.com. Read SDS before using these products. Breaking the tip of an ampoule in air rather than water may cause the glass ampoule to shatter. Wear safety glasses and protective gloves.