

Carbon Dioxide (dissolved) Caustic Titrant with pH Indicator Method

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Applications and Industries

Surface and groundwater, municipal water treatment systems
Satisfactory for field tests, and control and routine applications

References

APHA Standard Methods, 23rd ed., Method 4500-CO₂ C - 2004
ASTM D 513-82, Total and Dissolved Carbon Dioxide in Water,
Test Method E

Chemistry

Free carbon dioxide (CO₂) reacts with sodium hydroxide to form sodium bicarbonate. The sample is titrated to a phenolphthalein endpoint. Results are expressed in ppm (mg/L) CO₂.

Available Analysis Systems

Titrimetric: Titrets®

Storage Requirements

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

Shelf Life

When stored in the dark and at room temperature:

Titrets kits: at least 1 year

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 when a valve assembly is not attached may cause the glass ampoule to shatter. Wear safety glasses and protective gloves.

Accuracy Statement

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

Due to the non-linear nature of the test scale, the accuracy of these tests varies with the location of the test result on the scale.

K-1910: ± 6 ppm at 20 ppm

K-1920: ± 20 ppm at 200 ppm

K-1925: ± 50 ppm at 500 ppm

Interference Information

- When the test is conducted properly, this method provides an approximation of the free (dissolved) carbon dioxide concentration of a water sample.
- Analysis of the sample should be performed at the time of sampling in order to prevent changes to the CO₂ concentration.
- Cations and anions that disturb the normal CO₂-carbonate equilibrium will interfere.
- Any source of acidity other than carbon dioxide will cause a false positive result.
- Positive errors can be caused by weak bases (e.g. ammonia, amines) and by salts of weak acids and strong bases (e.g. nitrite, phosphate, silicate, borate). Such substances should not exceed 5% of the CO₂ concentration.
- Sulfide will cause a false positive bias. A correction can be applied to test results if the sulfide concentration is known. Contact technical@chemetrics.com for details.
- Metal ions that precipitate in alkaline solution (e.g. aluminum, chromium, copper, iron) can cause a false positive result.
- Ferrous iron should not exceed 1 ppm.
- This chemistry is not appropriate for the analysis of samples containing acid mine waste or effluent from acid-regenerated cation exchangers.
- High total dissolved salts, including high alkalinity typically found in seawater, will cause a negative bias.

Interpretation of Results

At the endpoint of this titration, the color of the solution in the test ampoule changes from pink to colorless. If the ampoule is filled with sample but the color of the solution remains pink (i.e. does not change to colorless), the carbon dioxide concentration of the sample is below the test range. If the solution in the ampoule changes to colorless immediately upon introduction of the first small dose of sample, the CO₂ concentration is above the test range. If the sample itself turns pink immediately upon addition of the indicator ("Activator") solution (prior to introduction of the sample into the test ampoule), the sample pH is greater than 8.3, which indicates that there is no carbon dioxide in the sample.