



## Technical Data Sheet

### Carbon Dioxide (dissolved)

Method: Caustic Titrant with pH Indicator

**Applications and Industries:** Surface water and groundwater; Municipal water treatment systems; Satisfactory for field tests, and control and routine applications.

**References:** APHA Standard Methods, 21<sup>st</sup> ed., Method 4500-CO<sub>2</sub> C (2005). ASTM D 513-82, Total and Dissolved Carbon Dioxide in Water, Test Method E.

**Chemistry:** With this titrimetric chemistry, free CO<sub>2</sub> reacts with sodium hydroxide to form sodium bicarbonate. The sample is titrated to a phenolphthalein endpoint. Results are expressed in ppm (mg/L) carbon dioxide (CO<sub>2</sub>).

#### Interference Information:

When the test is properly conducted, this method provides, at best, 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 CO<sub>2</sub> concentration.

Cations and anions that disturb the normal CO<sub>2</sub>-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 CO<sub>2</sub> concentration.

Sulfide will cause a false positive bias.

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 Titret ampoule is filled with sample but the color of the solution remains pink (i.e. does not change to colorless), the carbon dioxide concentration 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 CO<sub>2</sub> 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.

**Safety Information:** Safety Data Sheets (SDS) are available upon request and at [www.chemetrics.com](http://www.chemetrics.com). Read SDS before using these kits. 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.

**Available Analysis Systems:** Titrimetric: Titrets®

**Storage Requirements:** Kits should be stored in the dark and at room temperature.

**Shelf Life:** *When stored in the dark and at room temperature:* The carbon dioxide Titrets kits have 2-year shelf lives.

**Accuracy:** 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. For K-1920 and K-1925, the accuracy is +/- 10% error at twice the minimum concentration for the particular test range. For K-1910, the accuracy is +/- 30% error at twice the minimum concentration.

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