

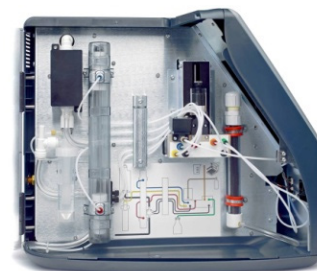


QbD1200+ Analyzer Method Overview

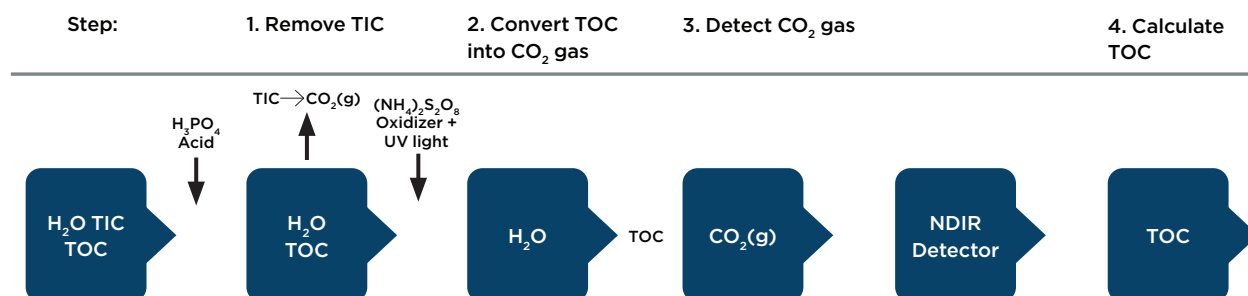
A water sample initially contains two types of carbon:

- Total Inorganic Carbon (TIC) (from CO_2 gas dissolved in H_2O and dissolved carbonates in the water).
- Total Organic Carbon (TOC) (from organic species).

To measure TOC, first remove TIC. Then convert organic species into CO_2 gas, measure the gas on detector, and convert the result into a TOC value.



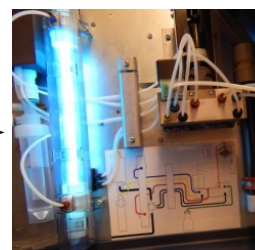
The Measurement Strategy:



Steps:

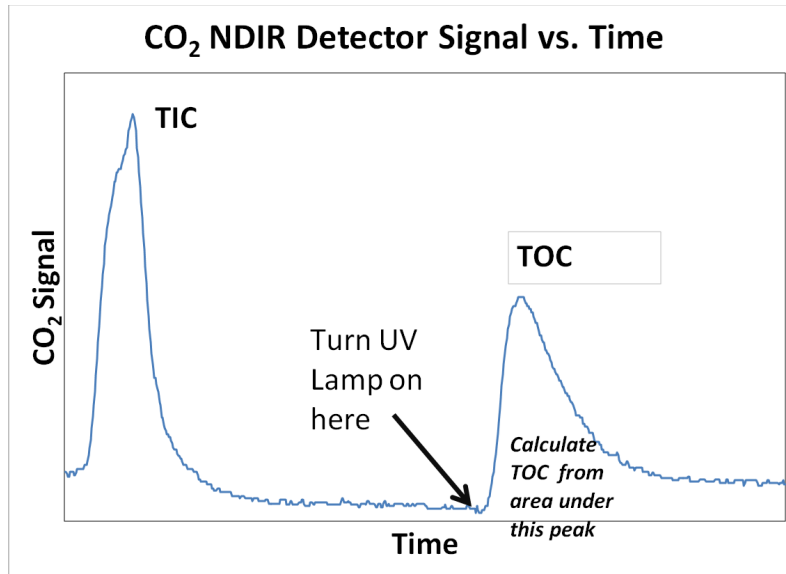
- 1. Remove TIC.** In presence of acid H_3PO_4 , all dissolved carbonates are converted into CO_2 gas. Blow carrier gas through reaction chamber to remove all CO_2 gas derived from inorganic carbon.
- 2. Convert TOC into CO_2 gas.** In presence of UV light and powerful oxidizer $(\text{NH}_4)_2\text{S}_2\text{O}_8$, organic carbon species are converted into CO_2 gas by oxidation. Blow carrier gas through reaction chamber to push all CO_2 gas through NDIR detector (step 3).
- 3. Detect CO_2 gas as it goes through NDIR detector.** TOC is quantified by integrating the area under the curve.
- 4. Calculate TOC.** Based on instrument calibration, convert CO_2 gas signal (area under the curve) into TOC.

UV lamp on →



NDIR detector →





Note that the area under the curve for TOC can also be referred to as 'NPOC' (Non-Purgeable Organic Carbon). If the initial water sample contained a volatile organic, the volatile organic would likely be purged during the step to remove TIC. Thus, what remains after TIC removal is non-purgeable organic carbon. Because the QbD1200+ analyzer is designed for clean water applications where high concentrations of volatiles are not present, this should not be a concern.

UV / Persulfate / NDIR Method

The general TOC analysis method described here has been widely used for many years in a variety of applications and conforms with numerous regulatory guidelines such as USP, EP, JP, and is also an approved method (5310c) under the US EPA guidelines. The QbD1200+ analyzer is unique in that it combines all required reagents (acid, oxidizer, and dilution water) into a single reagent instead of requiring multiple reagents.