

Application Note

QbD1200 Method Overview

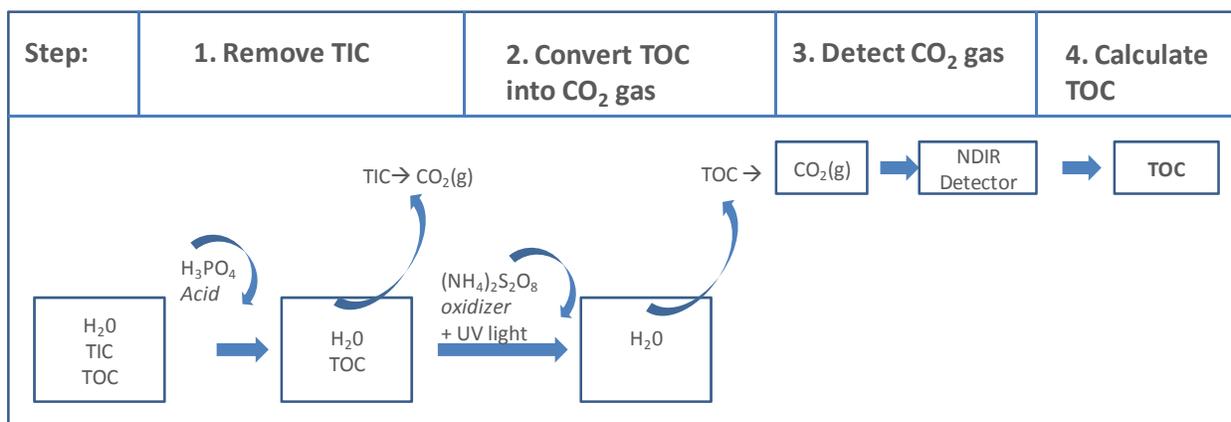
A water sample initially contains two types of carbon:

- 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:

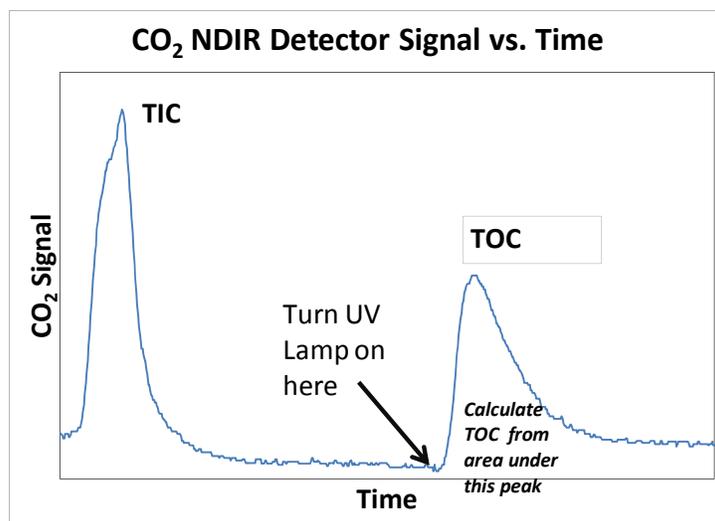


Steps:

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.



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 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 is an approved method (5310c) under USEPA guidelines. The QbD1200 is unique in that it combines all required reagents (acid, oxidizer, and dilution water) into a single reagent instead of requiring multiple reagents.

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