

DATA BULLETIN

*TOC determination in ultrapure water with the **acquray**[®] TOC*

In compliance with the European Pharmacopeia (EP 2.2.44) and the US Pharmacopeia (USP 643), the TOC concentration of the reagent water should have a TOC level ≤ 0.1 mg/l and the limit of detection of the instrument used for the TOC analysis should be 0.05 mg/l or lower for carbon.

The mandatory limit of detection is far exceeded by the **acquray** TOC. Figure 1 demonstrates a peak of a 0.05 mg/l TOC standard solution, analyzed with the **acquray** TOC, which is clearly different from the baseline and represents a higher peak area compared to distilled water, which had a TOC concentration of 0.03 mg/l. The TIC concentration for both samples was the same and the required reproducibility was reached. An injection volume of 10 ml has been used to allow triplicate analysis with a 40 ml vial. Higher injection volumes up to 40 ml are possible with the **acquray** TOC, which would further improve the separation of low concentrations due to higher differences in absolute carbon amounts.

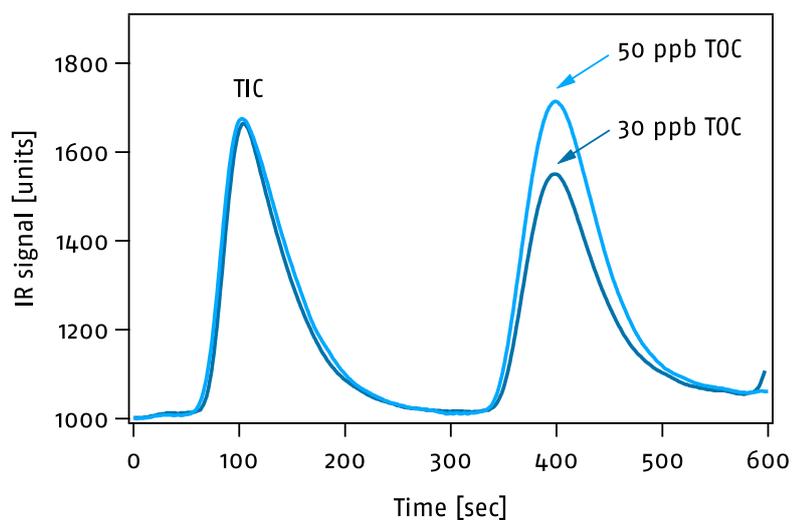


Figure 1. Analysis of distilled water with 30 ppb TOC and a 50 ppb TOC standard for TIC and TOC displayed in one graph.

OVERVIEW

acquray[®] TOC is the perfect solution for laboratories analyzing water samples with very low carbon concentrations.



STANDARDS & REGULATIONS

e.g.
European PHarmacopeia EP 2.2.44
US Pharmacopeia USP 643

The **acquray** TOC was calibrated using five standard solutions with TOC concentrations ranging from 0.05 mg/l to 0.09 mg/l. Linearity and reproducibility of the standards were excellent (see Figure 1 and Table 1). With the reported calibration, a limit of detection of 2 ppb can be calculated.

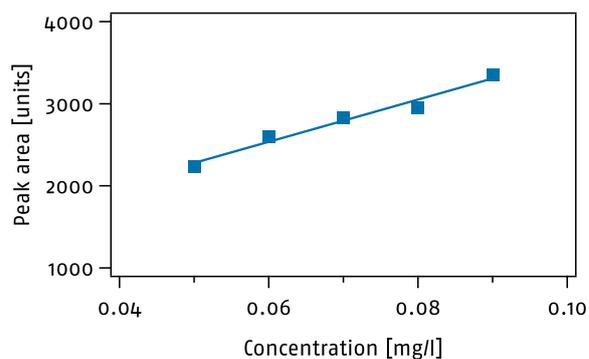


Table 1. Results of the standard solutions containing 50 to 90 ppb TOC analyzed with the **acquray** TOC

Figure 2. Five point calibration between 0.05 mg/l and 0.09 mg/l.

STANDARD	TOC CONC. [mg C/l C]	SD [mg C/l]	RSD [%]
50 ppb	0.050	0.002	3.0
60 ppb	0.062	0.001	0.7
70 ppb	0.071	0.002	2.6
80 ppb	0.078	0.003	3.8
90 ppb	0.090	0.002	1.9

Before sample preparation, it is important to sterilize the glassware and work very precisely to achieve stable and reliable results. Additionally, all potential contaminations have to be avoided. The use of persulfate as oxidizing agent can be avoided, because the power of the strong UV lamp is sufficient to oxidize such low amounts of carbon. Additionally, phosphoric acid for trace analysis ($\geq 99.999\%$ purity) should be used for acidification.



Conclusion

The great results highlight the suitability of the **acquray** TOC for the determination of low ppb carbon level. Consequently, the **acquray** TOC is the perfect solution for laboratories analyzing samples with very low carbon concentrations.

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