

Application Note

TOC (+TN_b) Determination in seawater TOC-V Combustion Model (+TNM-1)

About 700 injections of seawater samples are reachable till maintenance is required (injection volume 50µL).



TOC-V CSH with TNM-1

Depending on the used analyzer model, some additional hardware modifications are necessary.

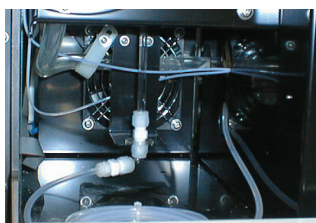
Modifications

TOC-V model CSN/CPN:

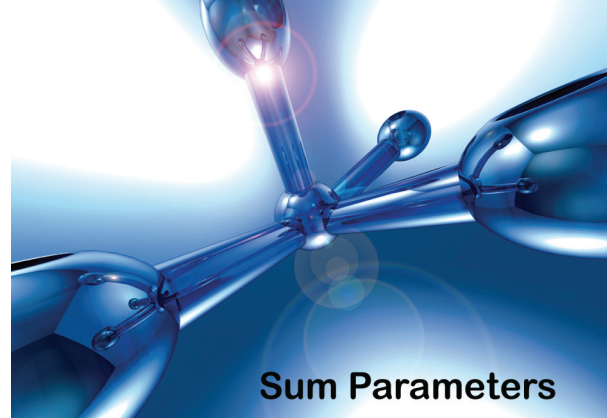
- No modifications necessary.

TOC-V model CSH/CPH:

- Exchange of metal cooling loop and connector against PFA cooling loop and Teflon connectors is necessary.



PFA cooling loop



TNM-1 Unit

The TNM-1 unit enables a combined determination of total organic carbon and total nitrogen. The TN_b determination is based on catalytic combustion and chemiluminescence detection in accordance with the requirements in ENV 12260 – Determination of Total Nitrogen.

Combustion temperature

Should be kept at 680°C, even a TNM-1 unit is connected, to reduce halogen production. (Longer life time of halogen scrubber)

Catalyst

Typical filling is two platinum sheets at the combustion tube bottom, 1cm quartz wool, then filling up with standard platinum ball catalyst to a height of 100mm (measured from combustion tube bottom).

Maintenance

Due to high salt content, analysis of seawater samples require higher maintenance effort to the analysis instrumentation.

- Combustion tube can be used about 3-4 times till it must be exchanged.
- Catalyst can be regenerated externally and used for a longer period. Cracked balls and dust must be removed. So far afterwards a little amount of new catalyst balls are required to reach the recommended filling height.
- Platinum nets can also be used for a longer period.

Calibration curve

NPOC Calibration Curve up to 5mgC/L.

This calibration curve was done with auto-dilution function from a 5mg KHP (potassium hydrogen phthalate) standard solution.

Parameter

Injection volume: 50µL

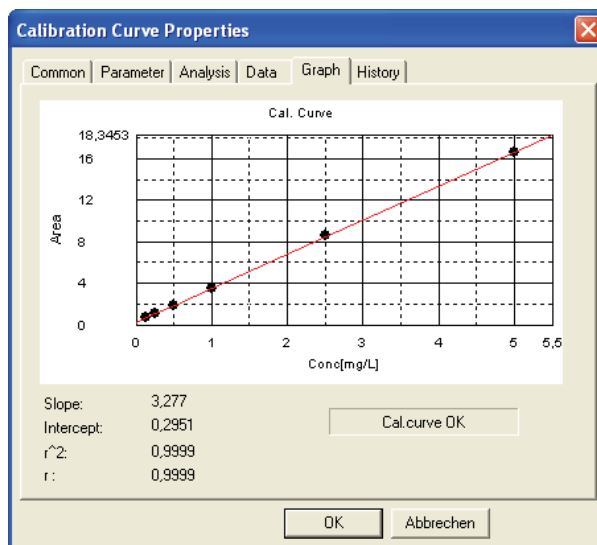
Number of inj.: 3/4

Acidification: 1,5%

Result

Concentration [mg/L]	Mean Area
0,125	0,702
0,250	1,145
0,500	1,870
1,000	3,534
2,500	8,606
5,000	16,63

Instrument: TOC-V CPH

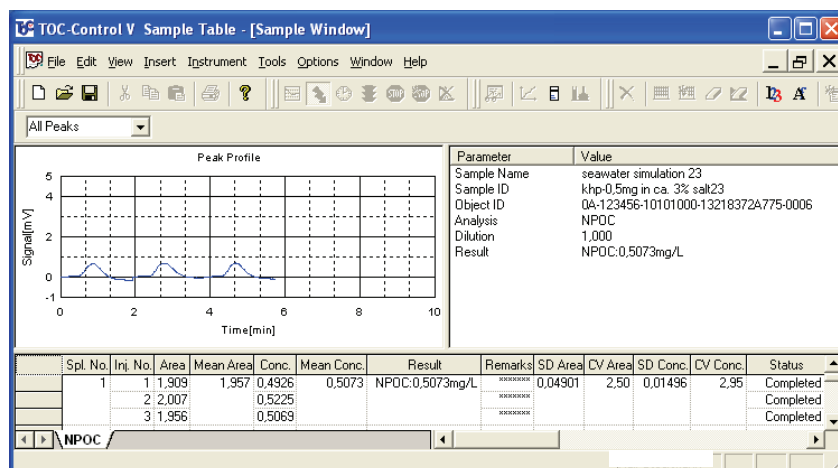


Example TOC measurement data

Test solution:

“Seawater simulation”

0,5mgC/L KHP in a
3% salt solution



Tips from experience

In TOC-V model CSN/CPN the “Ultra Pure Water Trap” is drained after each measurement sequence. From time to time this procedure should be checked for proper operation and that no residues block the tube which is connected to port 8 of the 8-port valve.

In TOC-V model CSH/CPH the “Ultra Pure Water Trap” is not drained after each measurement sequence; instead “ic-reactor” drain valve is opened after each measurement sequence. Nevertheless, it’s recommended to drain the “Ultra Pure Water Trap” at time the catalyst is replaced.

The easiest way is setting up “high sense catalyst” in the software. Start a blank check sequence (draining of pure water trap is done at the beginning). Then stop blank sequence before first injection is done. Afterwards change back catalyst settings in the software.

System stabilisation after catalyst replacement:

Measure pure water minimum 10x times in NPOC measurement with 150µL injection volume, 3/5 injections, acidification 3,0%. Then run a few more pure water measurements with the standard conditions till system is stable.