Determination of TOC (0-1000ppm) in industrial wastewater with high TIC and salt content using HACH QP1680 lab TOC analyzer

Background

- TOC is a valuable parameter in industrial waste water (WW) monitoring. It can be used as a more cost effective and non toxic surrogate for COD analysis for process control. TOC is also suitable for effluent control and is the required parameter for reporting in some countries/industries.
- Industrial wastewaters often contain large amounts of salts resulting from production processes. They also often contain compounds requiring a powerful digestion method. For that reason high temperature combustion is often preferred over UV digestion.
- Some pretreatment processes of industrial wastewater lead to high inorganic carbon (IC) content. If such high IC content is not taken into account and sparged completely during analysis, it can lead to significant errors in the TOC result.
- Hach® QP1680 is a lab TOC analyzer based on high temperature combustion technology. Its unique maintenance concept results in easy handling, that can be completed in a few quick steps.

Method

There are mainly two methods available to measure the TOC.

NPOC

- Use this method if no volatile organics are present. When measuring with the QP1680 standard settings of the NPOC method, 650µl of hydrochloric acid (HCl) are injected into the sample vial. Then oxygen is bubbled through the sample for 600s. This purges IC from the sample. Afterwards the sample is injected into the oven and the TOC is measured.
- Ensure that the sample is acidified to pH<2. Alkalinity and pH of the sample may require additional sample preparation prior to the measurement.
- You can test if all IC has been purged out of the sample by analyzing the IC after the NPOC measurement from the same sample vial.

TOC = TC – IC Difference Method

- Use this method if volatile organics are present. Avoid this method if IC > TOC. For this method both, IC and TC are measured. The TOC is then calculated from the two individual measurements.
- When QP1680 measures IC with standard settings, 100µl HCl (3N) are added to 500µl of sample and the IC is purged out of the sample by bubbling oxygen through the sample. Ensure that all IC is purged out of the sample by testing an aliquot of the sample spiked with IC.
- The accuracy of the method is the sum of the accuracies of the two individual measurements. This means, that it is usually less accurate than the NPOC method. That is why the difference method should be avoided if IC > TOC.

Generally speaking it is advisable to chose the calibration range such, that most measurements will be towards the middle of the range.

Analyzer

QP1680 Lab TOC (High Temperature Combustion)

SETUP QP1680

- 1000µl syringe with a 0.8 mm ID needle
- Autosampler attached
- Sample glass vials

NECESSARY LAB EQUIPMENT

- Water pre-treatment system for ultrapure water UPW (water purity min. 18.2 MΩ•cm, max. 1-2 ppb TOC), e.g. Millipore, ELGA, etc.Type 1 water (see Norm)
- Glassware: volumetric flasks with stoppers (appropriate size)
- Aluminium foil to cover sample vials (Part No. SMCON500300)

Calibration

Before calibrating the QP1680, make sure the blank value is below 50,000 AE and doesn't show a significant drift. To ensure that, run at least 10 blank measurements.

Calibration can either be done with prepared standard solutions or with the calibration wizard. In the latter case only one stock solution is needed and the instrument does the dilution on its own.

Note: In case of sample concentrations < 10 mg/L we recommend using prepared calibration standards.

TC and NPOC Calibration

The KHP standard solutions at the right can be used for TC and NPOC calibration depending on the required calibration range

The exact concentration of the standard solutions may differ slightly from the nominal value and will be noted in small on the container. For best results, please use that actual concentration of the respective standard for calibration. All standard solutions contain HCl and are therefore stable at room temperature for 1 month.

Product No.	Concentration
LCW844	10 mg/L C standard solution (1 L)
LCW842	25 mg/L C standard solution (1 L)
LCW843	100 mg/L C standard solution (1 L)
LCW848	250 mg/L C standard solution (1 L)
LCW846	500 mg/L C standard solution (1 L)
2791505	1000 mg/L C standard solution 5 pc. 20 mL glass vials

IC Calibration

For IC calibration, Hach offers the standard solution at the right.

Use sodium hydrogen carbonate $NaHCO_3$ to make up IC stock solutions of higher concentration:

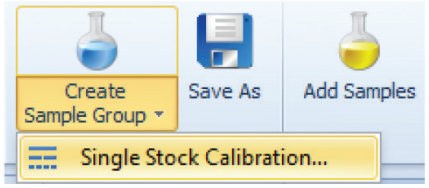
Product No.	Concentration
18149	240 mg/L IC Sodium carbonatet-standard solution, 0.02 N, 500 L

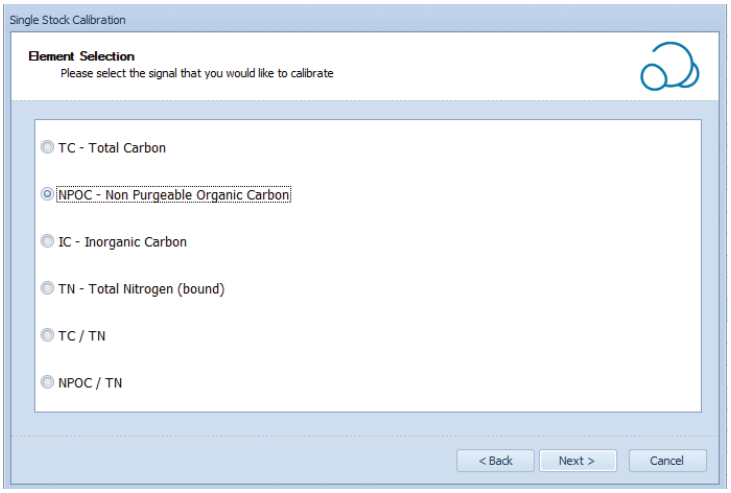
TIC stock standard solution 1000 mg/L C.

Add 7.04 g of sodium hydrogen carbonate of a 99.5 % mass fraction $NaHCO_3$ into ultra pure water. Add enough water to make the solution exactly 1 L. Mix well until all $NaHCO_3$ is dissolved in water.

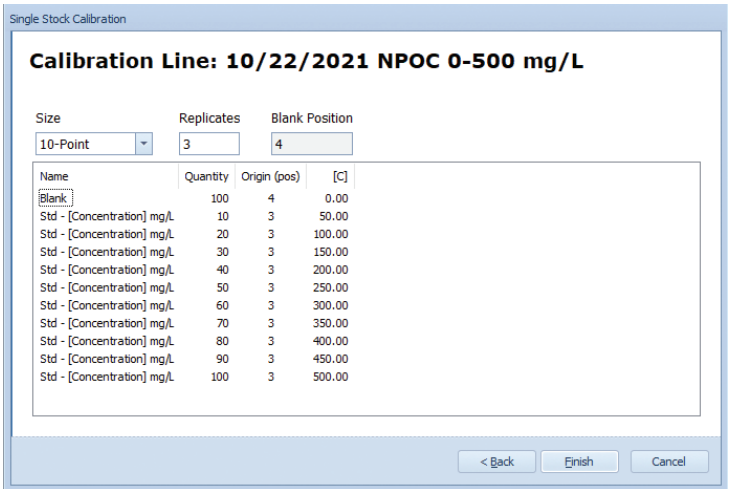
Calibration Procedure

- Open the single stock calibration wizard.
- Choose the method to be calibrated e.g. NPOC for the calibration of NPOC. For the calibration of the difference method (TOC=TC–IC), both TC and IC must be calibrated.
  TC is best calibrated using a KHP standard solution. IC must be calibrated using a carbonate standard solution.
- Click “Next”.
- Fill in the following parameters:
  - Concentration of stock solution (e.g. 500 mg/L)
  - Fill in the vial position of the stock solution
  - Select the method to be used ➔





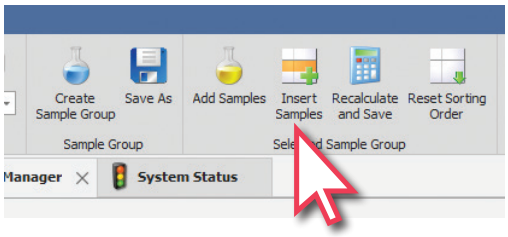
- Fill in the number of calibration points (recommended 10-points).
- Fill in how many replicates for every point should be run (recommended at least 3).
- Blank measurement is not necessary in the calibration only to condition the analyzer beforehand.
- Click “Finish”.



- Now you will see an empty calibration list.

	Status	Sample ...	Outlier	Sig...	Name	Concen...	Concent...	Mean	RSD	SD	Area	SampleType	Real ...	Quantity	Quanti...	Analyst	Densi...	Dilution	Calibration Line	Analysis Date
1	Not anal...	2		NPOC	Std - 0.00 mg/L	0.00	mg/L				0.00	Calibration	0.00	100	µL	Lab manager	1	1		
2	Not anal...	2		NPOC	Std - 0.00 mg/L	0.00	mg/L				0.00	Calibration	0.00	100	µL	Lab manager	1	1		
3	Not anal...	2		NPOC	Std - 0.00 mg/L	0.00	mg/L				0.00	Calibration	0.00	100	µL	Lab manager	1	1		
4	Not anal...	1		NPOC	Std - 50.00 mg/L	0.00	mg/L				0.00	Calibration	50.00	100	µL	Lab manager	1	1		
5	Not anal...	1		NPOC	Std - 50.00 mg/L	0.00	mg/L				0.00	Calibration	50.00	100	µL	Lab manager	1	1		
6	Not anal...	1		NPOC	Std - 50.00 mg/L	0.00	mg/L				0.00	Calibration	50.00	100	µL	Lab manager	1	1		
7	Not anal...	1		NPOC	Std - 100.00 mg/L	0.00	mg/L				0.00	Calibration	100.00	100	µL	Lab manager	1	1		
8	Not anal...	1		NPOC	Std - 100.00 mg/L	0.00	mg/L				0.00	Calibration	100.00	100	µL	Lab manager	1	1		
9	Not anal...	1		NPOC	Std - 100.00 mg/L	0.00	mg/L				0.00	Calibration	100.00	100	µL	Lab manager	1	1		
10	Not anal...	1		NPOC	Std - 150.00 mg/L	0.00	mg/L				0.00	Calibration	150.00	100	µL	Lab manager	1	1		
11	Not anal...	1		NPOC	Std - 150.00 mg/L	0.00	mg/L				0.00	Calibration	150.00	100	µL	Lab manager	1	1		
12	Not anal...	1		NPOC	Std - 150.00 mg/L	0.00	mg/L				0.00	Calibration	150.00	100	µL	Lab manager	1	1		
13	Not anal...	1		NPOC	Std - 200.00 mg/L	0.00	mg/L				0.00	Calibration	200.00	100	µL	Lab manager	1	1		
14	Not anal...	1		NPOC	Std - 200.00 mg/L	0.00	mg/L				0.00	Calibration	200.00	100	µL	Lab manager	1	1		
15	Not anal...	1		NPOC	Std - 200.00 mg/L	0.00	mg/L				0.00	Calibration	200.00	100	µL	Lab manager	1	1		
16	Not anal...	1		NPOC	Std - 250.00 mg/L	0.00	mg/L				0.00	Calibration	250.00	100	µL	Lab manager	1	1		
17	Not anal...	1		NPOC	Std - 250.00 mg/L	0.00	mg/L				0.00	Calibration	250.00	100	µL	Lab manager	1	1		
18	Not anal...	1		NPOC	Std - 250.00 mg/L	0.00	mg/L				0.00	Calibration	250.00	100	µL	Lab manager	1	1		
19	Not anal...	1		NPOC	Std - 300.00 mg/L	0.00	mg/L				0.00	Calibration	300.00	100	µL	Lab manager	1	1		
20	Not anal...	1		NPOC	Std - 300.00 mg/L	0.00	mg/L				0.00	Calibration	300.00	100	µL	Lab manager	1	1		
21	Not anal...	1		NPOC	Std - 300.00 mg/L	0.00	mg/L				0.00	Calibration	300.00	100	µL	Lab manager	1	1		
22	Not anal...	1		NPOC	Std - 350.00 mg/L	0.00	mg/L				0.00	Calibration	350.00	100	µL	Lab manager	1	1		
23	Not anal...	1		NPOC	Std - 350.00 mg/L	0.00	mg/L				0.00	Calibration	350.00	100	µL	Lab manager	1	1		
24	Not anal...	1		NPOC	Std - 350.00 mg/L	0.00	mg/L				0.00	Calibration	350.00	100	µL	Lab manager	1	1		
25	Not anal...	1		NPOC	Std - 400.00 mg/L	0.00	mg/L				0.00	Calibration	400.00	100	µL	Lab manager	1	1		
26	Not anal...	1		NPOC	Std - 400.00 mg/L	0.00	mg/L				0.00	Calibration	400.00	100	µL	Lab manager	1	1		
27	Not anal...	1		NPOC	Std - 400.00 mg/L	0.00	mg/L				0.00	Calibration	400.00	100	µL	Lab manager	1	1		
28	Not anal...	1		NPOC	Std - 450.00 mg/L	0.00	mg/L				0.00	Calibration	450.00	100	µL	Lab manager	1	1		
29	Not anal...	1		NPOC	Std - 450.00 mg/L	0.00	mg/L				0.00	Calibration	450.00	100	µL	Lab manager	1	1		
30	Not anal...	1		NPOC	Std - 450.00 mg/L	0.00	mg/L				0.00	Calibration	450.00	100	µL	Lab manager	1	1		
31	Not anal...	1		NPOC	Std - 500.00 mg/L	0.00	mg/L				0.00	Calibration	500.00	100	µL	Lab manager	1	1		
32	Not anal...	1		NPOC	Std - 500.00 mg/L	0.00	mg/L				0.00	Calibration	500.00	100	µL	Lab manager	1	1		
33	Not anal...	1		NPOC	Std - 500.00 mg/L	0.00	mg/L				0.00	Calibration	500.00	100	µL	Lab manager	1	1		

- Add a “blank” as a default sample with minimal 15 replicates.

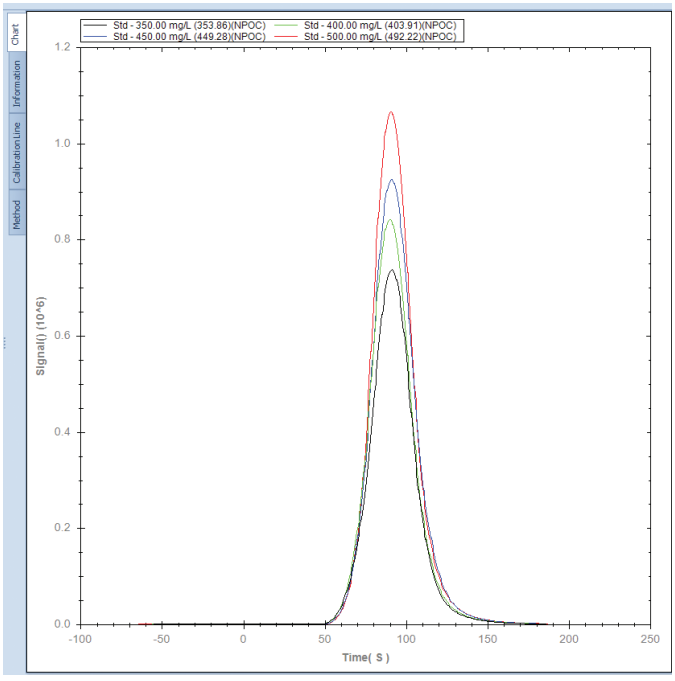


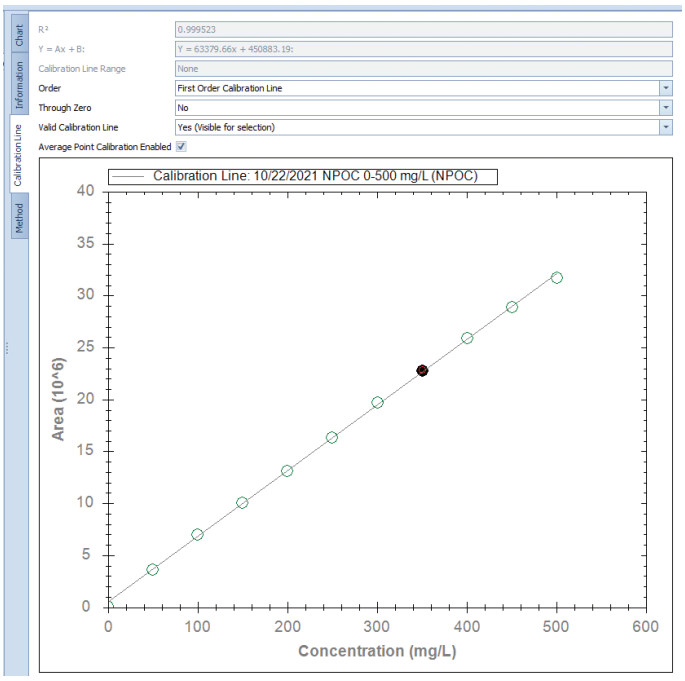
	Status	Sample ...	Outlier	Sig...	Name	Concen...	Concent...	Mean	RSD	SD	Area	SampleType	Real ...	Quantity	Quanti...	Analyst	Densi...	Dilution	Calibration Line	Analysis Dat
1	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
2	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
3	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
4	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
5	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
6	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
7	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
8	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
9	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
10	Not anal...	2		NPOC	blank	0.00	mg/L				0.00	Sample	0.00	100	µL	Lab manager	1	1		
11	Not anal...	2		NPOC	Std - 0.00 mg/L	0.00	mg/L				0.00	Calibration	0.00	100	µL	Lab manager	1	1		
12	Not anal...	2		NPOC	Std - 0.00 mg/L	0.00	mg/L				0.00	Calibration	0.00	100	µL	Lab manager	1	1		
13	Not anal...	2		NPOC	Std - 0.00 mg/L	0.00	mg/L				0.00	Calibration	0.00	100	µL	Lab manager	1	1		
14	Not anal...	1		NPOC	Std - 50.00 mg/L	0.00	mg/L				0.00	Calibration	50.00	100	µL	Lab manager	1	1		
15	Not anal...	1		NPOC	Std - 50.00 mg/L	0.00	mg/L				0.00	Calibration	50.00	100	µL	Lab manager	1	1		
16	Not anal...	1		NPOC	Std - 50.00 mg/L	0.00	mg/L				0.00	Calibration	50.00	100	µL	Lab manager	1	1		
17	Not anal...	1		NPOC	Std - 100.00 mg/L	0.00	mg/L				0.00	Calibration	100.00	100	µL	Lab manager	1	1		
18	Not anal...	1		NPOC	Std - 100.00 mg/L	0.00	mg/L				0.00	Calibration	100.00	100	µL	Lab manager	1	1		
19	Not anal...	1		NPOC	Std - 100.00 mg/L	0.00	mg/L				0.00	Calibration	100.00	100	µL	Lab manager	1	1		
20	Not anal...	1		NPOC	Std - 150.00 mg/L	0.00	mg/L				0.00	Calibration	150.00	100	µL	Lab manager	1	1		
21	Not anal...	1		NPOC	Std - 150.00 mg/L	0.00	mg/L				0.00	Calibration	150.00	100	µL	Lab manager	1	1		
22	Not anal...	1		NPOC	Std - 150.00 mg/L	0.00	mg/L				0.00	Calibration	150.00	100	µL	Lab manager	1	1		

- Now you can run the calibration.

	Status	Sample ...	Outlier	Sig...	Name	Concen...	Concent...	Mean	RSD	SD	Area	SampleType	Real ...	Quantity	Quanti...	Analyst	Densi...	Dilution	Calibration Line	Analysis Date
20	Done	1		NPOC	blank	0.00	mg/L	**0.00**	**NaN**	**0.00**	37 699.42	Sample	0.00	100	µL	Lab manager	1	1		10/22/2021 11:37:
21	Done	1		NPOC	Std - 0.00 mg/L	-6.16	mg/L				60 529.55	Calibration	0.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 11:41:
22	Done	1		NPOC	Std - 0.00 mg/L	-6.47	mg/L				41 124.19	Calibration	0.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 11:45:
23	Done	1		NPOC	Std - 0.00 mg/L	-6.09	mg/L	**-6.24**	**3.21**	**0.20**	64 965.58	Calibration	0.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 11:50:
24	Done	2		NPOC	Std - 50.00 mg/L	49.31	mg/L				3 575 822.69	Calibration	50.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 11:54:
25	Done	2		NPOC	Std - 50.00 mg/L	50.09	mg/L				3 625 609.56	Calibration	50.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:13:
26	Done	2		NPOC	Std - 50.00 mg/L	50.28	mg/L	**49.89**	**1.04**	**0.52**	3 637 626.55	Calibration	50.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:17:
27	Done	2		NPOC	Std - 100.00 mg/L	103.13	mg/L				6 987 031.65	Calibration	100.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:21:
28	Done	2		NPOC	Std - 100.00 mg/L	102.60	mg/L				6 953 786.39	Calibration	100.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:25:
29	Done	2		NPOC	Std - 100.00 mg/L	103.31	mg/L	**103.01**	**0.36**	**0.37**	6 998 931.16	Calibration	100.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:29:
30	Done	2		NPOC	Std - 150.00 mg/L	150.87	mg/L				10 012 676.23	Calibration	150.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:33:
31	Done	2		NPOC	Std - 150.00 mg/L	151.44	mg/L				10 049 353.61	Calibration	150.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:37:
32	Done	2		NPOC	Std - 150.00 mg/L	151.58	mg/L	**151.30**	**0.25**	**0.38**	10 057 761.78	Calibration	150.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:41:
33	Done	2		NPOC	Std - 200.00 mg/L	200.02	mg/L				13 128 117.10	Calibration	200.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:45:
34	Done	2		NPOC	Std - 200.00 mg/L	198.80	mg/L				13 050 780.53	Calibration	200.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:49:
35	Done	2		NPOC	Std - 200.00 mg/L	200.18	mg/L	**199.67**	**0.38**	**0.75**	13 138 161.85	Calibration	200.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:53:
36	Done	2		NPOC	Std - 250.00 mg/L	249.47	mg/L				16 262 323.99	Calibration	250.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 12:57:
37	Done	2		NPOC	Std - 250.00 mg/L	250.43	mg/L				16 323 038.25	Calibration	250.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:01:
38	Done	2		NPOC	Std - 250.00 mg/L	250.95	mg/L	**250.28**	**0.30**	**0.75**	16 356 072.32	Calibration	250.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:05:
39	Done	2		NPOC	Std - 300.00 mg/L	302.31	mg/L				19 611 102.99	Calibration	300.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:09:
40	Done	2		NPOC	Std - 300.00 mg/L	301.02	mg/L				19 529 183.76	Calibration	300.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:13:
41	Done	2		NPOC	Std - 300.00 mg/L	309.47	mg/L	**304.27**	**1.50**	**4.55**	20 065 013.42	Calibration	300.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:17:
42	Fault	2		NPOC	Std - 350.00 mg/L	348.54	mg/L				22 787 270.27	Calibration	350.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:21:
43	Done	2		NPOC	Std - 350.00 mg/L	353.87	mg/L				22 879 230.18	Calibration	350.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:25:
44	Done	2		NPOC	Std - 350.00 mg/L	353.86	mg/L				22 878 468.05	Calibration	350.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:29:
45	Done	2		NPOC	Std - 350.00 mg/L	352.67	mg/L	**353.47**	**0.20**	**0.69**	22 802 683.54	Calibration	350.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:33:
46	Done	2		NPOC	Std - 400.00 mg/L	401.36	mg/L				25 888 627.40	Calibration	400.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:37:
47	Done	2		NPOC	Std - 400.00 mg/L	403.91	mg/L				26 050 348.81	Calibration	400.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:41:
48	Done	2		NPOC	Std - 400.00 mg/L	401.46	mg/L	**402.24**	**0.36**	**1.44**	25 895 395.70	Calibration	400.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:45:
49	Done	2		NPOC	Std - 450.00 mg/L	448.61	mg/L				28 883 517.59	Calibration	450.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:49:
50	Done	2		NPOC	Std - 450.00 mg/L	449.28	mg/L				28 926 270.09	Calibration	450.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:53:
51	Done	2		NPOC	Std - 450.00 mg/L	448.51	mg/L	**448.80**	**0.09**	**0.42**	28 877 567.32	Calibration	450.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 13:58:
52	Done	2		NPOC	Std - 500.00 mg/L	494.40	mg/L				31 785 654.14	Calibration	500.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 14:02:
53	Done	2		NPOC	Std - 500.00 mg/L	492.22	mg/L				31 647 807.17	Calibration	500.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 14:06:
54	Done	2		NPOC	Std - 500.00 mg/L	492.69	mg/L	**493.10**	**0.23**	**1.15**	31 677 357.44	Calibration	500.00	100	µL	Lab manager	1	1	Calibration Line: 10/22/2021 NPO...	10/22/2021 14:10:

- Next to the data you will also be able to see the peaks and calibration line.





Recommendations

- It is best practice to add a stir bar to the sample vial to ensure good homogenization during the measurement. That is particularly important when particles are present in the sample.
- Particles larger than 800µm may clog the needle and should be removed before analysis.
- Minimize the contamination of the system by running an appropriate number of blank water samples prior to calibrations and samples. The blank value should be lower than 50,000 AU and stable.
- It is necessary to run a quality control standard on a regular basis (at least daily) to check the validity of the calibration. Use the "bracketing" function to set up automatic quality control measurements.

Maintenance

- After refreshing the reagents always run the system method "Fill tubing sampler with liquids"

- On a daily basis: before analyzing samples, check the injection port for leakages by putting a droplet of water onto the furnace port. If you see bubbles, clean the injection port and test again. If there is still gas coming out of the furnace port, replace the furnace port. Chapter 17.14 explains the maintenance of the Injection port.
- Carefully clean the sample needle, if salt or other solids build up on the outside.
- Clean the IC and waste port, if salt or other solids build up on them.
- The method of standard addition (spiking) and/or dilution of the sample can be use to understand matrix effects.
- If the quality control measurement reveals too low recovery, it is necessary to recalibrate the instrument. Eventually it will be necessary to replace the furnace and/or catalyst completely. Signs for the need to exchange the furnace and/or catalyst are:

  1. Blank measurements not getting below 50,000 area units.
  2. CO_2 peaks that don't have a clean shape, but are for example split into two peaks.

At a typical industrial (chemical) wastewater plant in Germany with high salt content this has been the case after three months of continous use of the instrument.

Features and Benefits

As stated above, the QP1680 can handle particulates up to 800 µm. The analyzer can also handle dirty samples better than some competitive products. This is because the sample does not travel more than a couple cm past the injection needle on the sampler arm. Therefore, there is never the possibility of the sample contaminating the injection syringe or internal valves. Competitive TOC analyzers are susceptible to dirty samples, from wastewater or industrial waters (i.e. influents, oil refining, etc), clogging internal injection valves that would require cleaning.

The QP1680 also offers an injection needle washing station. This port sprays ultra-pure water onto the outside of the needle to rinse off possible contaminates from previous samples, reducing issues from sample carry over contamination.

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