

USEPA¹ Direct Method**Method 10267****30 to 300 mg/L C (HR)****TNTplus 811****Scope and application:** For wastewater, drinking water, surface water and process water analyses.

¹ Hach Method 10267 is USEPA approved for the determination of total organic carbon (TOC) in drinking water, Federal Register Volume 81, Number 138 (Tuesday, July 19, 2016).



Test preparation

Instrument-specific information

Table 1 shows all of the instruments that have the program for this test. The table also shows the adapter and light shield requirements for the applicable instruments that can use TNTplus vials.

To use the table, select an instrument, then read across to find the applicable information for this test.

Table 1 Instrument-specific information for TNTplus vials

Instrument	Adapters	Light shield
DR 6000, DR 5000	—	—
DR 3900	—	LZV849
DR 3800, DR 2800	—	LZV646
DR 1900	9609900 or 9609800 (A)	—

Before starting

DR 3900, DR 3800, DR 2800: Install the light shield in Cell Compartment #2 before this test is started.

Review the safety information and the expiration date on the package.

Use the DRB reactor with 13-mm wells for the digestion. If the reactor has 16-mm wells, insert adapter sleeves into the wells.

Make sure to digest the samples at 100 °C. Higher temperatures may cause the vials to break apart.

Be careful with the vials after the digestion. Pressure increases in the vials during the digestion and can cause the vials to break apart.

Use only the TOC-X5 shaker to remove total inorganic carbon (TIC) from the sample.

Carbon dioxide from the air can contaminate the sample. Do not open the indicator vial before the shaker operation is complete. Immediately install the double cap on the indicator vial after the cap is removed, then immediately install the other side of the double cap on the sample vial.

The formation of crystals in the sample vial does not affect the result.

The recommended temperature for reagent storage is 2–8 °C (35–46 °F).

The recommended sample pH is 3–10.

If the sample contains particles, dilute the sample. Use the diluted sample in the test procedure. Multiply the test result by the dilution factor.

After both vials are attached to the double cap, keep the vial assembly together. Put the vial assembly in the plastic packaging after the analysis.

DR 1900: Go to All Programs>LCK or TNTplus Methods>Options to select the TNTplus number for the test. Other instruments automatically select the method from the barcode on the vial.

Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

Dispose of reacted solutions according to local, state and federal regulations. Refer to the Safety Data Sheets for disposal information for unused reagents. Refer to the environmental, health and safety staff for your facility and/or local regulatory agencies for further disposal information.

Items to collect

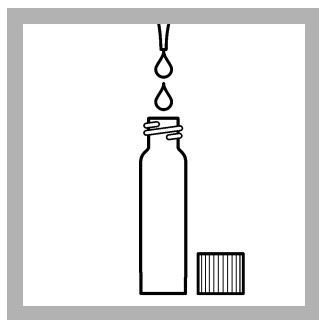
Description	Quantity
Total Organic Carbon, HR TNTplus 811 Reagent Set	1
DRB200 reactor with 13-mm wells	1
TOC-X5 shaker	1
Pipet, adjustable volume, 1.0–5.0 mL	1
Pipet tips, for 1.0–5.0 mL pipet	1
Test tube rack	1

Refer to [Consumables and replacement items](#) on page 4 for order information.

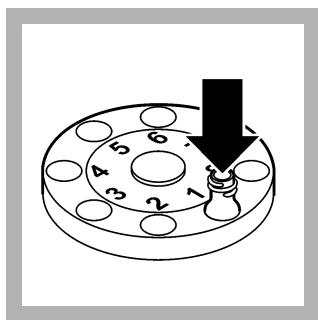
Sample collection

- Collect samples in clean glass bottles.
- Homogenize samples that contain solids to get a representative sample.
- Rinse the sample bottle several times with the sample to be collected.
- Fill the bottle completely full, then tighten the cap on the bottle.
- Analyze the samples as soon as possible for best results.
- Acid preservation is not recommended.

Test procedure



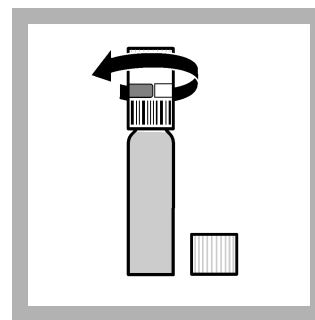
1. Remove the cap from a clear vial. Use a pipet to add 1 mL of sample to the vial.



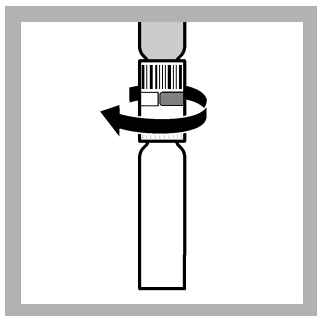
2. Insert the uncapped sample vial into the TOC-X5 shaker. Make sure that the vial is pushed all the way down into the shaker. Move the fan over the vial.



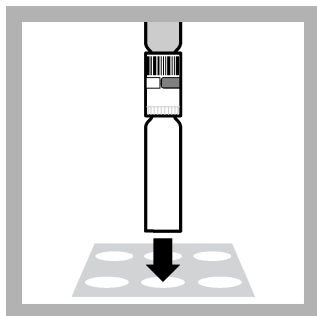
3. Push the on/off switch to start the shaker. Operate the shaker for 5 minutes.



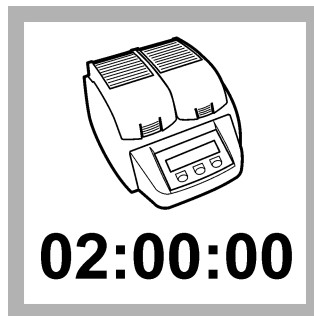
4. When the shake time is complete, remove the cap from a blue indicator vial. Immediately install and tighten a double cap on the indicator vial with the barcode label toward the vial.



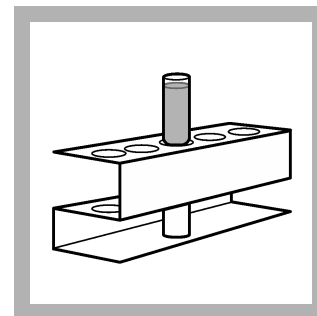
5. Immediately invert the indicator vial, then install and tighten the other side of the double cap on the sample vial. Hold the vial assembly vertically.



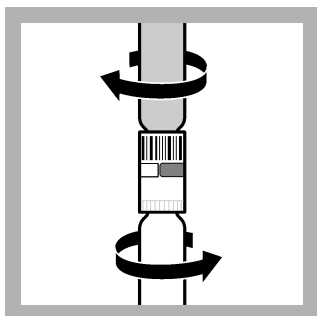
6. Insert the vial assembly into the DRB reactor (indicator vial on top).



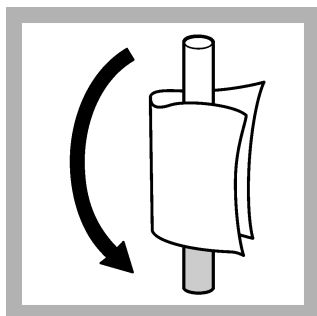
7. Increase the vial assembly temperature for 2 hours at 100 °C.



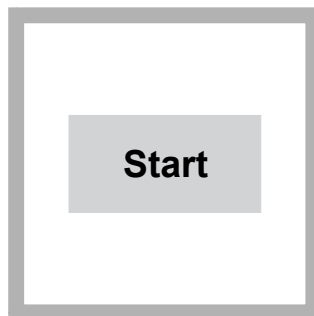
8. Let the vial assembly cool completely to room temperature. Make sure that the vials cool completely. Warm vials will give high results.



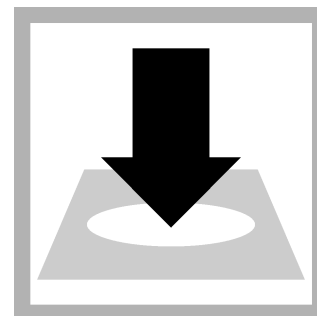
9. Tighten the double cap on both vials.



10. Invert the vial assembly so the indicator vial is on the bottom. Clean the indicator vial.



11. DR 1900 only: Select program 811. Refer to [Before starting](#) on page 1.



12. Insert the vial into the cell holder. DR 1900 only: Push **READ**. Results show in mg/L C.

Interferences

The table that follows shows the substances that were tested for interference and did not interfere up to the levels shown.

Interfering substance	Interference level
Ammonium	2000 mg/L
Calcium	2000 mg/L as CaCO ₃
Chloride	1400 mg/L
Magnesium	2000 mg/L as CaCO ₃
TIC	250 mg/L

Accuracy check

Standard solution method

Use the standard solution method to validate the test procedure, the reagents and the instrument.

Items to collect:

- 1000-mg/L C, TOC Standard Solution
- 200-mL volumetric flask, Class A
- 20-mL volumetric pipet, Class A and pipet filler safety bulb
- Organic-free water

1. Prepare a 100-mg/L C standard solution as follows:
 - a. Use a pipet to add 20 mL of a 1000-mg/L C standard solution into the volumetric flask.
 - b. Dilute to the mark with organic-free water. Mix well. Prepare this solution daily.
2. Use the test procedure to measure the concentration of the prepared standard solution.
3. Compare the expected result to the actual result.

Note: The factory calibration can be adjusted slightly with the standard adjust option so that the instrument shows the expected value of the standard solution. The adjusted calibration is then used for all test results. This adjustment can increase the test accuracy when there are small variations in the reagents or instruments.

Method performance

The method performance data that follows was derived from laboratory tests that were measured on a spectrophotometer during ideal test conditions. Users can get different results under different test conditions.

Program	Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
TNTplus 811	50 mg/L C	48.84–51.16 mg/L C	3.5 mg/L C

Summary of method

The total inorganic carbon (TIC) in the sample is first removed during the shaker operation. The sample is then digested to oxidize the total organic carbon (TOC) in the sample to carbon dioxide (CO₂). The CO₂ from the digested sample goes through the membrane in the double cap to the indicator vial and causes the indicator solution to change color. The color of the indicator solution is measured by the spectrophotometer. The measurement wavelength is 435 nm.

Consumables and replacement items

Required reagents

Description	Quantity/test	Unit	Item no.
Total Organic Carbon Reagent Set, HR, TNTplus	1	25/pkg	TNT811

Required apparatus

Description	Quantity/test	Unit	Item no.
DRB 200 Reactor, 115 VAC option, 9 x 13 mm + 2 x 20 mm, 1 block	1	each	DRB200-01
DRB 200 Reactor, 230 VAC option, 9 x 13 mm + 2 x 20 mm, 1 block	1	each	DRB200-05
Pipet, adjustable volume, 1.0–5.0 mL	1	each	BBP065
Pipet tips, for 1.0–5.0 mL pipet	1	75/pkg	BBP068
Test tube rack	1	each	1864100
TOC-X5 shaker	1	each	LQV148.99.00002
Wipes, disposable	1	280/pkg	2097000

Recommended standards

Description	Unit	Item no.
TOC Standard Solution Ampule (KHP Standard, 1000-mg/L C)	5/pkg	2791505

Optional reagents and apparatus

Description	Unit	Item no.
Reactor adapter sleeves, 16 mm to 13 mm diameter, for TNTplus vials	5/pkg	2895805
Ampule Breaker, 2-mL PourRite® Ampules	each	2484600
Flask, volumetric, Class A, 200 mL	each	1457445
Pipet, volumetric Class A, 20 mL	each	1451520
Pipet filler, safety bulb	each	1465100
Potassium Acid Phthalate (KHP), ACS	500 g	31534
Water, organic-free	500 mL	2641549



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