

## Chromazurol S Method

**Method 10215**
**0.02 to 0.50 mg/L Al**
**TNTplus® 848**

**Scope and application:** For drinking water, surface water, swimming pool water, wastewater and process analysis.



### 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.

The recommended sample pH is 2.5–3.5.

The sample temperature must be 20–23 °C (68–73 °F) for accurate results.

The recommended temperature for reagent storage is 15–25 °C (59–77 °F).

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

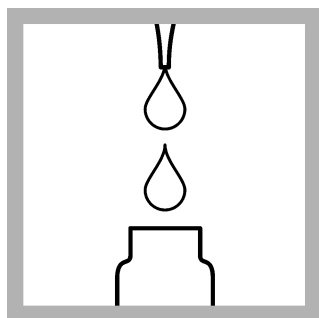
Description	Quantity
Aluminum TNT848 Reagent Set	1
Pipet, adjustable volume, 1.0–5.0 mL	1
Pipet tips, for 1.0–5.0 mL pipet	1

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

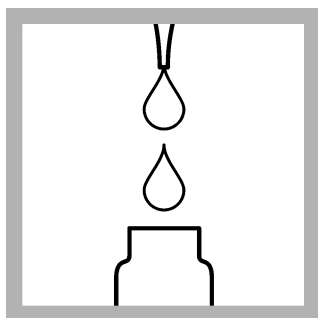
## Sample collection and storage

- Collect samples in clean glass or plastic bottles that have been cleaned with 6 N (1:1) hydrochloric acid and rinsed with deionized water.
- To preserve samples for later analysis, adjust the sample pH to less than 2 with concentrated nitric acid (approximately 2 mL per liter). No acid addition is necessary if the sample is tested immediately.
- Keep the preserved samples at room temperature for a maximum of 6 months.
- Before analysis, adjust the pH to 2.5–3.5 with 5 N sodium hydroxide solution.
- Correct the test result for the dilution caused by the volume additions.

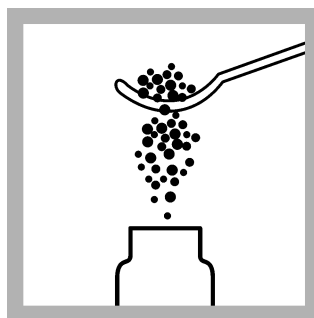
## Test procedure



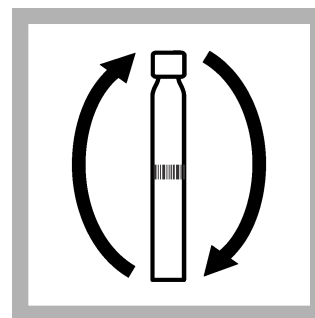
1. Use a pipet to add 2.0 mL of Solution A to the test vial.



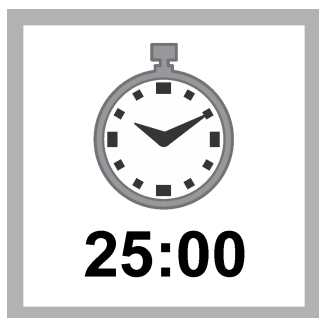
2. Use a pipet to add 3.0 mL of sample to the test vial.



3. Add one level spoonful of Reagent B to the vial.



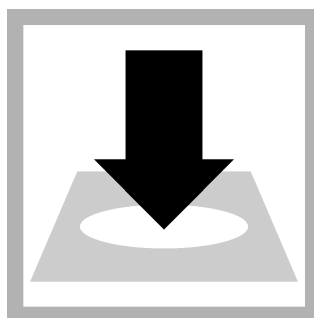
4. Tighten the cap on the vial and invert until completely mixed.



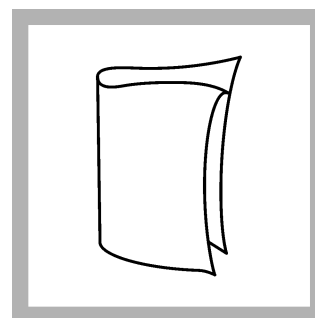
5. Start the reaction time of 25 minutes.



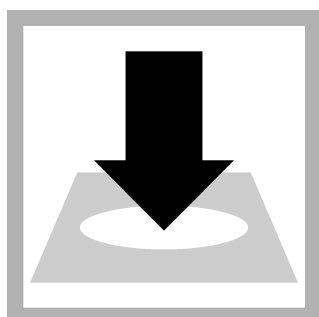
6. DR 1900 only: Select program 848. Refer to [Before starting](#) on page 1.



7. Insert the Zero vial into the cell holder. DR 1900 only: Push **ZERO**. The instrument zero is set.



8. When the timer expires, clean the vial.



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

## Reagent blank correction

For the best results, measure the reagent blank value for each new lot of reagent. Replace the sample with deionized water in the test procedure to determine the reagent blank value. Subtract the reagent blank value from the sample results automatically with the reagent blank adjust option. Measure the reagent blank value when a new lot of reagent is used.

1. Use deionized water as the sample in the test procedure to measure the reagent blank value.
2. Set the reagent blank function to on. The measured reagent blank value is shown.
3. Accept the blank value. The reagent blank value is then subtracted from all results until the reagent blank function is set to off or a different method is selected.

**Note:** As an alternative, record or enter the reagent blank value at a different time. Push the highlighted reagent blank box and use the keypad to enter the value.

## Sample blanks

A sample blank is the portion of the test result that is from color or turbidity in the sample and not from the analyte. Samples that do not have color or turbidity have no sample blank value. If the sample blank value is within the permitted range, the sample blank value is automatically subtracted from the test result.

## Interferences

Table 2 shows that the ions were individually examined to the given concentrations and do not cause interference. No cumulative effects or influences of other ions were found.

Higher concentrations of heavy metals other than those given, as well as fluoride, phosphate and relatively rare elements (e.g., beryllium, thorium, titanium, zirconium and vanadium) interfere with the determination. Aluminum oxide hydrates and hydroxide are only partially found.

Verify the measurement results with sample dilutions or standard additions.

**Table 2 Interfering substances**

Interfering substance	Interference level
Mg <sup>2+</sup> , K <sup>+</sup> , Na <sup>+</sup> , NH <sub>4</sub> <sup>+</sup> , Cl <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , SO <sub>4</sub> <sup>2-</sup> , Ca <sup>2+</sup>	500 mg/L
Ag <sup>+</sup> , Mn <sup>2+</sup>	100 mg/L
Cd <sup>2+</sup> , Co <sup>2+</sup> , Ni <sup>2+</sup> , Sn <sup>2+</sup> , Pb <sup>2+</sup> , PO <sub>4</sub> <sup>3-</sup>	50 mg/L
Cu <sup>2+</sup> , Hg <sup>2+</sup>	10 mg/L
Fe <sup>2+</sup> , Fe <sup>3+</sup> , Zn <sup>2+</sup> , Si <sup>4+</sup>	5 mg/L
F <sup>-</sup>	2 mg/L
Cr <sup>3+</sup> , Cr <sup>6+</sup>	0.5 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:

- 100-mg/L Aluminum Standard Solution
- 250-mL volumetric flask, Class A
- 1.0-mL volumetric pipet, Class A and pipet filler safety bulb
- Deionized water

1. Prepare a 0.4-mg/L aluminum standard solution as follows:
  - a. Use a pipet to add 1.0 mL of a 100-mg/L aluminum standard solution into the volumetric flask.
  - b. Dilute to the mark with deionized 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.*

## Summary of Method

Chromazurol S forms a green lake with aluminum in weak acidic acetate-buffered solutions. The amount of color formed is directly proportional to the amount of aluminum in the sample. The measurement wavelength is 620 nm.

## Consumables and replacement items

### Required reagents

Description	Quantity/Test	Unit	Item no.
Aluminum TNT848 Reagent Set	1	24/pkg	TNT848

### Required apparatus

Description	Quantity/test	Unit	Item no.
Pipet, adjustable volume, 1.0–5.0 mL	1	each	BBP065
Pipet tips, for 1.0–5.0 mL pipet	1	75/pkg	BBP068
Light shield, DR 3800, DR 2800, DR 2700	1	each	LZV646
Light shield, DR 3900	1	each	LZV849

### Recommended standards

Description	Unit	Item no.
Aluminum Standard Solution, 10-mL Voluette Ampule, 50 mg/L as Al	16/pkg	1479210
Aluminum Standard Solution, 100-mg/L as Al <sup>3+</sup>	100 mL	1417442

### Optional reagents and apparatus

Description	Unit	Item no.
Flask, volumetric, Class A, 250 mL	each	1457446
Nitric Acid, concentrated	500 mL	15249
Sample blank vials for TNTplus methods	5/pkg	TNT919
Sampling bottle with cap, low density polyethylene, 500-mL	12/pkg	2087079
Sodium Hydroxide Standard Solution, 5.0 N	100 mL MDB	245032
Syringe, 10-cc, Luer-Lock tip	each	2202400
Test tube rack, stainless steel	each	1864100
Water, deionized	4 L	27256





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