

## Turbidimetric Method

**Method 10227**
**HR (150 to 900 mg/L SO<sub>4</sub><sup>2-</sup>)**
**TNTplus™ 865**
**Scope and Application:** For drinking water, wastewater, raw water and process control


### Test preparation

## How to use instrument-specific information

The [Instrument-specific information](#) table displays requirements that may vary between instruments. To use this table, select an instrument then read across to find the corresponding information required to perform this test.

**Table 390 Instrument-specific information**

Instrument	Light shield
DR 6000	—
DR 5000	—
DR 3900	LZV849
DR 3800, DR 2800	LZV646

### Before starting the test:

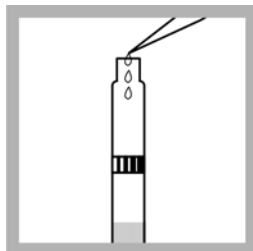
<b>Install the light shield</b> if applicable (see <a href="#">Instrument-specific information</a> ).
Please read Safety Advice and Expiration Date on package.
Refer to the <a href="#">Accuracy check</a> to verify results.
Recommended sample, sample vial and reagent temperature is 15–25 °C (59–77 °F). Recommended reagent storage temperature is 15–25 °C (59–77 °F).
Recommended sample pH is 3–10.
TNT plus methods are activated from the Main Menu screen when the sample vial is inserted into the sample cell holder.

### Collect the following items:

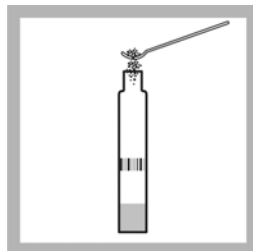
Description	Quantity
Sulfate TNTplus 865 Reagent Set	1
Light Shield (see <a href="#">Instrument-specific information</a> )	1
Pipettor, variable, 1–5 mL	1
Pipettor Tips for 1–5 mL Pipettor	1

See [Consumables and replacement items](#) for reorder information.

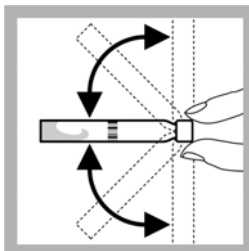
## Sulfate, HR, TNTplus865



1. Carefully pipet 2.0 mL of sample into the vial.



2. Add one level spoonful of Reagent A to the vial.



3. Immediately cap the vial and **invert for 1 minute.**



4. Wait for 30 seconds.



5. Clean the outside of the vial to remove fingerprints and other marks.



6. Insert the vial into the cell holder.

The instrument reads the barcode, then selects and performs the correct test. Results are in mg/L  $\text{SO}_4^{2-}$ . No instrument Zero is required.

## Interferences

The ions listed in the [Interfering substances](#) table have been individually checked up to the given concentrations and do not cause interference. Cumulative effects and the influence of other ions have not been determined. Measurement results can be verified using sample dilutions or standard additions.

**Table 391 Interfering substances**

Interfering substance	Interference level
$\text{K}^+$ , $\text{Na}^+$	2000 mg/L
$\text{Ca}^{2+}$ , $\text{NO}_3^-$ , $\text{Cl}^-$	1000 mg/L
$\text{Cd}^{2+}$ , $\text{Cr}^{3+}$ , $\text{Cu}^{2+}$ , $\text{Fe}^{2+}$ , $\text{Fe}^{3+}$ , $\text{Mg}^{2+}$ , $\text{Mn}^{2+}$ , $\text{NH}_4^+$ , $\text{Ni}^{2+}$ , $\text{Si}^{2+}$ , $\text{Sn}^{2+}$ , $\text{Zn}^{2+}$	500 mg/L
$\text{Al}^{3+}$ , $\text{Pb}^{2+}$ , $\text{Hg}^{2+}$ , $\text{PO}_4^{3-}$ , $\text{CO}_3^{2-}$ , $\text{I}^-$ , $\text{CN}^-$ , $\text{NO}_2^-$	50 mg/L
$\text{Cr}^{6+}$	20 mg/L
$\text{Ag}^+$	2.5 mg/L

## Sample collection, preservation and storage

- Analyze samples within 3 hours after collection for best results.
- Samples may be stored up to 28 days at 4 °C (39 °F).
- Warm samples to room temperature before analysis.

## Accuracy check

### Standard solution method with prepared standard

**Note:** Refer to the instrument user manual for specific software navigation instructions.

Required for accuracy check:

- Sulfate standard solution, 2500-mg/L
- Deionized water
- Volumetric flask, Class A, 100-mL
- Volumetric pipet, Class A, 20-mL
- Pipet filler

Use one of the following methods to check accuracy.

1. Prepare a 500-mg/L sulfate standard solution:
  - d. Pipet 20 mL of sulfate standard solution, 2500-mg/L, into a 100-mL volumetric flask.
  - e. Dilute to the mark with deionized water. Prepare this solution daily.
2. Use 2 mL of the prepared standard in place of the sample in the [Sulfate](#), [HR](#), [TNTplus865](#) test.

### Standard solution method with mixed parameter standard

Use a mixed-parameter standard, which contains sulfate and other common ions that may be present in samples of a given type. The Wastewater Influent Standard contains 400 mg/L SO<sub>4</sub>, as well as other ions.

Required for accuracy check:

- Wastewater Influent Standard
1. Use 2 mL of the mixed parameter standard in place of the sample.
  2. Follow the [Sulfate](#), [HR](#), [TNTplus865](#) test.

## Summary of method

Sulfate ions in the sample react with barium chloride in aqueous solution and form a precipitate of barium sulfate. The resulting turbidity is measured photometrically at 880 nm (890 nm on DR2800).

## Consumables and replacement items

### Required reagents

Description	Quantity/Test	Unit	Catalog number
Sulfate TNTplus HR, TNT865 Reagent Set	1	25/pkg	TNT865

### Required apparatus

Description	Quantity/Test	Unit	Catalog number
Pipettor, variable volume, 1.0–5.0 mL	1	each	BBP065
Pipettor Tips, for BBP065 pipettor	1	75/pkg	BBP068

### Recommended standards and apparatus

Description	Unit	Catalog number
Mixed Parameter, Wastewater Influent Standard	500 mL	2833149
Sulfate Standard Solution, 2500 mg/L SO <sub>4</sub>	500 mL	1425249
Water, deionized	4 L	27256

### Optional reagents and apparatus

Description	Unit	Catalog number
Bottle, 500-mL sampling, low-density polyethylene, with cap	12/pkg	2087079
Flask, volumetric, 100-mL, Class A	each	1457422
Pipet, volumetric, 20-mL Class A	each	1451520
Pipet Filler, safety bulb	each	1465100
Test Tube Rack. 13-mm vials	each	2497900
Wipers, disposable	280/pkg	2097000



FOR TECHNICAL ASSISTANCE, PRICE INFORMATION AND ORDERING:  
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Outside the U.S.A. – Contact the HACH office or distributor serving you.  
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