Hydrogen Peroxide (H_2O_2)

DOC316.53.01559

DPD Method **Method 10290**

0.05 to 5.00 mg/L H_2O_2 **Powder Pillows**

Scope and application: For testing hydrogen peroxide in water.

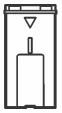
Test preparation

Instrument specific table

Table 1 shows all of the instruments that have the program for this test. The table also shows requirements that can change between instruments, such as adapter and sample cell requirements.

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

Table 1 Instrument-specific information

Instrument	Adapter	Sample cell orientation	Sample cell
DR6000	—	The orientation key is toward the arrow on the universal cell adapter.	4864302 
DR5000	A23618	The orientation key is toward the user.	
DR3900	LZV846 (A)	The orientation key is away from the user.	
DR1900	9609900 or 9609800 (C)	The 1-cm path is aligned with the arrow on the adapter.	
DR900	—	The orientation key is toward the user.	
DR3800 DR2800 DR2700	LZV585 (B)	The 1-cm path is aligned with the arrow on the adapter.	5940506 

Before starting

Install the instrument cap on the DR900 cell holder before ZERO or READ is pushed.
In bright light conditions (e.g., direct sunlight), close the cell compartment, if applicable, with the protective cover during measurements.
To prevent cross-contamination, put a label on each volumetric flask used to prepare stock solutions and calibration standards (e.g., Stock LR, Stock HR, REF2 LR and REF2 HR).
Keep the 50% Hydrogen Peroxide solution in the reagent refrigerator that is next to the analyzer.
Do not use post-GAC (granular activated carbon) water to make stock solutions and calibration standards.
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

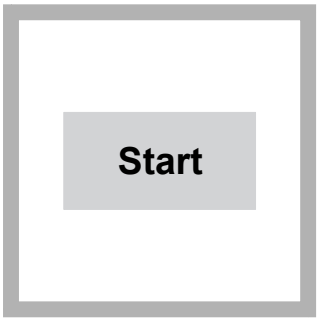
Description	Quantity
DPD Total Chlorine Reagent Powder Pillows, 25 mL	1
Ammonium Molybdate Reagent	3 drops
Potassium Iodide Solution, 20%	3 drops
Sample cells (For information about sample cells, adapters or light shields, refer to Instrument specific table on page 1.)	1

Refer to Consumables and replacement items on page 5 for order information.

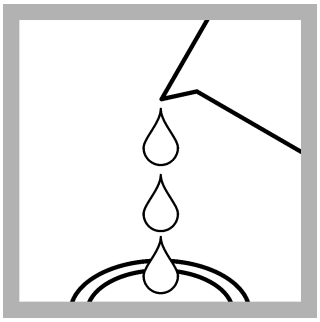
Sample collection

- Analyze the samples immediately. The samples cannot be preserved for later analysis.

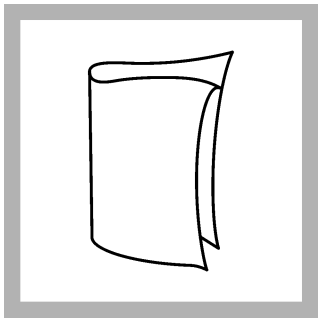
Test procedure



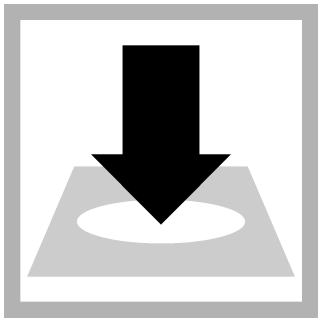
1. Start program **791 H2O2**. DR900: Change the chemical from Cl_2 to H_2O_2. Select Advanced Options > Chemical Form > H2O2.



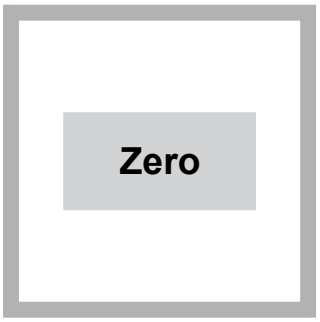
2. Prepare the blank: Fill a sample cell to the 10-mL mark with sample.



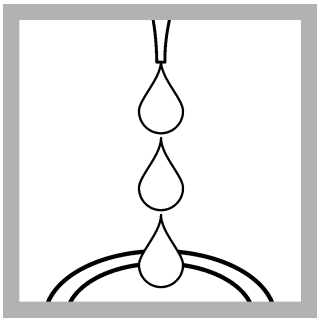
3. Clean the blank sample cell.



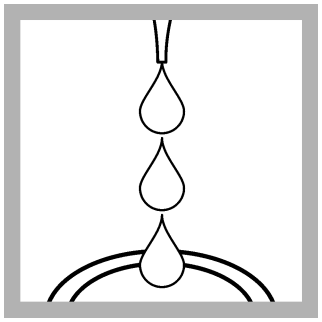
4. Insert the blank into the cell holder.



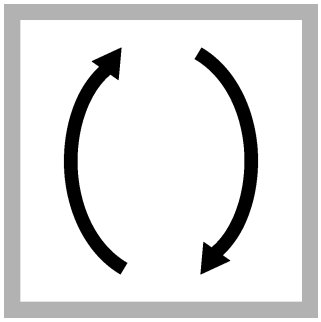
5. Push **ZERO**. The display shows 0.0 mg/L H_2O_2.



6. Prepare the sample: Add 3 drops of the Potassium Iodide Solution to the sample cell.

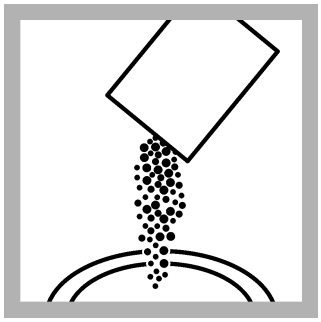


7. Add 3 drops of the Ammonium Molybdate Reagent to the sample cell.

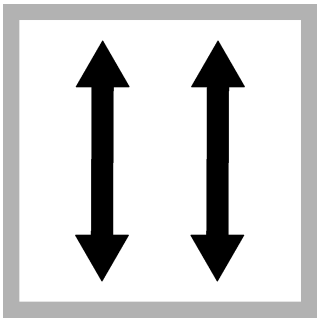


8. Put the stopper on the sample cell. Invert the sample cell to mix.

9. Start the instrument timer. A 6-minute reaction time starts.

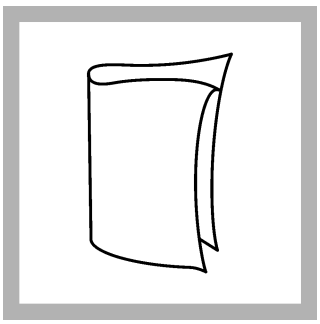


10. When the timer expires, add one DPD Total Chlorine Powder Pillow for 25-mL samples to the sample cell.

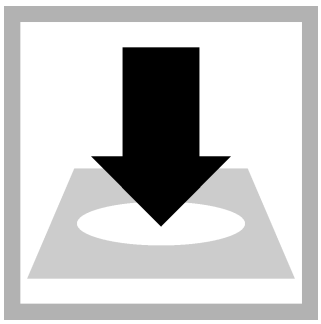


11. Put the stopper on the sample cell. Shake the sample cell to dissolve the reagent.
A pink color shows when H_2O_2 is in the sample.

12. Start the instrument timer. A 30-second reaction time starts. Make sure that the powder has fully dissolved and that there are no air bubbles. Invert slowly to remove air bubbles.



13. Clean the sample cell during the reaction time.



14. Insert the prepared sample into the cell holder.

15. When the timer expires, push **READ**. Results show in mg/L H_2O_2. Do not wait more than 60 seconds to read the sample.

Interferences

Interfering substance	Interference level
Acidity	More than 150 mg/L $CaCO_3$. The full color may not develop or the color may fade instantly. Adjust to pH 6–7 with 1 N Sodium Hydroxide. Measure the amount to add on a separate sample aliquot, then add the same amount to the sample that is tested. Correct the test result for the dilution from the volume addition.
Alkalinity	More than 250 mg/L $CaCO_3$. The full color may not develop or the color may fade instantly. Adjust to pH 6–7 with 1 N Sulfuric Acid. Measure the amount to add on a separate sample aliquot, then add the same amount to the sample that is tested. Correct the test result for the dilution from the volume addition.
Bromine, Br_2	Positive interference at all levels
Chlorine Dioxide, ClO_2	Positive interference at all levels
Inorganic chloramines	Positive interference at all levels
Chloramines, organic	May interfere may interfere in the results for H_2O_2
Hardness	No effect at less than 1000 mg/L as $CaCO_3$

Interfering substance	Interference level
Manganese, oxidized (Mn^{4+}, Mn^{7+}) or Chromium, oxidized (Cr^{6+})	Pre-treat the sample as follows: **1.** Adjust the sample pH to 6–7. **2.** Add 3 drops of Potassium Iodide (30-g/L) to 10 mL of sample. **3.** Mix and wait 1 minute. **4.** Add 3 drops of Sodium Arsenite (5-g/L) and mix. **5.** Use the test procedure to measure the concentration of the treated sample. **6.** Subtract this result from the result without the treatment to obtain the correct chlorine concentration.
Ozone	Positive interference at all levels
Peroxides	May interfere
Highly buffered samples or extreme sample pH	Can prevent the correct pH adjustment (of the sample) by the reagents. Sample pretreatment may be necessary.

Prepare a low-range calibration standard

Make a new stock solution and calibration standard each day. Dispose of the remaining stock solution and calibration standard at the end of each day, and rinse the volumetric flasks with deionized water.

Items to collect:

- Hydrogen Peroxide, 50%
- Deionized water
- Flask, volumetrics, 1-L polypropylene, with stoppers (2x)

1. Prepare a low-range (LR) stock solution (500 ppm H_2O_2) as follows:
   a. Fill the 1 L volumetric flask for the low-range stock solution half full with deionized water.
   b. Add 1 mL of 50% hydrogen perioxide solution to the volumetric flask.
   c. Dilute to the 1L mark with deionized water. Mix well.
2. Prepare a 0.5-ppm H_2O_2 calibration standard as follows:
   a. Fill the 1 L volumetric flask for the low-range calibration standard half full with deionized water.
   b. Add 1 mL of the low-range stock solution to the volumetric flask.
   c. Dilute to the 1 L mark with deionized water. Mix well.

Prepare a high-range calibration standard

Make a new stock solution and calibration standard each day. Dispose of the remaining stock solution and calibration standard at the end of each day, and rinse the volumetric flasks with deionized water.

Items to collect:

- Hydrogen Peroxide, 50%
- Deionized water
- Flask, volumetrics, 1-L polypropylene, with stoppers (2x)

1. Prepare a high-range (HR) stock solution (5000 ppm H_2O_2) as follows:
   a. Fill the 1 L volumetric flask for the high-range stock solution half full with deionized water.
   b. Add **10 mL** of 50% Hydrogen Perioxide solution to the volumetric flask.
   c. Dilute to the mark with deionized water. Mix well.

2. To prepare a 10-ppm H_2O_2 calibration standard:
   a. Fill the 1 L volumetric flask for the high-range calibration standard half full with deionized water.
   b. Add **2 mL** of the high-range stock solution to the volumetric flask.
   c. Dilute to the mark with deionized water. Mix well.
3. To prepare a 20-ppm H_2O_2 calibration standard:
   a. Fill the 1 L volumetric flask for the high-range calibration standard half full with deionized water.
   b. Add **4 mL** of the high-range stock solution to the volumetric flask.
   c. Dilute to the 1 L mark with deionized water. Mix well.
4. To prepare a 50-ppm H_2O_2 calibration standard:
   a. Fill the 1 L volumetric flask for the high-range calibration standard half full with deionized water.
   b. Add **10 mL** of the high-range stock solution to the volumetric flask.
   c. Dilute to the mark with deionized water. Mix well.

Summary of method

Total DPD reacts with hydrogen peroxide with the addition of catalysts.

Consumables and replacement items

Required reagents

Description	Quantity/Test	Unit	Item no.
DPD Total Chlorine Reagent Powder Pillow, 25 mL	1	100/pkg	1406499
Ammonium Molybdate Reagent	3 drops	100 mL MDB	193332
Potassium Iodide Solution, 20%	3 drops	100 mL	1456842
Hydrogen Peroxide, 50%	varies	500 mL	2119649
Water, deionized	varies	4 L	27256

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
Flask, volumetric, 1 L polypropylene, with stopper	1	each	—

Optional reagents and apparatus

Description	Unit	Item no.
DPD Total Chlorine Reagent Powder Pillows, 25 mL	1000/pkg	1406428
Dropper, LDPE, 0.5 –1.0 mL	20/pkg	2124720

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