Peracetic Acid (PAA)

DOC316.53.01524

DPD Method[1]

Method 10297

0.04 to 50.0 mg/L as PAA

Chemkey® Reagents

Scope and application: For testing peracetic acid in water.

[1] Adapted from *Standard Methods for the Examination of Water and Wastewater*.

Test preparation

Before starting

Analyze the samples immediately. The samples cannot be preserved for later analysis.
To analyze drinking water, open the sample valve or spigot and let the water flow for a minimum of 5 minutes.
Make sure that the sample is colorless and the turbidity value is less than 20 NTU. Use a filter to remove particulates in wastewater and effluent before analysis.
Use a new Chemkey for each measurement.
Do not touch the Chemkey with hands.
Do not move the Chemkey after it is installed in the meter.
The display shows a progress bar with the time that remains until the measurement is completed. Different parameters have different reaction times.
The meter automatically identifies the type of Chemkey(s) that is installed.
Refer to the meter documentation for additional information.
The Chemkeys are articles and have no MSDS/SDS.
Dispose of reacted solutions according to local, state and federal regulations. 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
Peracetic Acid (PAA) Chemkey	1

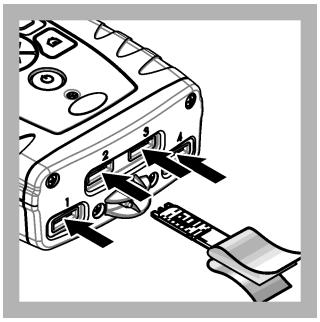
Refer to Consumables and replacement items on page 4 for order information.

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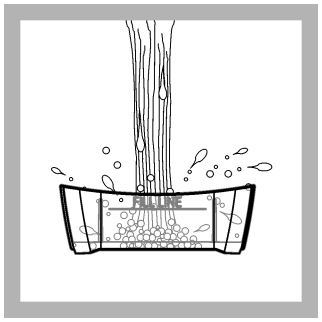
Test procedure



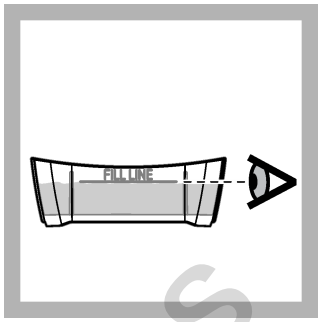
1. Peel back the packaging to show the end of the Chemkey. Do not touch the Chemkey with hands.



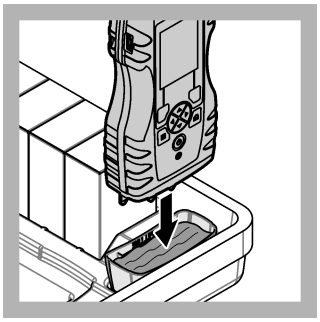
2. Put the Chemkey quickly in one movement into any slot. Carefully remove the packaging from the Chemkey.



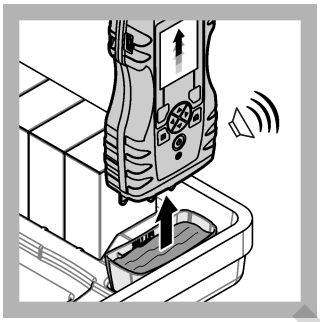
3. Rinse the sample cup with the sample. Make sure to use a filter to remove particulates from wastewater and effluent samples before analysis.



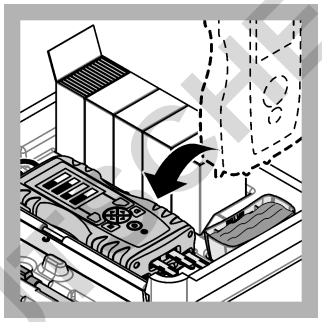
4. Fill the sample cup to the fill-line with sample.



5. Put the meter into the sample cup.



6. Wait for the sound alert and/or the meter removal animation (within 1 to 2 seconds), then immediately remove the meter from the sample cup.



7. Put the meter back into the case. Wait for the measurement to complete.

Interferences

The substances that are shown in Table 1 interfere in the peracetic acid determination at the given concentrations. The interference from some substances can be prevented by pretreatment of the sample as shown in the table. If the sample is pretreated, use the pretreated sample only for the applicable parameter. Do not use a pretreated sample to measure multiple parameters.

Table 2 shows the substances that were tested and do not interfere at or below the levels that are shown.

Table 1 Interfering substances

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 to 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 examined. Correct the test result for the dilution from the volume addition.
Alkalinity	More than 1000 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

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Table 1 Interfering substances (continued)

Interfering substance	Interference level
Free and Total Chlorine	Positive interference at all levels
Chloramines	May interfere
Iodine, I_2	Positive interference at all levels
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 30 drops of Potassium Iodide (30-g/L) to 100 mL of sample (adjust for the sample cup volume). **3.** Mix and wait 1 minute. **4.** Add 30 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 get the correct chlorine concentration.
Ozone	Positive interference at all levels
Highly buffered samples or extreme sample pH	Can prevent the correct pH adjustment of the sample by the Chemkey. Sample pre-treatment may be necessary. Adjust to pH 6–7 with acid (Sulfuric Acid, 1.000 N) or base (Sodium Hydroxide, 1.00 N).

Table 2 Non-interfering substances

Substance	Maximum level tested	Substance	Maximum level tested
Alkalinity (as $CaCO_3$)	1000 mg/L	Magnesium (Mg^{2+})	1000 mg/L
Aluminum (Al^{3+})	0.50 mg/L	Manganese (Mn^{2+})	0.2 mg/L
Calcium (Ca^{2+})	1000 mg/L	Nitrate (NO_3^-–N)	50.0 mg/L
Chloride (Cl^-)	1200 mg/L	Phosphate (PO_4^{3-})	4.0 mg/L
Copper (Cu^{2+})	2.0 mg/L	Sodium (Na^+)	500 mg/L
Fluoride (F^-)	4.0 mg/L	Sulfate (SO_4^{2-})	1000 mg/L
Iron (Fe^{2+})	1.0 mg/L	Zinc (Zn^{2+})	5.0 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:

- Peracetic acid solution[1]
- 500-mL volumetric flasks, Class A (2x)
- 4-mL volumetric pipet, Class A and pipet filler safety bulb
- Deionized water

1. Prepare a 1000-mg/L (approximate) PAA standard solution as follows:

a. Refer to the COA supplied with the PAA standard solution to identify the PAA concentration (e.g., 40% = 400,000 mg/L).

b. Add 1.25 mL of the 40% PAA standard solution to a 500-mL volumetric flask.

c. Dilute to the mark with deionized water. Mix well.

[1] Use Sigma Aldrich 40% solution (item number 777240) or equivalent. Hach does not supply a peracetic acid standard solution.

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2. Prepare a 4-mg/L (approximate) PPA standard solution as follows:
   a. Use a pipet to add 2.0 mL of the 1000-mg/L PAA solution to a 500-mL volumetric flask.
   b. Dilute to the mark with deionized water. Mix well. Prepare this solution daily.
3. Use the test procedure to measure the concentration of the prepared standard solution.

Method Performance

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

Method detection limit (MDL)[2] = 0.04 mg/L

Minimum quantifiable limit (MQL)[3] = 0.12 mg/L

Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
4.00 mg/L PAA	3.96 to 4.04 mg/L PAA	0.04 mg/L PAA
35.5 mg/L PAA	35.3 to 35.7 mg/L PAA	0.39 mg/L PAA

Summary of method

Potassium iodide is added to the sample. PAA oxidizes iodide ion (I^-) to iodine (I_2), which then reacts with the DPD indicator to form a pink color. The intensity of the pink color is proportional to the PAA concentration. Hydrogen peroxide does not interfere with the PAA reaction. The addition of catalysts and a longer reaction time is necessary for a hydrogen peroxide reaction. The measurement wavelength is 510 nm.

Consumables and replacement items

Description	Quantity/Test	Unit	Item no.
Peracetic Acid (PAA) Chemkey®	1	25/pkg	8635200
Sample cup	1	each	9418100

Optional reagents and apparatus

Description	Unit	Item no.
Flask, volumetric, Class A, 500 mL, glass	each	1457449
Pipet, adjustable volume, 1.0–5.0 mL	each	BBP065
Pipet tips, for 1.0–5.0 mL pipet	75/pkg	BBP068
Water, deionized	4 L	27256

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[2] The U.S. Environmental Protection Agency (USEPA) method detection limit (MDL) is described as the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero.

[3] The minimum concentration of an analyte where positive identification and quantitative measurement can be achieved using a specific method. MQL is usually defined as 3 to 5 times the MDL.

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