Chloramine (Mono)

DOC316.53.01500

Indophenol Method

Method 10270

0.04 to 4.00 mg/L as Cl_2

Chemkey® Reagents

Scope and application: For drinking water. This product has not been evaluated to test for chlorine and chloramines in medical applications in the United States.

Test preparation

Before starting

Analyze the samples immediately. The samples cannot be preserved for later analysis.
Make sure that the sample is colorless and the turbidity value is less than 20 NTU.
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

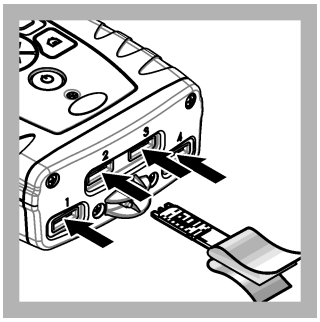
Description	Quantity
Monochloramine Chemkey	1

Refer to Consumables and replacement items on page 3 for order information.

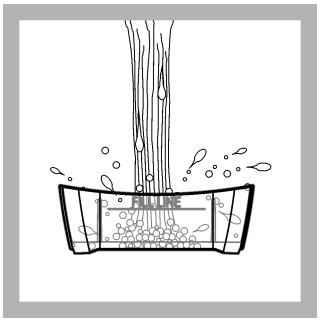
Test procedure



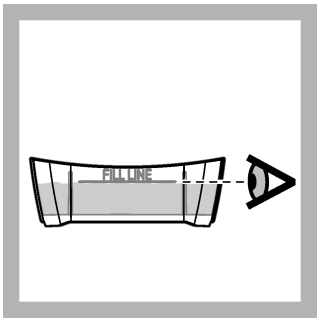
1. Peel back the packaging to show the end of the Chemkey. Do not touch the Chemkey with hands.



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

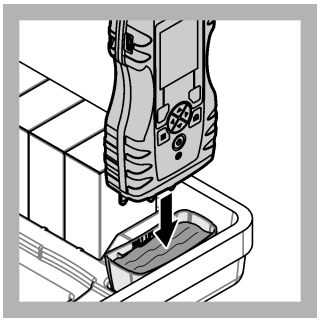


3. Rinse the sample cup with the sample.

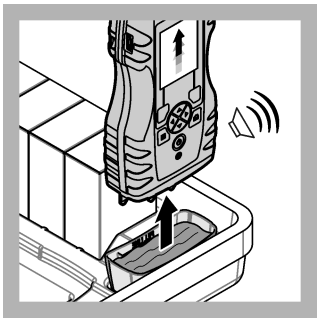


4. Fill the sample cup to the fill-line with sample.

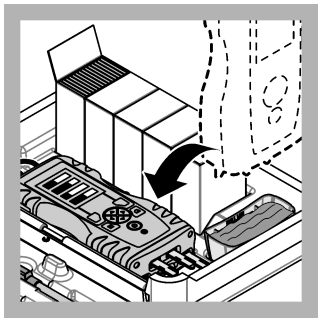
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5. Put the meter into the sample cup.



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 do not interfere in the chloramine determination at or below the given concentration.

Table 1 Non-interfering substances

Substance	Maximum level tested	Substance	Maximum level tested
Iron (Fe^{2+})	0.3 mg/L	Alkalinity (as $CaCO_3$)	1000 mg/L
Aluminum (Al^{3+})	0.2 mg/L	Chloride (Cl^-)	1200 mg/L
Calcium (Ca^{2+})	1000 mg/L	Magnesium (Mg^{2+})	250 mg/L
Copper (Cu^{2+})	1.0 mg/L	Nitrate (NO_3^-–N)	10.0 mg/L
Manganese (Mn^{2+})	0.2 mg/L	Zinc (Zn^{2+})	5.0 mg/L
Sulfate (SO_4^{2-})	500 mg/L		

Accuracy check

Standard solution method

Items to collect:

- Buffer Powder Pillow, pH 8.3
- Nitrogen, Ammonia Standard Solution, 100 mg/L as NH_3–N
- Chlorine Solution Ampules, 50–70 mg/L
- 100-mL Class A volumetric flask
- 200-mL Class A volumetric flask
- 50-mL graduated cylinder
- Pipet, adjustable volume, 1.0–5.0 mL and pipet tip
- Pipet, Mohr, 5-mL
- Pipet bulb
- Organic-free water

1. Prepare a 2.25-mg/L (as Cl_2) monochloramine standard immediately before use as follows.
   a. Add the contents of two Buffer Powder Pillows, pH 8.3 to approximately 50 mL of organic-free water in a clean 100-mL Class A volumetric flask. Swirl to dissolve the powder.
   b. Use a Class A volumetric pipet to add 2.00 mL of Nitrogen, Ammonia Standard Solution, 100 mg/L as NH_3–N into the flask.

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c. Dilute to the mark with organic-free water. Mix well. This is a 2.00-mg/L buffered ammonia standard.
d. Use a graduated cylinder to add 50.00 mL of the buffered ammonia standard into a clean 100-mL beaker. Add a stir bar.
e. Find the exact concentration of the Chlorine Solution Ampules, 50–70 mg/L from the label on the package.
f. Calculate the volume of the Chlorine Solution to add to the ammonia standard: mL chlorine solution required = 455/(free chlorine concentration).
g. Open an ampule and use a glass Mohr pipet to add the calculated amount of Chlorine Solution slowly to the ammonia standard in the beaker. Keep the beaker on a stir-plate at medium speed during the chlorine addition.
h. Stir the monochloramine solution for 1 minute after the Chlorine Solution addition is complete.
i. Quantitatively transfer the monochloramine solution to a clean 200-mL Class A volumetric flask. Dilute to the mark with organic-free water and mix well. This is a nominal 2.25-mg/L (as Cl_2) monochloramine standard.

2. Use this standard within 1 hour of preparation. Use the test procedure to measure the concentration of the monochloramine 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 during ideal test conditions. Users can get different results under different test conditions.

Method detection limit (MDL)[1] = 0.04 mg/L

Minimum quantifiable limit (MQL)[2] = 0.12 mg/L

Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
2.10 mg/L Cl_2	2.08 to 2.12 mg/L Cl_2	0.06 mg/L Cl_2

Summary of method

When there is a cyanoferrate catalyst, monochloramine in the sample reacts with a substituted phenol to form an intermediate monoimine compound. The intermediate combines with excess substituted phenol to form a green-colored indophenol, which is proportional to the amount of monochloramine in the sample.

Consumables and replacement items

Description	Quantity/Test	Unit	Item no.
Monochloramine Chemkey®	1	25/pkg	9429400
Kit, Monochloramine Chemkey® and Free Ammonia Chemkey®	1	25/pkg (2x)	9429600
Sample cup	1	each	9418100

[1] 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.

[2] 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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Recommended standards

Description	Unit	Item no.
Chlorine Standard Solution, 10-mL Voluette® Ampule, 50-75 mg/L	16/pkg	1426810
Nitrogen Ammonia Standard Solution, 100-mg/L as NH_3–N	500 mL	2406549

Optional reagents and apparatus

Description	Unit	Item no.
Ampule Breaker, 10-mL Voluette® Ampules	each	2196800
Buffer Powder Pillows, pH 8.3	25/pkg	89868
Beaker, glass, 100 mL	each	50042H
Flask, volumetric, Class A, 100 mL, glass	each	1457442
Flask, volumetric, Class A, 200 mL	each	1457445
Graduated cylinder, 50 mL	each	50841
Pipet, adjustable volume, 1.0–5.0 mL	each	BBP065
Pipet tips, for 1.0–5.0 mL pipet	75/pkg	BBP068
Water, organic-free	500 mL	2641549

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