Ammonia, Free and Total

DOC316.53.01521

Indophenol Method **Method 10268**

0.05 to 0.50 mg/L free ammonia as NH_3–N **Chemkey® Reagents**

0.05 to 1.50[1] mg/L total ammonia as NH_3–N

Scope and application: For drinking water.

[1] With maximum 0.50 mg/L free ammonia.

Test preparation

Before starting

A Free Ammonia Chemkey and Monochloramine Chemkey are necessary to do this test. Calculations are done by the SL1000.
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
Free and Total Ammonia Chemkey	1
Monochloramine Chemkey	1

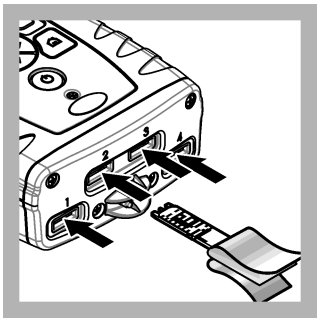
Refer to Consumables and replacement items on page 4 for order information.

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Test procedure



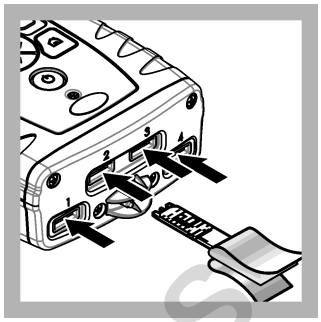
1. Free Ammonia Chemkey: Peel back the packaging to show the end of the Chemkey. Do not touch the Chemkey with hands.



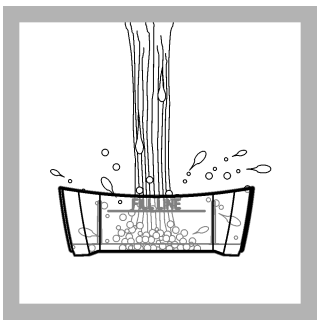
2. Free Ammonia Chemkey: Put the Chemkey slowly in one movement into any slot. Carefully remove the packaging from the Chemkey.



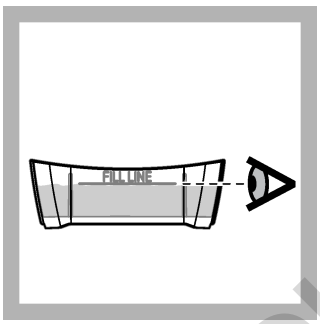
3. Monochloramine Chemkey: Peel back the packaging to show the end of the Chemkey. Do not touch the Chemkey with hands.



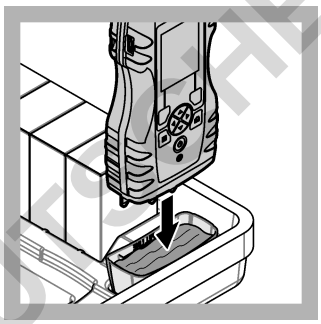
4. Monochloramine Chemkey: Put the Chemkey slowly in one movement into any slot. Carefully remove the packaging from the Chemkey.



5. Rinse the sample cup with the sample.



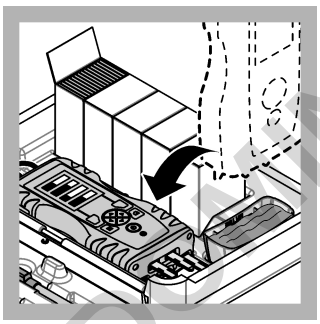
6. Fill the sample cup to the fill-line with sample.



7. Put the meter into the sample cup.



8. 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.



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

Interferences

This method is for finished, drinking water samples that have a measurable combined (total) chlorine disinfectant residual. Samples that do not have a disinfectant residual and samples that have a chlorine demand can cause low ammonia test results. Blanks and ammonia standards that are analyzed without a disinfectant residual must be prepared with high quality, reagent grade water.

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The substances that are shown in Table 1 do not interfere in the free and total ammonia 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

Use the standard solution method to validate the test procedure, the reagents and the instrument.

Items to collect:

- 10 mg/L NH_3–N Ammonia Standard Solution
- 200-mL volumetric flask, Class A
- Pipet, adjustable volume, 1.0–5.0 mL and pipet tip
- Deionized water

1. Prepare a 0.50-mg/L ammonia[1] standard solution as follows:
   a. Use a pipet to add 10.0 mL of the 10-mg/L ammonia 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.*

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] = 0.05 mg/L

Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
0.28 mg/L NH_3–N	0.27 to 0.29 mg/L NH_3–N	0.01 mg/L NH_3–N

Summary of method

Monochloramine (NH_2Cl) and free ammonia (NH_3 and NH_4^+) can be in the same water sample. Added hypochlorite combines with free ammonia to form more monochloramine.

[1] An 0.50-mg/L ammonia standard solution is prepared because the upper limit for the free and total ammonia test is 1.50-mg/L ammonia as total ammonia.

[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.

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In the presence of a cyanoferrate catalyst, monochloramine in the sample reacts with a substituted phenol to form an intermediate monoimine compound. The intermediate couples with excess substituted phenol to form a green-colored indophenol, which is proportional to the amount of monochloramine in the sample. Free ammonia is determined by comparing the color intensities, with and without added hypochlorite.

Consumables and replacement items

Description	Quantity/Test	Unit	Item no.
Free and Total Ammonia Chemkey®	1	25/pkg	8791500
Kit, Monochloramine Chemkey® and Free Ammonia Chemkey®	1	25/pkg (2x)	9429600
Sample cup	1	each	9418100

Recommended standards

Description	Unit	Item no.
Nitrogen Ammonia Standard Solution, 10-mg/L NH_3–N	500 mL	15349

Optional reagents and apparatus

Description	Unit	Item no.
Flask, volumetric, Class A, 200 mL	each	1457445
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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