Copper

DOC316.53.01503

USEPA[1] Bicinchoninate Method

Method 10272

0.06 to 5.75 mg/L as Cu

Chemkey® Reagents

Scope and application: For drinking water.

[1] Hach Method 10272 is USEPA approved for the determination of copper in drinking water, Federal Register Volume 81, Number 138 (Tuesday, July 19, 2016).

Test preparation

Before starting

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

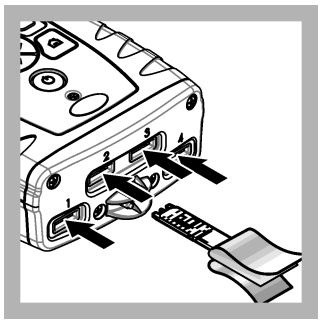
Description	Quantity
Copper Chemkey	1

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

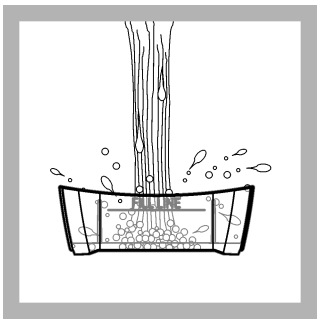
Test procedure



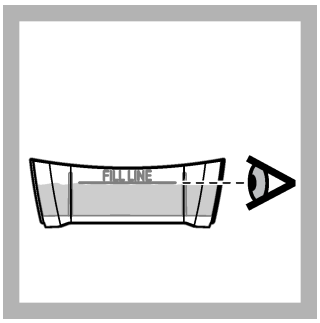
1. Peel back the packaging to show the end of the Chemkey. Do not touch the Chemkey with hands.



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

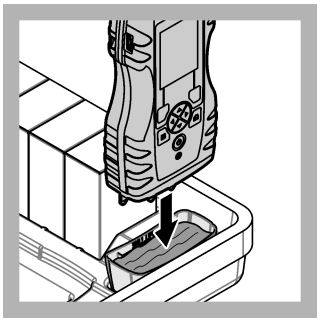


3. Rinse the sample cup with the sample.

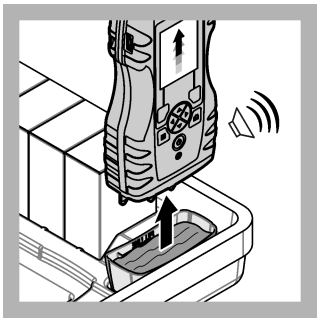


4. Fill the sample cup to the fill-line with sample.

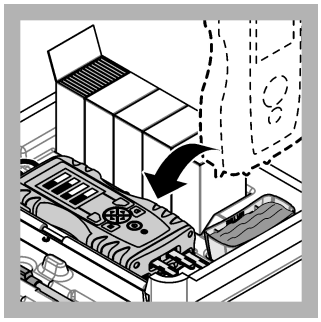
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5. Put the meter into the sample cup.



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 interfere in the copper determination. 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	If the sample is extremely acidic (pH 2 or less), a precipitate may form. Add 8 N Potassium Hydroxide Standard Solution one drop at a time until the sample pH is above 4, then start the test.
Cyanide, CN^-	Prevents full color development. Add 2.0 mL of formaldehyde to the 100-mL sample (adjust for the sample cup volume). Wait 4 minutes, then use the test procedure to measure the concentration of the treated sample. Multiply the test results by 1.02 to correct the result for the dilution with the formaldehyde.
Silver, Ag^+	If silver interference is thought to be in the sample, add 20 drops of 50% saturated Potassium Chloride Solution to 150 mL of sample (adjust for the sample cup volume). Then, put the sample through a fine or highly retentive filter. Use the filtered sample in the test procedure.

Table 2 Non-interfering substances

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

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Accuracy check

Standard solution method

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

Items to collect:

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

1. Prepare a 4.0-mg/L copper standard solution as follows:
   a. Use a pipet to add 8.0 mL of the 100-mg/L copper 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)[1] = 0.06 mg/L

Minimum quantifiable limit (MQL)[2] = 0.19 mg/L

Standard	Precision (95% confidence interval)	Sensitivity Concentration change per 0.010 Abs change
2.55 mg/L Cu	2.52 to 2.58 mg/L Cu	0.13 mg/L Cu

Summary of method

Copper in the sample reacts with a salt of bicinchoninic acid in the Chemkey to form a purple colored complex that is proportional to the copper concentration.

Consumables and replacement items

Description	Quantity/Test	Unit	Item no.
Copper Chemkey®	1	25/pkg	9429200
Sample cup	1	each	9418100

Recommended standards

Description	Unit	Item no.
Copper Standard Solution, 100-mg/L as Cu	100 mL	12842

[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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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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HACH COMPANY
WORLD HEADQUARTERS
Telephone: (970) 669-3050
FAX: (970) 669-2932

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