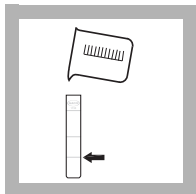
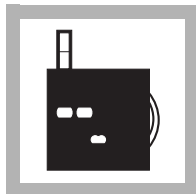


# Copper Test Kit • 0–5 mg/L

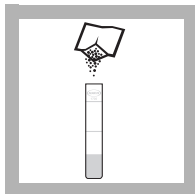
**WARNING: Handling chemical samples, standards, and reagents can be dangerous. Review the Material Safety Data Sheets before handling any chemicals.**



**1.** Rinse both color viewing tubes several times with the water to be tested. Fill both tubes to the bottom (5 mL) mark with the water sample.



**2.** Open the cover of the comparator box and insert the color disc. Close the cover. Place one tube in the top left opening of the comparator.

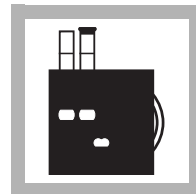


**3.** Open one Free Copper Reagent Powder Pillow. Add the contents of the pillow to one of the tubes. Stopper the tube and invert several times to mix.



**4.** Allow at least two minutes for color development.

**Note:** A purple color will develop if free copper is present.



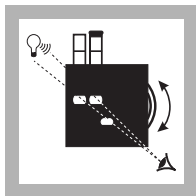
**5.** Insert the tube of prepared sample into the top right opening of the color comparator.

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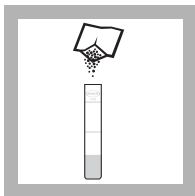
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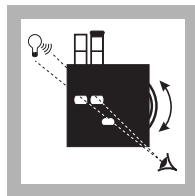
**6.** Hold the comparator up to a light source such as the sky, a window or lamp and view through the openings in front. Rotate the disc to obtain a color match. Read the mg/L free copper through the scale window. Record the value.



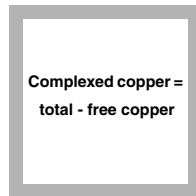
**7.** To determine the amount of total dissolved copper in the sample, add the contents of one Hydrosulfite Reagent Powder Pillow to the sample tube from step 6.



**8.** Stopper the tube and invert several times to mix. Allow at least two additional minutes before completing step 9.



**9.** Replace the tube in the right top opening of the color comparator. Hold the comparator up to a light source and rotate the color disc to obtain a match. Read the mg/L total dissolved copper through the scale window.



**10.** The amount of complexed copper can be determined by subtracting the amount of free copper (results from step 6) from the amount of total copper in the sample (results from step 9).

## Using PermaChem<sup>®</sup> Powder Pillows

To open PermaChem Powder Pillows:

1. Tap the bottom of the pillow on a hard surface.
2. Tear open the pillow along the dashed line.
3. Push the sides together to form a spout for pouring.

## Measuring Hints and General Test Information

- This kit tests for free and total dissolved copper. Free copper refers to any free or weakly chelated copper ion in solution. Complexed (chelated) copper is tightly bound, as in Cu(EDTA). Free copper plus complexed copper equals the total dissolved copper in the sample.
- Free copper determinations are used to monitor free copper levels that may become toxic to fish or other aquatic species and to check if sufficient chelant has been added to complex the free copper present in other types of applications.

- High concentrations of cyanide will inhibit color development. If the cyanide concentration is greater than 2 mg/L, add three drops of Formaldehyde Solution (Cat. No. 2059-36) to the prepared sample after completing Step 3. Wait three minutes before reading the mg/L free copper in Step 6. The Formaldehyde Solution is not part of this kit but may be ordered from Hach Company. See Optional Reagents.
- Accuracy is not affected by undissolved powder.
- Verify kit accuracy by using a copper standard solution of known concentration in place of the sample. The result should be close to the value of the standard solution. For example, follow steps 1–6 of the procedure using a 2.5 mg/L copper standard solution (Cat. No. 28336-49) in place of the sample. A result close to 2.5 mg/L free copper verifies that the kit and reagents are working properly.

## Summary of Method

Free (uncomplexed) copper in the sample reacts with bicinchoninic acid in the Free Copper Reagent Powder Pillow to give a purple color. When the Hydrosulfite Reagent is added, complexed (chelated) copper present in the sample will also react. The result after both reagents are added is total dissolved copper. The difference between the total and free copper determination is the amount of complexed copper present.

## Replacements

Description	Unit	Cat. No.
Reagent Set, Free and Total Copper.....	100 tests .....	24392-00
Includes:		
Free Copper Powder Pillows .....	100/pkg .....	21823-69
Hydrosulfite Powder Pillows .....	100/pkg .....	21188-69
Color Comparator .....	each .....	1732-00
Color Disc, Copper .....	each .....	14212-00
Color Viewing Tube .....	6/pkg .....	1730-06
Stopper for Viewing Tube .....	6/pkg .....	1731-06

## Optional Reagents

Copper Standard Solution, 2.5 mg/L (Metals QC Standard, High Range).....	500 mL .....	28336-49
Formaldehyde .....	15 mL SCDB .....	2059-36