Copper PP / M153

0.05 - 5 mg/l Cu

Bicinchoninate

Instrument specific information

The test can be performed on the following devices. In addition, the required cuvette and the absorption range of the photometer are indicated.

<table>
<thead>
<tr>
<th>Instrument Type</th>
<th>Cuvette</th>
<th>λ</th>
<th>Measuring Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>MD 100, MD 600, MD 610, MD 640, MultiDirect, PM 620, PM 630, SpectroDirect, XD 7000, XD 7500</td>
<td>ø 24 mm</td>
<td>560 nm</td>
<td>0.05 - 5 mg/l Cu</td>
</tr>
</tbody>
</table>

Material

Required material (partly optional):

<table>
<thead>
<tr>
<th>Reagents</th>
<th>Packaging Unit</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>VARIO CU1 F10</td>
<td>Powder / 100 pc.</td>
<td>530300</td>
</tr>
<tr>
<td>VARIO CU1 F10</td>
<td>Powder / 1000 pc.</td>
<td>530303</td>
</tr>
</tbody>
</table>

Application List

- Cooling Water
- Boiler Water
- Waste Water Treatment
- Pool Water Control
- Pool Water Treatment
- Drinking Water Treatment
- Galvanization

Preparation

1. Digestion is required for the determination of total copper.
2. Extremely acid water samples (pH 2 or less) must be adjusted between pH 4 and pH 6 before the reagent is added (with 8 mol/l Potassium hydroxide solution KOH).
   Note: pH values above 6 can lead to Copper precipitation.
Notes

1. Accuracy is not affected by undissolved powder.
Implementation of the provision Copper, free with Vario Powder Pack

Select the method on the device
For this method, no ZERO measurements are to be carried out with the following devices: XD 7000, XD 7500

10 ml

Fill 24 mm vial with 10 ml sample.

Close vial(s).

Place sample vial in the sample chamber. * Pay attention to the positioning.

Zero

Press the ZERO button.

Remove the vial from the sample chamber.

For devices that require no ZERO measurement, start here.

Add Vario Cu 1 F10 powder pack.

Close vial(s).

Mix the contents by shaking.
Place **sample vial** in the sample chamber. • Pay attention to the positioning.

Once the reaction period is finished, the measurement takes place automatically.

The result in mg/l Copper appears on the display.

Press the **TEST (XD: START)** button.

Wait for **2 minute(s) reaction time**.
Chemical Method

Bicinchoninate

Appendix

Calibration function for 3rd-party photometers

Conc. = a + b•Abs + c•Abs² + d•Abs³ + e•Abs⁴ + f•Abs⁵

<table>
<thead>
<tr>
<th>Ø 24 mm</th>
<th>□ 10 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>-6.44214 • 10⁻²</td>
</tr>
<tr>
<td>b</td>
<td>3.7903 • 10⁰</td>
</tr>
<tr>
<td>c</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td></td>
</tr>
<tr>
<td>f</td>
<td></td>
</tr>
</tbody>
</table>

Interferences

Removeable Interferences

1. Cyanide, CN⁻: Cyanide prevents full colour development. Cyanide interference is eliminated as follows: Add 0.2 ml Formaldehyde to 10 ml water sample and wait for a reaction time of 4 minutes. (Cyanide is masked). After this perform the test as described. Multiply the result by 1.02 to correct the sample dilution by Formaldehyde.

2. Silver, Ag⁺: If a turbidity remains and turns black, silver interference is likely. Add 10 drops of saturated Potassium chloride solution to 75 ml of water sample and filter it through a fine filter. Use 10 ml of the filtered water sample to perform test.

Method Validation

<table>
<thead>
<tr>
<th>Limit of Detection</th>
<th>0.05 mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limit of Quantification</td>
<td>0.15 mg/l</td>
</tr>
<tr>
<td>End of Measuring Range</td>
<td>5 mg/l</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>3.77 mg/l / Abs</td>
</tr>
<tr>
<td>Confidence Intervall</td>
<td>0.064 mg/l</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.027 mg/l</td>
</tr>
<tr>
<td>Variation Coefficient</td>
<td>1.07 %</td>
</tr>
</tbody>
</table>
Bibliography
S. Nakano, Y. Zasshi, 82 486 - 491 (1962) [Chemical Abstracts, 58 3390e (1963)]

Derived from
APHA Method 3500Cu