1.14553.0001

Spectroquant®

Copper Cell Test

Cu

1. Method

In an ammoniacal medium copper(II) ions react with cuprizone to form a blue complex that is determined photometrically.

2. Measuring range and number of determinations

Measuring range	Number of determinations
0.05 - 8.00 mg/l Cu	25

For programming data for selected photometers / spectrophotometers see www.service-test-kits.com.

3. Applications

This test measures only copper(II) ions. Samples must be decomposed by digestion before undissolved or complex-bound copper can be measured (see section 6). When hydrogen peroxide is added, copper(I) ions are measured at the same time (see section 6).

Sample material:
Groundwater, surface water, and seawater
Drinking water
Wastewater and percolating water
Food after appropriate sample pretreatment

4. Influence of foreign substances

This was checked in solutions containing 3 and 0 mg/l Cu. The determination is not yet interfered with up to the concentrations of foreign substances given in the table.

Concentrations of foreign substances in mg/l or %							
Ag^+	100	Fe^{3+}	100	NO_2^-	1000	Ascorbic acid	10
Al^{3+}	1000	Hg^{2+}	100	Pb^{2+}	100	**EDTA**	**5**
Ca^{2+}	100	Mg^{2+}	1000	PO_4^{3-}	1000	Surfactants[1]	5 %
Cd^{2+}	100	Mn^{2+}	1000	S^{2-}	**0,1**	Na-acetate	20 %
CN^-	**0,1**	MoO_4^{2-}	1000	SiO_3^{2-}	100	NaCl	15 %
Cr^{3+}	**10**	NH_4^+	1000	Sn^{2+}	100	$NaNO_3$	15 %
$Cr_2O_7^{2-}$	100	Ni^{2+}	100	Zn^{2+}	100	Na_2SO_4	15 %

[1] tested with nonionic, cationic, and anionic surfactants

5. Reagents and auxiliaries

Please note the warnings on the packaging materials!
The test reagents are stable up to the date stated on the pack when stored closed at +15 to +25 °C.

Package contents:
1 bottle of reagent Cu-1K
25 reaction cells
1 sheet of round stickers for numbering the cells

Other reagents and accessories:
Nitric acid 65 % for analysis EMSURE®, Cat. No. 100456
Spectroquant® Crack Set 10C, Cat. No. 114688
+ thermoreactor
or
Spectroquant® Crack Set 10, Cat. No. 114687
+ empty cells 16 mm with screw caps (25 pcs), Cat. No. 114724
+ thermoreactor
Hydrogen peroxide 30 % H_2O_2 (Perhydrol®) for analysis EMSURE®, Cat. No. 107209
MQuant™ Copper Test, Cat. No.110003, measuring range 10 - 300 mg/l Cu
MColorpHast™ Universal indicator strips pH 0 - 14, Cat. No. 109535
MColorpHast™ pH-indicator strips pH 5.0 - 10.0, Cat. No. 109533
Sodium hydroxide solution 1 mol/l TitriPUR®, Cat. No. 109137
Sulfuric acid 0.5 mol/l TitriPUR®, Cat. No. 109072
Spectroquant® CombiCheck 30, Cat. No. 114677

Pipette for a pipetting volume of 5.0 ml

6. Preparation

- Analyze immediately after sampling. Otherwise preserve with nitric acid 65 % (1 ml nitric acid per 1 l of sample solution).
- Undissolved or complex-bound copper can be determined after pretreatment of the sample using one of the Spectroquant® Crack Sets.
- To determine copper(I) ions add a few drops of Perhydrol® to the sample and mix.
- Check the copper content with the MQuant™ Copper Test. Samples containing more than 8.00 mg/l Cu must be diluted with distilled water **prior to** digestion.
- **The pH must be within the range 4 - 10.** Adjust, if necessary, with sodium hydroxide solution or sulfuric acid.
- Filter turbid samples.

7. Procedure

Pretreated sample (**10 - 30 °C**)	5.0 ml	Pipette into a reaction cell, close the cell, and mix. **The pH must be within the range 7.0 - 9.5.** Check with MColorpHast™ pH-indicator strips.
Reagent Cu-1K	5 drops[1]	Add, close the cell tightly, and mix.
Leave to stand for 5 min (reaction time), then measure the sample in the photometer.		

[1] **Hold the bottle vertically while adding the reagent!**

Notes on the measurement:

- For photometric measurement the cells must be clean. Wipe, if necessary, with a clean dry cloth.
- Measurement of turbid solutions yields false-high readings.
- The pH of the measurement solution must be within the range 7.0 - 9.5.
- The colour of the measurement solution remains stable for at least 30 min after the end of the reaction time stated above. (After 45 min the measurement value would have diminished by 5 %.)
- In the event of copper concentrations exceeding 50 mg/l, other reaction products are formed and false-low readings are yielded. In such cases it is advisable to conduct a plausibility check of the measurement results by diluting the sample (1:10, 1:100).

8. Analytical quality assurance

recommended before each measurement series
To check the photometric measurement system (test reagents, measurement device, handling) and the mode of working, Spectroquant® CombiCheck 30 can be used. Besides a **standard solution** with 2.00 mg/l Cu^{2+}, this article also contains an **addition solution** for determining sample-dependent interferences (matrix effects).
Additional notes see under **www.qa-test-kits.com**.

Characteristic quality data:

In the production control, the following data were determined in accordance with ISO 8466-1 and DIN 38402 A51:

Standard deviation of the method (mg/l Cu)	± 0.034
Coefficient of variation of the method (%)	± 0.84
Confidence interval (mg/l Cu)	± 0.08
Number of lots	26

Characteristic data of the procedure:

Sensitivity: Absorbance 0.010 A corresponds to (mg/l Cu)	0.04
Accuracy of a measurement value (mg/l Cu)	max. ± 0.14

For quality and batch certificates for Spectroquant® test kits see the website.

9. Notes

- Reclose the reagent bottle immediately after use.
- **Information on disposal can be obtained at www.disposal-test-kits.com.**

Merck KGaA, 64271 Darmstadt, Germany,
Tel. +49(0)6151 72-2440
www.analytical-test-kits.com

EMD Millipore Corporation, 290 Concord Road,
Billerica, MA 01821, USA, Tel. +1-978-715-1335