ANDalyze
Real-Time Water Testing Powered by DNA

# Analytical Data Sheet for ANDalyze Copper (0.6 - 3 ppm) Sensor

***Detection of copper in drinking water*** ***0.6-3 ppm***

ANDalyze's proprietary Catalytic DNA sensor for copper uses a DNAzyme reaction that fluoresces in the presence of the target contaminant, copper. The fluorescence of the reaction is measured using the ANDalyze fluorimeter to determine the concentration of free copper (present as $Cu^{2+}$) in solution and is reported in parts per million (ppm) of copper.

*Note that a different sensor pack (Part Number: AND012) is available for detecting copper in the range of 40 – 200 ppb range.*

## Performance

Copper dilutions were prepared in test buffer. The Copper sensor kits and the ANDalyze fluorimeter were used to perform the copper test at each dilution (five replicates).
***Note:*** *The protocol for using this sensor kit requires mixing 1 part of test solution with 29 parts of buffer, thus test solution is diluted 30 times during the test. The fluorimeter screen displays the results as concentration of copper in the test solution.*

**Materials Used**

ANDalyze Fluorimeter

Copper (High) Sensor kit (Part Number: AND013)

Standard Copper Solutions

**Limit of Detection (LOD)**

0.2 ppm copper

Based on 3 sigma method

**Limit of Quantification (LOQ)**

0.5 ppm copper

Based on 10 sigma method

**Linear Detection Range**

0.3 – 3 ppm copper

**Precision**

Standard: 1.2 ppm $Cu^{2+}$

95% confidence limits: 0.9-1.5 ppm $Cu^{2+}$

**Coefficient of Variation (CV)**

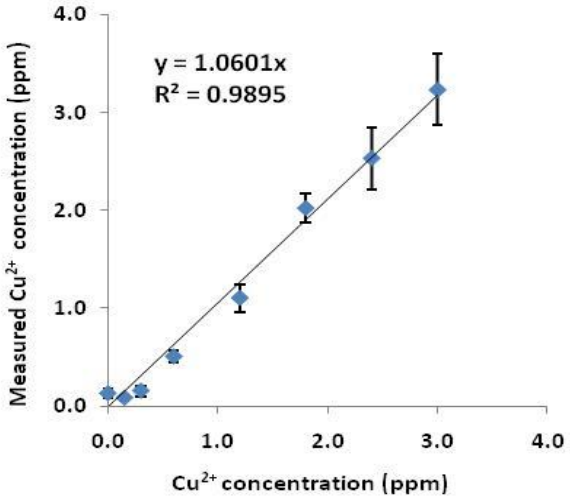
0.6–3 ppm $Cu^{2+}$ ±20% or 0.3ppm, whichever is greater
**Note:** This data is for tests in DI water. Environmental and other matrix variations will be higher.

**All specifications are subject to change without notice.**

**Graphs**

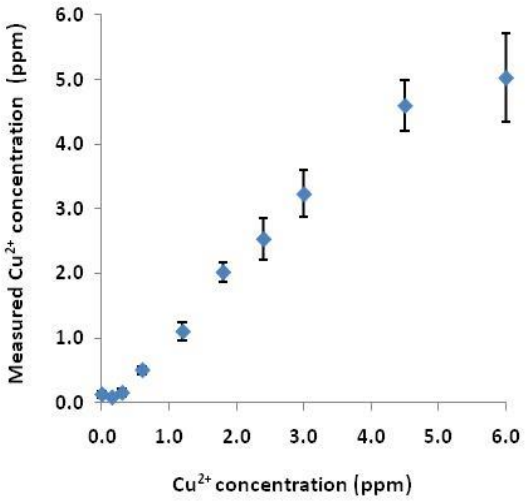
The plot depicts the average measured copper concentration as displayed on ANDalyze fluorimeter (y-axis) vs. the known concentration of the copper standards (x-axis). Error bars depict the standard deviation from at least five measurements.

**Figure 1**




Linear detection range is 0.3 – 3 ppm copper (Figure 1). For higher concentration of copper (tested up to 6 ppm copper), the accuracy decreases (Graph 2). *Note that a different sensor pack (Part Number: AND012) is available for detecting copper in the range of 40-200 ppb copper.*

**Figure 2**



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## Interference

Interference tests were done with a 1.5 ppm copper solution plus the potential interfering ion. The interference tolerance levels represent the concentration above which the lead concentration is changed to ±10%. Data represents an average of at least three replicates. For each interference test, an on-site calibration with the particular water matrix (containing the interfering ion) was performed.

| Interfering ion | Interference level |
|---|---|
| Calcium, $Ca^{2+}$ | 15000 ppm |
| Magnesium, $Mg^{2+}$ | 6000 ppm |
| Zinc, $Zn^{2+}$ | 150 ppm |
| Aluminum, $Al^{3+}$ | 9 ppm |
| Copper, $Cu^{2+}$ | 30 ppm |
| Iron, $Fe^{3+}$ | 30 ppm |
| Iron, $Fe^{2+}$ | 1.5 ppm |
| Cadmium, $Cd^{2+}$ | 150 ppm |
| Mercury, $Hg^{2+}$ | 9 ppm |
| Manganese, $Mn^{2+}$ | 300 ppm |
| Lead, $Pb^{2+}$ | 3 ppm |
| Ammonium, $NH_4^+$ | 7500 ppm |
| Carbonate, $CO_3^{2-}$ | 15000 ppm |
| Phosphate, $PO_4^{3-}$ | 1500 ppm |
| Chloride, $Cl^-$ | 2000 ppm |
| Nitrate, $NO_3^-$ | 9000 ppm |
| Sulfate, $SO_4^{2-}$ | 15000 ppm |

## Temperature Range

ANDalyze test kits work when the sample is in the 17 – 35 ˚C (63 – 95 ˚F) temperature range. However, the most accurate and precise results are obtained if the sample is n the range of 20 - 25 ˚C (68 – 77 ˚F). A change in temperature of several degrees will require an on-site calibration to be performed.

## Storage and Shelf Life

The shelf life is 1 year (12 months) from manufacture date for the sensors if stored in cool, dry area away from direct sunlight at temperature less than 23°C (73°F); however the shelf life of the product is limited by the liquid buffer supplied with the sensor kit which is only 6 months from manufacture date. The life of the liquid buffer can be improved if refrigerated/frozen for up to one year from manufacture date.