

Analytical Data Sheet for ANDalyze Zinc Sensor

Detection of zinc in drinking water

1-15ppm

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

Performance

Zinc dilutions containing 0, 0.5, 1, 2, 5, 10, 15, 20, 25 ppm Zn^{2+} were prepared in DI water. The Zinc Sensor Kit and the ANDalyze Fluorimeter were used to perform the zinc tests at each dilution (Five replicates were made for each test)

Materials Used

ANDalyze Fluorimeter
Zinc Sensor Kit (Part Number: AND015)
Standard Zinc Solutions

Limit of Detection (LOD)

0.3 ppm Zn^{2+}
Based on 3 sigma method

Limit of Quantification (LOQ)

1 ppm Zn^{2+}
Based on 10 sigma method

Linear Detection Range

1 – 15 ppm Zn^{2+}

Precision

Standard: 5 ppm Zn^{2+}
95% confidence limits: 4 – 6 ppm Zn^{2+}

Coefficient of Variation (CV)

1 – 15 ppm $\text{Zn}^{2+} \pm 20\%$ or 1ppm, 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 in Figure 1 depicts the average measured average measured Zn^{2+} concentration as displayed on the ANDalyze fluorimeter (y-axis) vs. the known concentration of the zinc standards (x-axis). Error bars depict the standard deviation from at least five measurements.

Figure 1

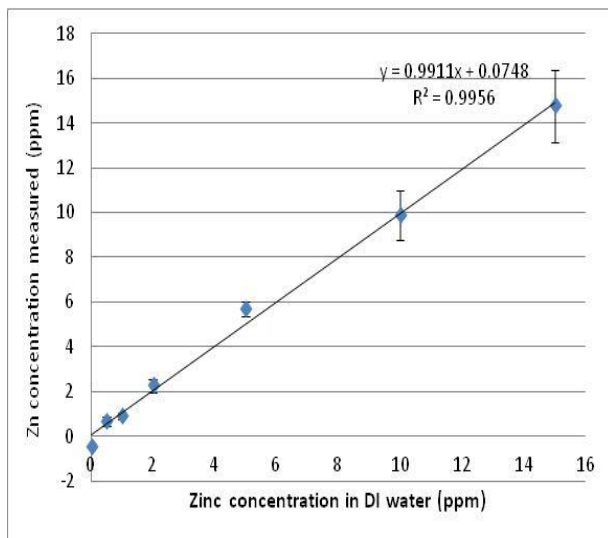
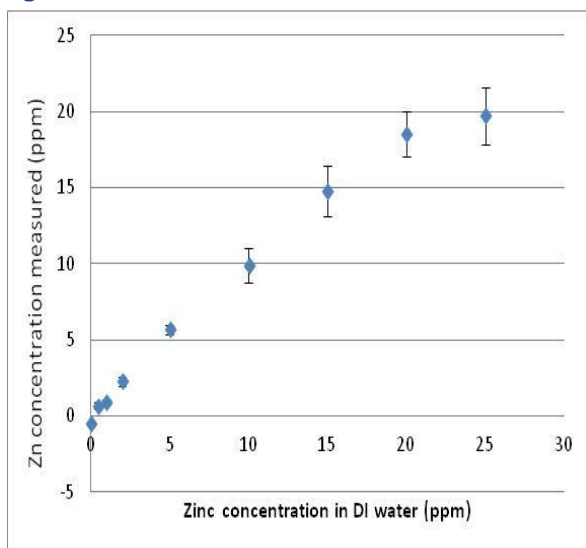


Figure 2 shows the linear range of 0 – 15 ppm Zn^{2+} . For higher concentrations of Zn^{2+} (tested up to 25 ppm Zn^{2+}), the accuracy decreases (Graph 2). Samples containing higher than 15 ppm Zn^{2+} can be diluted 1:1 and re-analyzed.

Figure 2



Interference

Interference tests were done with a 5ppm Zn^{2+} solution plus the potential interfering ion. The interference tolerance levels represent the concentration above which the zinc concentration is changed to $\pm 20\%$. 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+}	300 ppm
Magnesium, Mg^{2+}	300 ppm
Aluminum, Al^{3+}	100 ppb
Copper, Cu^{2+}	100 ppb
Iron, Fe^{3+}	80 ppb
Lead, Pb^{2+}	30 ppb
Cadmium, Cd^{2+}	20 ppm
Manganese, Mn^{2+}	10 ppm
Ammonium, NH_4^+	1000 ppm
Carbonate, CO_3^{2-}	250 ppm
Phosphate, PO_4^{3-}	300 ppm
Sulfate, SO_4^{2-}	2000 ppm
Nitrate, NO_3^-	3000 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 in 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.