Conclusions and Discussion

The [AR94] selection data shows the [AR94] in the pair of solutions containing 1.4×10^{-4} M [AR94] and 2.6×10^{-5} M [Pb^{2+}] (vial 4) resulted in the greatest maximum fluorescence intensity difference. Therefore, the [AR94] in that vial would allow for measurable differences in fluorescence intensities for lower [Pb^{2+}]. The fluorescence vs. [Pb^{2+}] data suggests the linearized exponential model is the best fit for it due to resulting in the highest R^2 value of 0.962. That means about 96.2% of the variation in the natural log of the fluorescence intensity ratios is explained by the variation in [Pb^{2+}]. The linear regression t-test run on the data (n = 30 samples) at the 95 % confidence level resulted in a p-value of about 0.00 which is less than the critical value of 0.05. Therefore, the data supports the hypothesis by providing statistically significant evidence that there is a positive linear relationship between the natural log of the fluorescence intensity ratios and [Pb^{2+}]. Additionally, the 95% confidence interval for the slope of the linear regression line is greater than zero, which further supports this conclusion. The selectivity and sensitivity data shows that AR94 can be used as a selective sensor for lead. Its sensitivity is high but not high enough to match the EPA's action level for lead. Once [Pb^{2+}] is low enough visual observations are insufficient to detect Pb^{2+} using AR94 and alternative, more precise methods such as fluorescence spectroscopy should be used. However, for higher concentrations, AR94 can be used as a visual indicator for [Pb^{2+}] as shown by the color change of the AR94 dyed paper strips. Finally, the Job plot data suggest AR94 forms a complex with Pb^{2+} such that the complex has a 1 to 2 AR94 to Pb^{2+} ratio. Future work to

verify the molar ratio of complex could include growing crystals of the complex and measuring FTIR spectra and performing X-ray diffraction analysis. In addition, a color scale could be constructed to relate the color of the AR94 dyed paper strips to [Pb^{2+}]. Finally, [AR94] can be varied to determine what [AR94] produces the strongest association with Pb^{2+} and therefore has the highest K_{SV} value.