

As part of the optimization of a sensitive assay for methanol in seawater, I hypothesized that the synthesis of a spectroscopically active chromophore, diacetyldihydrolutidine (DDL), from formaldehyde could be detected at low concentrations via a low-cost but sensitive spectroscopic assay. DDL is synthesized via the reaction of acetylacetone and ammonia with formaldehyde in aqueous media. To determine limits of detection, sensitivity, and linear range, standard curves were then prepared from the signals detected by formaldehyde standards of various concentrations. By changing standard-to-reagent ratio, adjusting methods of standard preparation, and testing both fluorescence and absorbance spectroscopy, the sensitivity of this reaction was optimized for a seawater medium. Ultimately, while absorbance curves showed a precise linearity that strongly obeyed Beer-Lambert's Law, the limit of detection was tenfold higher than the preliminary LOD of fluorescence spectroscopy. However, the plausible degradation of formaldehyde standards in seawater media, as well as quenching effects at lower concentrations, merit further investigation of the fluorometric method and necessitate improvement of the method. The process of coupling an enzymatic oxidation of methanol to the measured transformation of formaldehyde remains an upcoming challenge.