

# A COLORIMETRIC SENSOR ARRAY FOR AQUEOUS ANALYSES

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Molecular recognition of organic compounds in aqueous solutions is inherently challenging, due to the potential interference from the very high concentration of water. This thesis describes a simple colorimetric sensor array that probes a wide range of chemical properties. By printing hydrophobic dyes on a hydrophobic membrane, sensor arrays are easily prepared with substantial chemical selectivity for the identification and quantification of various chemicals dissolved in water with a concentration range of 0.1 M to 1  $\mu$ M. Upon immersion in aqueous solutions, digital imaging of the dye array before and after exposure to an analyte provides a color change profile that is a fingerprint for the chemical components of the solution. Chemometric and statistical analyses, including principal component analysis (PCA) and hierarchical clustering analysis (HCA) were used to analyze the digital databases. This technique has been successfully applied to the analyses of various commercial beverages as complex mixtures, including sodas, beers and teas. The great potential of this sensor array technique on the quality control/quality assurance purposes in the food and beverage industry has also been demonstrated.