



Detection of Cyanide in Water by Environmentally Friendly Colorimetry with Digital Image Analysis

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An expeditious digital image colorimetry was applied to detect cyanide in water. The environmentally friendly colorimetric species was synthesized by adding borontrifluoride to the carbonyl group of curcumin, an extract from turmeric. Its reaction mechanism relied on the deprotonation of the hydroxyl group of BF₂-curcumin. The orange-red color of BF₂-curcumin solution changed to blue to indicate the presence of cyanide ions. A free-of-charge application program installed on a mobile phone was successfully employed for the colorimetric analysis to obtain analytical data in the form of Red Green Blue (RGB) values. Parameters affecting to the reaction, i.e. the sample pH, curcumin concentration and reaction time, were optimized to obtain the highest concentration of product. Relationship between cyanide ion concentration and RGB intensities (I_R, I_G, I_B) was calibrated to quantify CN⁻ concentration. The obtained RGB intensity was inversely proportional to the concentration of cyanide. The optimum reaction was 1mM BF₂-curcumin concentration, pH 9 of sample and 3 minutes reaction time. A wide linear range (0.2-7mgL⁻¹) was achieved and the method validation point out good intra- and inter-day precision (1.41-2.0%RSD and 0.73-2.2%RSD respectively).

Keywords: Cyanide; mobile phone; RGB Color system; Curcumin, Colorimetry