

DEVELOPMENT OF EMBEDDED SYSTEM BASED COLORIMETER FOR THE ANALYSIS OF NICKEL: AN ALGORITHMIC APPROACH

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ABSTRACT

The hardware and software of an embedded system based colorimeter, has developed, built and tested. It has designed to detect and measure automatically the contents of nickel in water. The light dependant resistor (LDR) and high flux light emitting diode (LED) were used as detector and source of light respectively. A constant current LED driver was constructed with the use of two transistors. The effect of dark current of LDR was compensated by use of hardwired potential divider network. The microcontroller PIC18F4550 was used to develop embedded system for the control, measurement, and analysis of absorption of light. An algorithm and C- language program have been written for the purpose of adjustment of zero absorption for the no-analyte reference, measurement of transmitted light intensity and its conversion into absorbance, detection of characteristics wavelength, calculation of absorptivity coefficient from the standard analyte solutions, and finally estimation of unknown concentration of nickel. The colorimeter is portable, easy to use, and it can be used for the detection of other metallic elements.

KEYWORDS: Colorimeter, LED, LDR, Microcontroller