A Study on the Production of Kit to Detect Nickel Ion in Waste Water Using Luminol

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The purpose of this research is to develop an easy and inexpensive kit that detects heavy metal ions in drainage and monitors the degree of water pollution. It was assumed that Luminol's luminous time would vary depending on the types of heavy metal ions and the type of sodium compounds. Therefore, using image analysis and fluorescent spectrophotometer, Luminol's luminous time and intensity were measured with two variables: the types of heavy metal ions (Pb^{2+}, Cd^{2+}, Zn^{2+}, Ni^{2+}, Mn^{2+}) and sodium compounds (Na_2CO_3, NaOH, Na_2HPO_4, $NaBO_3$). As a result, luminol with sodium carbonate and nickel ions were reacted uniquely long, and it was decided that a kit to detect nickel selectively could be produced. Next, the concentration of nickel ions was divided into six grades, and a kit was designed to visually represent each grade by the LED colors. For this, 1) The luminous values were measured using a light sensor by reacting a nickel ionic solution of each grade with a luminol solution. 2) Based on the values, a program was encoded using Arduino and the kit to represent the nickel ion concentration in six LED colors was produced. This kit has strengths: 1) Through LED color changes using Arduino, it is possible to identify the risk of heavy metals visually without additional numerical analysis, while existing heavy metal concentration measuring devices are difficult for lay people to decide the level of risk by just looking at the figures. 2) It's cheap; existing kits for general use are priced at KRW50,000 (USD60) per unit though they lack accuracy; the kits for experts at 10 million won (USD8,330) per unit with higher accuracy. However, the kits in this research are predicted to be reduced at KRW2,100~2,300 (USD1.8) per unit and at KRW 1,500~1,700 (USD1.3) in mass production.