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Abstract
Hydrogen peroxide is widely used in the industry and food preservation, and therefore developing a hydrogen peroxide sensor which can detect the hydrogen peroxide rapidly and conveniently is an important research subject. In recent years, diabetes has become one of the top ten causes of death for the people in Taiwan. Therefore developing a rapid and convenient glucose biosensor also has become an important research subject. A study was conducted to use the Meldola's Blue to modify the carbon paste electrode. Because the Meldola's Blue possesses the excellent catalytic characteristic it can be used with the carbon paste and carbon powders which possess the high conductivity to make the carbon paste electrode and to elevate the responding current of hydrogen peroxide. The responding current of hydrogen peroxide is detected in the phosphate buffer solution (PBS), and then the concentration of hydrogen peroxide can be determined. The glucose and oxygen can be catalyzed by the glucose oxidase to produce the gluconic acid and hydrogen peroxide, and therefore, as the concentration of hydrogen peroxide can be determined, the concentration of glucose can also be determined. At 30℃, -300 mV operating potential, 500 rpm stirring rate and in PBS buffer solution (pH = 7.4), the results of experiments showed that the optimum weight ratio for Meldola's Blue : carbon powders : carbon paste was 2 : 15 : 15.
A study of factorial design involving three factors (operating potential, stirring rate, and pH value of PBS) and two levels was performed to analyze the effect of reaction parameters on the sensitivity and average responding current of detection of hydrogen peroxide for the carbon paste electrode modified with the Meldola's Blue. The results showed that the main effect of operating potential (F = 38.366, p value ＜ 0.05), the main effect of stirring rate (F = 7.842, p value ＜ 0.05), and the main effect of pH value (F = 8.225, p value ＜ 0.05) were significant on the sensitivity. The main effect of operating potential (F = 36.521, p value ＜ 0.05), the main effect of stirring rate (F = 7.326, p value ＜ 0.05), and the main effect of pH value (F = 7.635, p value ＜ 0.05) were also significant on the average responding current. The results showed that the optimum operating conditions for this research were operating potential = -300 mV, stirring rate = 500 rpm, and pH = 7.4.
At 30℃, -300 mV operating potential, 500 rpm stirring rate and in 0.05 M PBS buffer solution (pH = 7.4) , when the carbon paste electrode was modified with the Meldola's Blue [Meldola's Blue : carbon powders : carbon paste = 2 ： 15 ： 15 (weight ratio)] , the detection limit was 0.02 mM H_2O_2 , the linear range was 0.02～1.4 mM H_2O_2 , R^2 = 0.9994 , the sensitivity was 159.39

U+B5A/cm2 · mM H2O2, and the average responding current was 2.54 μA.
Advisory Committee Hau Lin - advisor

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