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Abstract ABSTRACT
Nowadays, sometimes the hydrogen peroxide is used in the food industry for the purpose of preservation and therefore, developing a hydrogen peroxide sensor is an important research subject. In recent years, the diabetes has become one of the top ten causes of death for the people in our country. Therefore, developing a glucose biosensor which can detect the glucose rapidly and conveniently is also an important research subject. The glucose and oxygen can be catalyzed by the glucose oxidase to produce the gluconic acid and hydrogen peroxide. A study was conducted to use the ferrocene to modify the carbon paste electrode. Because the ferrocene(Fe(C5H5)2) possessed the excellent catalytic characteristic, it can be used with the graphite carbon powders which possessed the excellent 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 the hydrogen peroxide can be obtained and consequently, the concentration of the glucose can be determined.
The experimental design is used widely in many fields and it is an important tool for the test and the improvement of the process of industrial production. 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 ferrocene. The results of the calculating the effects showed that the sensitivity and average responding current at -200 mV operating potential were higher than those at -50 mV operating potential, the sensitivity and average responding current at 500 rpm stirring rate were higher than those at 300 rpm stirring rate, and the sensitivity and average responding current at pH=7.4 were higher than those at pH=4.0. The SPSS(Statistical Package for the Social Science) was used to perform the analysis of variance. The results showed that the main effect of operating potential ($F = 151.494$, p value < 0.05) , the main effect of stirring rate ($F = 7.288$, p value < 0.05) and the main effect of pH value ($F = 94.461$, p value < 0.05) were significant on the sensitivity. The main effect of operating potential ($F = 141.515$, p value < 0.05) , the main effect of stirring rate ($F = 7.487$, p value < 0.05) and the main effect of pH value ($F = 89.901$, p value < 0.05) were also significant on the average responding current. The results showed that the optimum operating condition for this research is operating potential = -200 mV , stirring rate = 500 rpm and pH = 7.4.

At 30℃, -200 mV operating potential, 500 rpm stirring rate and in 0.05M PBS buffer solution (pH = 7.4) , when the carbon paste electrode was modified with the ferrocene [ferrocene : graphite carbon powder = 3 : 7 (weight ratio)] , the detection limit was 0.02 mM H2O2 , the linear range was 0.02～1.2 mM H2O2 , R2 = 0.9998 and the sensitivity was 161.43U+B5A/cm2 · mM H2O2.
Advisory Committee Lin,Hau - advisor

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