

Urea Biosensor Development using Immobilized Urease and Light Dependent Resistor

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Abstract	<p>The existence of urea in human's body becomes an important biological parameter for kidney disease identification. Development of urea analysis methods are widely studied, including the using a biosensor. This study was developed a urea biosensor using immobilized urease in alginate matrix and a light dependent (LDR) as continuous color change detector. The color detection was based in the reaction of urea with urease to produce ammonia which finally identified using bromothymol blue as color indicator. The LDR, a cheap electronic component was controlled by Arduino microcontroller to monitor the color change related to urea concentration. The result showed the optimum reaction time was 4 minutes with the best linearity was obtained by red color change with urea concentration ($y = 0.42x + 39.34$, $R^2 = 0.991$). Furthermore, the limit of detection of this developed urea biosensor was 0.35 mM and the limit of quantification was 1.17 mM. The linear range of the urea biosensor was 1.17 mM to 42.65 mM. The immobilized urease in alginate bead could be used up to 11 times. Urea detection in blood samples showed no significant differences between the results of the clinical analysis with the results of developed urea biosensor with a correction value of 1.3.</p>
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