

Development Of The Ammonia Bio-Sniffer With Fmo3

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Ammonia is one of harmful substances in human body (normal level in blood: 30 – 80 µg/dl). The measurement of ammonia concentration is important in the fields of medical diagnosis and food industries. There are some methods for ammonia measurement by using absorptiometric analysis and ion electrode. However, they have some problems which are low selectivity respectively and vexatious complication. For this reason, its problem was discussed to solve by using enzyme and antibody have high selectivity of the biocatalyst.

Flavin containing monooxygenase (FMO) as one of the drug metabolizing enzymes in human liver has been reported to catalyze the oxidation of nitric compounds, especially tertiary amines [1]. In this research, an amperometric ammonia sensor was developed with FMO type-3 (FMO3), and its characteristics were evaluated.

The FMO3 biosensor was possible to use in the amperometric measurement of ammonia by detecting the oxygen consumption induced by FMO3 enzymatic reaction. And an application of a substrate regeneration cycle by coupling the monooxygenase with L-ascorbic acid (AsA) as reducing reagent could successfully amplify the output current.

Typical response curve of the FMO3 biosensor for ammonia solution were increased rapidly following the injection of the ammonia solution to reach the steady state current. The sensor outputs were related to the concentrations of ammonia solution from 0.09 to 21.6 mmol/l, with a correlation coefficient of 0.994, using 10.0 mmol/l AsA.

And the FMO3 biosensor was applied to measurement of ammonia vapor as a bio-sniffer. The sensor outputs were related to the concentration of the ammonia vapor. The FMO3 biosensor showed good selectivity attributable to the enzyme specificity. The biosensor based on FMO3 was conveniently applied for ammonia measurement.

REFERENCES

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