

Characteristics of Acetylcholine Sensor Using an ISFET and Its Application to Chemical Analysis

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The characteristics of an acetylcholine sensor based on an ion-sensitive field-effect transistor (ISFET) as a pH sensor using immobilized acetylcholine esterase (AChE) in the BSA membrane, are reported for the chemicals measurable by the sensor. The AChE-ISFET sensor's detection range for acetylcholine was found to be 5×10^{-5} – 10^{-2} M. The response of the enzyme sensor depended on pH (optimal pH 8.0) and the concentration of the buffer solution. New data on the analysis of chemicals by means of the present acetylcholine sensor based on the inhibition of the immobilized AChE, are reported. Reactivation of immobilized AChE after inhibition with an irreversible inhibitor was carried out using a mixture of acetylcholine and pyridine-2-aldoxime methiodide (PAM). Detection of Trichlorfon (DEP) and methomyl was possible in the ranges of 5×10^{-5} – 10^{-1} M and 10^{-2} – 5×10^{-1} M, respectively.

1. Introduction

Environmental pollution by toxic chemicals has become one of the world's most serious problems. Pesticide compounds are used worldwide as insecticides, fungicides and herbicides. In particular, monitoring by means of sensors is increasingly becoming necessary for health-risk assessment of drinking water polluted by pesticides from golf links or agricultural land.⁽¹⁾ At present, the chemical analysis