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# Detection of ethanol in food: A new biosensor based on bacteria

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## ABSTRACT

A microbial biosensor for determination of ethanol has been developed. The microbial ethanol biosensor comprises a *Methylobacterium organophilium*-immobilized eggshell membrane and an oxygen (O<sub>2</sub>) electrode. The microbial biosensor responds linearly to ethanol in the range 0.050–7.5 mM with a detection limit of 0.025 mM ( $S/N = 3$ ) and the response time is 100 s. The optimal loading of bacterial cells on the biosensor membrane is 40 mg (wet weight). The optimal working conditions for the microbial biosensor are pH 7.0 phosphate buffer (50 mM) at 20–25 °C. The interference test, operational and storage stability of the biosensor are studied in detail. Finally, the biosensor is applied to determine the ethanol contents in various alcohol samples and the results are comparable to that obtained by a gas chromatographic method. Our work demonstrates that the proposed microbial biosensor is a reliable method to determine the ethanol content in wine samples.

**Keywords:** Oxygen electrode; *Methylobacterium organophilium*; Microbial biosensor; Ethanol; Eggshell membrane

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