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## Whole-cell biosensor for determination of methanol

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### Abstract

A novel biosensor for determination of methanol has been developed. It comprises a *Methylobacterium organophilium*/gold nanoparticles immobilized eggshell membrane and a commercial oxygen sensor. The response mechanism is based on the respiratory activity of the bacterial cells with a concomitant consumption of dissolved oxygen on exposure to methanol in the sample. The biosensor displays a linear response to methanol in the range 0.050–2.5 mM with a detection limit of 0.047 mM ( $S/N = 3$ ) and a relative standard deviation of 2.3%. The response time is less than 60 s at ambient conditions. The optimal working conditions for the microbial biosensor are pH 7.0 phosphate buffer (20 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 methanol contents in the apple juices and the results are comparable to that obtained by gas chromatographic method. Our proposed biosensor provides a convenient, simple and reliable method to determine methanol content in real samples.

**Keywords:** *Methylobacterium organophilium*; Biosensor; Gold nanoparticles; Eggshell membrane

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