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Title : An amperometric biosensor based on alanine dehydrogenase for the determination of low level of ammonium ion in water

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Abstract : An amperometric electrochemical biosensor has been developed for ammonium (NH₄⁺) ion detection by immobilising alanine dehydrogenase (AlaDH) enzyme in a photocurable methacrylic membrane made up of poly(2-hydroxyethyl methacrylate) (pHEMA) on a screen-printed carbon paste electrode (SPE). The current detected was based on the electrocatalytic oxidation of nicotinamide adenine dinucleotide reduced (NADH) that is proportional to the consumption of NH₄⁺ ion whilst enzymatic amination of AlaDH and pyruvate is taking place. The biosensor was operated amperometrically at a potential of +0.6V and optimum pH 7. The NH₄⁺ biosensor demonstrated linear response to NH₄⁺ ion concentration in the range of 0.031-0.02mg/L with a limit of detection (LOD) of 8.52g/L. The proposed method has been successfully applied to the determination of NH₄⁺ ion in river water samples without any pretreatment. The levels of possible interferences in the waters were negligible to cause any interference on the proposed method. The analytical performance of the biosensor was comparable to the colorimetric method using Nesslerisation but with much lower detection limit and linear response range at ppb level. Copyright © 2011 Tan Ling Ling et al.

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