An Amperometric Acetone Sensor by Using an Electro-Deposited Pb-Modified Electrode

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An amperometric acetone sensor was developed by using an electrodeposited Pb electrode in a sodium tartrate electrolyte. The major factors determining the electrode and sensing characteristics such as the applied potential, electrodeposition current density, electrodeposition temperature, agitation rate, and sensing temperature were explored. The best conditions for preparation of the electrodeposited Pb electrode were obtained at a 30 mA cm^{-2} electrodeposition current density and a 30 °C electrodeposition temperature. Additionally, the optimal sensing conditions are a 155 rpm agitation rate and 50 °C sensing temperature with the applied potential in the range from $-2.25 \sim -2.35$ V (*vs.* Ag/AgCl). The results also revealed that the electrodeposited Pb electrode has a good linearity between the response current and the acetone concentration. This type of acetone sensor has excellent selectivity and shows the highest sensitivity at 8 μA$ppm^{-1}cm^{-2}$.

Key words: Acetone, Sensor, Lead, Electrodeposited Pb, Amperometry