Short Communication

Preparation of Phosphate Ion-Selective Membrane Based on Silver Salts Mixed with PTFE or Carbon Nanotubes

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A sensitive phosphate sensor has been prepared by constructing a solid membrane disk consisting of variable mixtures of silver phosphate, silver sulfide, and PTFE (Type 1 membrane) or silver phosphate, silver sulfide and nanotube (Type 2 membrane). The ternary membranes exhibit greater selectivity over the wide range of concentration. The membrane with the composition of 50.00% PTFE; 41.66% \( \text{Ag}_3\text{PO}_4 \) and 8.33% \( \text{Ag}_2\text{S} \) was selected as our preferred membrane. The membranes exhibited linear potential response in the concentration range of \( 1 \times 10^{-1} \) to \( 1 \times 10^{-5} \) M. Their detection limit is about \( 5 \times 10^{-6} \) M. The membranes have a long lifetime and can be stored in air when they are not in use. The best performance for nanocomposite sensor was obtained with membrane of the following composition: 78.00% \( \text{Ag}_3\text{PO}_4 \); 20.00% \( \text{Ag}_2\text{S} \), and 2.00% carbon nanoparticles. The membrane had a slope of 32.6 mV toward \( \text{HPO}_4^{2-} \) ions in the range between \( 1 \times 10^{-1} \) and \( 1 \times 10^{-5} \) M with a detection limit of \( 5.45 \times 10^{-6} \) M. The proposed sensors were found to be applicable over a pH range between 3 and 7.

Keywords: ion selective electrode, monohydrogen phosphate, potentiometry, carbon nanotubes, PTFE.

FULL TEXT

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