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Polarographic determination of anticancer drug vitamin K_3 with direct and indirect methods/application to serum and K_3 injection solution

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Abstract: In this work, direct and indirect methods for determination of vitamin K_3 were developed using differential pulse polarography. The reaction between sulfite and the quinone (Q) form of vitamin K_3 was used for indirect determination, since the sulfite peak at -0.7 V is sharp and very reproducible in 0.1 M HAc NaAc (pH = 5.5). It was found that at pH 4.5-5.5, this reaction was quantitative and very fast when the temperature was 45 °C. For its direct determination, on the other hand, vitamin K_3 was standardized by the indirect method using standard sulfite as the reducing agent. The calibration graph for vitamin K_3 (in Q form), using the peak at -1.0 V in a HAc-NaAc medium with a pH of 5.5, was linear for concentrations ranging from 5 \times 10^{-7} to 3 \times 10^{-5} M, and the limit of detection (LOD) was 1.5 \times 10^{-7} M. The proposed methods were successfully applied to the determination of vitamin K_3 in a clinical injection solution and in blood serum.

Key Words: Vitamin K_3, sulfite, direct, indirect, differential pulse polarography

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