Nanoparticles Based Carbon Paste Electrodes for the Determination of Flupentixol Dihydrochloride: Application to Pharmaceutical Analysis and Pharmacokinetic Study

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Five different carbon paste electrodes were developed and applied for the electrochemical determination of flupentixol dihydrochloride. Sensor 1 was fabricated using a mixture of graphite powder and multiwall-carbon-nanotubes. Different additives were used to improve the performance and the sensitivity of the carbon paste electrode. Sensor 2 was developed using chitosan in addition to the graphite powder and the multiwall-carbon-nanotubes while sensor 3 was fabricated with the addition of calix[4]arene ionophore. Copper nanoparticles were incorporated in the membrane paste of sensor 4. Sensor 5 was fabricated using a mixture of copper nanoparticles, multiwall-carbon-nanotubes and calix[4]arene in a graphite paste. The studied carbon paste electrodes exhibited the best performance characteristics with slopes of 29.7, 28.8, 30.2, 30.7 and 30.8 (mV / concentration decade) and linear concentration ranges of 1.0×10^{-5} - 1.0×10^{-2} , 1.0×10^{-6} - 1.0×10^{-1} , 1.0×10^{-7} - 1.0×10^{-2} , 1.0×10^{-9} - 1.0×10^{-2} and 1.0×10^{-10} - 1.0×10^{-2} mol L⁻¹ for sensors 1, 2, 3, 4 and 5, respectively. The sensors linear ranges deviated from their ideal ranges after 40, 46, 58, 63 and 82 days for sensors 1, 2, 3, 4 and 5, respectively. All the proposed sensors were successfully used for the determination of flupentixol dihydrochloride in bulk, tablets dosage forms and human plasma samples.

Keywords: Flupentixol; copper nanoparticles; multiwall-carbon-nanotubes; pharmacokinetics; dissolution.

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