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Spectrophotometric determination of fenoprofen calcium drug in pure and pharmaceutical preparations. Spectroscopic characterization of the charge transfer solid complexes

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Abstract

Simple, accurate and robust spectrophotometric method was developed for determination of fenoprofen calcium drug (FPC). The proposed method was based on the charge transfer (CT) reaction of FPC drug (as n-electron donor) with 2,3-dichloro-5,6-dicyano-1,4-benzoquinone (DDQ), 2,4,6-trinitrophenol (picric acid, PA) or 1,2,5,8-tetrahydroxyanthraquinone (Quinalizarin, QZ) (as π-acceptors) to give highly colored charge transfer complexes. Different variables affecting the reaction such as reagent concentration, temperature and time have been carefully optimized to achieve the highest sensitivity. Beer's law was obeyed over the concentration ranges of 2-60, 0.6-90 and 4-30 μg mL^{-1} using DDQ, PA and QZ CT reagents, respectively, with correlation coefficients of 0.9986, 0.9989 and 0.997 and detection limits of 1.78, 0.48 and 2.6 μg mL^{-1} for the CT reagents in the same order. Elucidation of the chemical structure of the solid CT complexes formed via reaction between the drug under study and π-acceptors was done using elemental, thermal analyses, IR, ^{1}H NMR and mass spectrometry. X-ray diffraction was used to estimate the crystallinity of the CT complexes. Their biological activities were screened against different bacterial and fungal organisms. The method was applied successfully with satisfactory results for the determination of FPC drug in fenoprofen capsules. The method was validated with respect to linearity, limit of detection and quatification, inter- and intra-days precision and accuracy. The proposed method gave comparable results with the official method.

Key Words: Spectrophotometry, Fenoprofen calcium, DDQ, Picric acid, Quinalizarin, Charge transfer complexes.