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Determination of cefixime at gold nanoparticles modified carbon paste electrode

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Cefixime (Cef) is a semi synthetic and generally classified as a third-generation cephalosporin antibiotic for oral administration. It is used for the treatment of susceptible infections, including gonorrhea, otitis media, pharyngitis, lower respiratory-tract infections such as bronchitis andurinary-tract infections. Cef has been studied and determined by relatively few procedures such as spectrophotometric, fluorimetric, high performance liquid chromatographic and high performance thin layer chromatographic methods [1,2]. The widespread use of this compound and the need for clinical and pharmacological study require fast and sensitive analytical techniques to assay the presence of the drug in pharmaceutical dosage forms and biological samples. Electroanalytical methods have proved to be useful for development of very sensitive and selective methods for the determination of organic molecules, including drugs and related molecules such as cephalosporins in dosage forms and biological fluids [3].
Gold nanoparticles (GNPs), with large surface area, good biocompatibility, high conductivity and electrocatalysis characteristics, have been used to improve the detection limits in electrochemical studies [4,5]. They are also suitable for many surface immobilization mechanisms and can act as tiny conduction centers and can facilitate the transfer of electrons.
In this work we constructed a modified carbon paste electrode with gold nanoparticles as modifier and used for determination of Cef by square wave voltammetric method (SWV).
The optimization of the parameters that affected the square wave signals such as pH, deposition potential and time and the other experimental parameters was performed.
At the optimum conditions, the concentration of cef was determined using square wave anodic voltametry (SWAV) in a linear range of 1.0×10^{-8} to 2.0×10^{-4} mol L^{-1} with a correlation coefficient of 0.9997, and a detection limit of 3.0×10^{-9} mol L^{-1}, respectively. The modified electrode can be used for the determination of Cef spiked into urine samples, and excellent recovery results were obtained.

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Thermodynamic behavior of complexation process between 1,13-bis (8-quinolyl)-1,4,7,10,13-pentaoxatridecane with Sn^{2+} ion in some binary non-aqueous solvents

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Sience the first report of Moore and Pressman on the induction of the transport of potassium ions through the mitochondrial membrane by the antibiotic valinomycin a series of other naturally occurring and synthetic compounds (including crown ethers and cryptands) has been discussed as potential ion carriers in artificial and biological membranes[1].Cryptands (trade name Kryptofix) are cyclic or polycyclic molecules which contain three or more binding sites held together by covalent bonds. These molecules are three dimensional analogues of crown ethers[2].
The stability constant of 1:1(M:L) complexes of 1,13-bis(8-quinolyl)-1,4,7,10,13-pentaoxatridecane ligand (Kryptofix5) with Sn^{2+} ion , the Gibbs standard free energies (ΔG_c^o),the standard enthalpy changes (ΔH_c^o), and standard entropy changes (ΔS_c^o) for formation of these complexes in dioxin-acetonitril (AN) , dichlorometan-(AN) and methanol (MeOH)-(AN) binary solvent systems at different temperatures have been determined conductometrically.The conductance data show that the stiochimetry of the complexes formed between this ligand and Sn^{2+} ion is 1:1 (M:L) in solutions . the stability constant of the complexes were obtained from fitting of molar conductivity curves using a computer program GENPLOT . Standard enthalpies and standard entropies of the complex formation were obtained from the temperature dependence of the stability constant . In all cases , negative (ΔH_c^o) and positive (ΔS_c^o) values characterize the formation of Kryptofix5 complexe. The results obtained show that the stability of complex is governed by the solvent medium and the thermodynamic parameters ΔH_c^o, ΔS_c^o and ΔG_c^o are sensitive to the composition of mixed solvent . In addition , it was found that , at 25°c , the stability constant of the resulting 1:1 complex among various neat solvents used various in the order Dioxan >DCM >MeOH .The normaly stability constant (K_f) of Kryptofix5-Sn^{2+} complexes in Dioxan-AN , DCM-AN and MeOH-AN binary systems is related to the net changes of standard free energy , ΔG_c^o , standard enthalpy , ΔH_c^o , and standard entropy , ΔS_c^o , of complexation . From this function , important conclusions may be drawn about the various factors governing complex formation , such as salvation effects , the character of the coording bond and the changes in the structure that often take place during complex formation.

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Novel SiO_2@Cu_2O@Au core/shell/shell–chitosan–platinum nanocomposite catalysts for electrooxidation of methanol

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In recent decades, due to high-energy demands, fossil fuel depletions, and environmental pollution throughout the world [1], there has been an increasing interest in the development of fuel cells, because they can directly convert chemical energy to electrical energy with higher efficiency than other sources of