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Conductivity measurements to assess the effect of solvent on the dissociation of sodium salt of diclofenac

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Introduction: The literature offers several methods to estimate the dissociation constants of drugs that are very little soluble in water, and for which this parameter is a property of great relevance. The pk values are used in drug dispensing problems and development of dosage forms and can also be used to predict which pH will provide an optimal bioavailability by maintained a certain ratio of ionized and unionized form of the drug. In addition, allows you to predict the solubility of drugs in water by a simple relation involving the pH of the solution and the concentration of the drug. Since most anti-inflammatory drugs are very little soluble in water, the dissociation constants of the values found in the literature were obtained in water mixtures with an organic solvent, especially an alcohol, to provide a suitable solubility. **Objective:** The aim of this work is to estimate the dissociation constant of the sodium salt of diclofenac amphiprotic neutral solvents and solvent mixtures through conductivity measures. **Methods:** The conductivity of sodium salt of diclofenac was measured in ethanol, 2-propanol, methanol, water and ethanol-water mixtures in the range of concentration of 1 x 10^{-4} to 1 x 10^{-2} molL^{-1} the 25 $\pm$ 1 C. Dissociation constants of sodium diclofenac in solvents studied were calculated from the conductivity data using the Debye-Hückel-Onsager equation. The Debye-Hückel equation was used to calculate the average activity coefficient ($\gamma^2\pm$) of salt in each medium. The selected organic solvents were restricted to alcohols, because they are like water, i.e. amphiprotic and neutral and have great ability to dissolve Ionic compounds. **Results:** The dependence of molar conductivity with the square root of concentration for sodium diclofenac in the pure solvents showed a decrease in molar conductivity with the increase of the concentration of salt. This behavior can be explained in terms of the properties of the Ionic atmosphere. As the ions that form the Ionic atmosphere do not align with the movement of other ions, a spherical charge cloud is formed in front of the other ions. The overall effect is the shifting of the load center with the atmosphere of another ion movement. As the two charges are opposite, the result is a reduction in the movement of ions. For binary mixtures ethanol-water, molar conductivity solutions decreases with the increase in the proportion of ethanol in binary mixture, because the transfer of a proton a protonated ethyl alcohol molecule to another nearby is favored by the presence of water. Consequently the molar conductivity of salt of diclofenac is greater in the presence of the largest concentrations of water in ethanol/water mixture. Dissociation constants of salt of sodium diclofenac were calculated for each pure solvent. In methanol the pk value to sodium diclofenac was 1,93 (pk □ 2) which indicates that it is completely dissociated in this medium. The values obtained for the other solvents studied were larger than two. **Conclusion:** The increase in the concentration of sodium diclofenac in the pure solvents showed a decrease in molar conductivity. In ethanol-water binary mixtures, the molar conductivity of salt of diclofenac was greater in the presence of water concentrations above 70%. The dissociation constant of salt of sodium diclofenac calculated for each pure methanol solvent indicates that the salt is completely dissociated. The smallest value of the dissociation constant obtained in using 2-propanol, ethanol and water is mainly due to proton donor capacity of solvent.

Keywords: Sodium diclofenac, conductivity, dissociation constant.

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