Organotin(IV) compounds have been characterized to exhibit relatively high antitumour activity. Several authors have dealt a great attention on it and have tried to elucidate many aspects of these compounds such as: their structures, stability constants, binding sites, chelating donor atoms of a ligand and so forth. The structures adopted by the di- and trialkyltin(IV) ions in aqueous solutions appear to have linear C-Sn-C and planar skeletons, respectively. Information pertaining to the structure and behavior of these ions in solution at different pH has been the subject of many recent papers. These ions have rather unusual effects on the structure in water as solvent. There should be particularly pronounced ordering of water molecules in the equatorial plane of the dialkyltin(IV) ions because of the strong electrostatic field near the tin atom. In addition, the hydrophobic nature of the alkyl groups will tend to force more hydrogen bonding in the solvent around the axial positions.

Accepting the hypothesis that \( \text{R}_2\text{Sn}^{2+} \) and \( \text{R}_3\text{Sn}^+ \) are the usual active species for antitumour action of organotins, a good antitumour agent should be easily dissociable following administration to animals. This requires weak bonds between tin and the donor atom of the coordinated ligands, which are readily hydrolysable. If the compound is hydrolytically unstable, the \( \text{R}_2\text{Sn}^{2+} \) and \( \text{R}_3\text{Sn}^+ \) moieties will be released too soon, and if it is too stable, it may be released too slowly and consequently lower activity will be observed. Therefore, there is a relationship between the stability of the organotin compounds and their antitumour activity.

Organotin cations are considered to be acids, in the Lewis scale, of different hardness, depending on the groups bonded to the tin(IV). Consequently, they show a strong tendency to hydrolysis in aqueous solution, as demonstrated by several authors. Other studies on the interactions of organotin cations with O-donor ligands have been recently reported, confirming the results obtained previously in the hydrolysis investigations. Recently, we have synthesized two triorganotin(IV) that are not soluble.
in water but soluble in aqueous-organic solvent with higher percent of organic solvents. This work deals with the study of hydrolysis of \((\text{CH}_3)_2\text{C}_6\text{H}_5\text{Sn(IV)}\) and \((\text{C}_6\text{H}_5)_3\text{Sn(IV)}\) in different solution of water-ethanol systems to show how the solvents and their mixtures with various dielectric constants affect the hydrolysis reactions of the triorganotin(IV).

The hydrolysis of both triorganotins(IV) have been investigated at 25°C and different aqueous solutions of ethanol, using a combination of spectrophotometric and potentiometric techniques. The species formed together with their formation constants have been determined using the computer program Squad, over a wide pH range of 1-10. The hydrolysis constants at different media were analyzed in terms of Kamlet and Taft’s parameters. Single-parameter correlation of the formation constants, \(K_{11}\) and \(K_{12}\), versus \(\alpha\) (hydrogen-bond donor acidity), \(\beta\) (hydrogen-bond acceptor basicity), and \(\pi^*\) (dipolarity/polarizability) for both cases are relatively poor in all solutions, but multi-parameter correlation represents significant improvement with regard to the single-parameter models. In this work, we have also used the normalized polarity parameter, \(E_{TN}\), alone and in combination with the Kamlet-Taft’s parameter to find a better correlation of the formation constants in different aqueous solutions of ethanol.

References
