

### III

## P R E F A C E

The work described in this thesis was undertaken as a part of a general programme aimed at the synthesis and study of potential organotin biocides. Though almost all the compounds described here are active, some of them being extremely so, against bacteria and fungus, the present work is concerned more with their preparation and spectral behaviour than on the biocidal properties. This is because spectral studies furnish a lot of information on the structural aspect which serve as a guide for further work.

The thesis is divided into six chapters. A brief survey of the organotin chemistry is presented in chapter I while organotin carboxylates are reviewed with emphasis on their structural aspects in chapter II.

The synthesis of a number of new organotin carboxylates and their IR spectra constitute the subject matter of chapter III. All the compounds are organotin derivatives of either *o*- or *p*-aryl azo benzoic acid. By comparison of the IR spectra and spectrophotometric titration with  $\text{OH}^-$  of the *o*- and *p*-derivatives, organotin (*o*-aryl azo)benzoate]s have been shown to be chelate compounds in which  $-\text{COO}$  group forms a part of the chelate ring. Evidence for formulating the triorganotin *o*-(*o*-hydroxy benzene azo) benzoate]s as hexa coordinated triorganotin complexes has been presented. Triorganotin complexes are usually penta coordinated. The present work, thus, provides a few examples of the rare hexa coordinated  $\text{R}_3\text{Sn}$  compounds.

#### IV

The electronic spectra and effect of solvents on the absorption spectra are discussed in some detail in chapter IV. On the basis of solvent effects, the organotin derivatives of the aryl azo benzoic acids have been divided into tetra, penta and hexa coordinated compounds. The absorption spectra of the *para* aryl azo benzoates and *o*-(*o'*-hydroxy aryl azo) benzoates are not very much solvent dependent. But the absorption spectra of the penta coordinated *o*-aryl azo benzoates undergo dramatic change in solvents containing donor atoms. The effect has been interpreted in terms of the coordination of the solvent molecule to the tin atom leading to breakage of *azo*-*Sn* linkage.

Equilibrium constants of a number of organotin (*o*-aryl azo benzoate)- solvent systems have been determined spectrophotometrically and the results are presented in chapter V. The usefulness of the penta coordinated derivatives for measuring the relative co-ordinating ability of solvents towards organotin groups have been pointed out.

In the last chapter some unusual donor properties of organotin derivatives of methyl red have been discussed. The versatility of this group of compounds to act as donor towards almost any type of compound including saturated hydrocarbons with formation of ionic complexes in methanol has been demonstrated spectrophotometrically. Though the results are almost

unequivocal, an ESR study would have provided an added confirmation. However, because of the non-availability of the ESR facilities in our institution, the ESR results are not available at the moment, but are expected to be available shortly. In any case, the results appear to be very significant since a proper understanding of the reasons for this unusual donor properties of methyl red derivatives may lead to the preparation of more effective donors in future and chemical methods for the preparation of anion of almost any compound may be developed. Such species will not only be of theoretical importance, but also of practical value, since many chemical reactions may be planned via such charged species.