

PREFACE

The thesis entitled "Organotin Compounds: An investigation on the Synthesis, Structures and Properties (Including biocidal properties) of Organotin Carboxylates and related compounds" has aimed to explore the chemistry of simple organotin(IV) carboxylates and other related compounds. The work has been divided in five chapters.

Chapter 1

This chapter gives a brief review on the nature of bonding and other related properties of the organotin compounds.

Chapter 2

This chapter describes the synthesis, characterization and biological properties of Mn(II), Fe(II), Co(II), Ni(II) and Cu(II) complexes of 3-cyclohexylpropanoic acid. The complexes were characterized by IR and elemental analyses. Magnetic moment studies and differential calorimetric analyses were also carried out for these complexes. Antifungal activities of these compounds against two fungal pathogens namely, *Curvularia eragrostidis* and *Alternaria porri* were also studied.

Chapter 3

In this chapter, the synthesis, characterization and biological properties of organotin(IV) complexes of two carboxylic acid ligands, namely, cyclopropane carboxylic acid and 3-cyclohexylpropanoic acid are described. All the compounds have been characterized by IR, (^1H , ^{13}C and ^{119}Sn) NMR spectroscopy along with the elemental analyses. The decomposition of a few selected complexes were studied by thermogravimetric analyses(TGA).The solid state structure of dimethyltin(IV) derivative of cyclopropane carboxylic acid was studied by X-ray crystallography. The biological activity of these compounds against four fungal pathogens, namely, *Curvularia eragrostidis*, *Alternaria porri*, *Dreschlerea oryzae* and *Macrophomina phaseolina* of four different crops were investigated. Some of the newly synthesized organotin(IV) carboxylates were screened for their antibacterial activity against

Pseudomonas fluorescens, a fish-pathogenic, Gram-negative bacteria. Phytotoxicities of these new organotin compounds were determined on healthy wheat seeds (variety-Sonalika).

Chapter 4

This chapter describes the synthesis, characterization, fluorescence and biological properties of diorganotin(IV) compounds of Schiff bases derived from salicylaldehyde/substituted salicylaldehyde and thiosemicarbazide. The ligands selected for the study were salicylaldehyde thiosemicarbazone, 5-bromo salicylaldehyde thiosemicarbazone, 5-chloro salicylaldehyde thiosemicarbazone, naphthaldehyde thiosemicarbazone. The complexes with the general formulae $[R_2Sn(OArCH=N-N=CSNH_2)]$, where R=Me, n-Bu, Ph and Ar = $-C_6H_4$, $-C_6H_3(5-Cl)$, $-C_6H_3(5-Br)$ and $-C_{10}H_6$ were characterized by UV, IR, NMR (1H , ^{13}C and ^{119}Sn) spectroscopy and elemental analysis. The solid state structures of some of these complexes were studied by X-ray crystallography. The biological activity of these compounds against four fungal pathogens, namely, *Curvularia eragrostidis*, *Alternaria porri*, *Dreschleria oryzae* and *Macrophomina phaseolina* of four different crops and a panel of bacteria, namely, *Aeromonas hydrophila*, *Salmonella typhi*, *Salmonella typhimurium*, *Salmonella flexneri*, *Escheria coli*, *Salmonella aureus*, *Bacillus subtilis* and *Lactobacillus rhamnosus* were investigated. The phytotoxic effects of these compounds were also investigated against *Oryzae sativa*, *Lens culinaris* and *Cicer aurantinum*.

Chapter 5

This chapter deals with the cytotoxic effects of the newly synthesized diorganotin(IV) compounds of Schiff bases derived from salicylaldehyde/substituted salicylaldehyde and thiosemicarbazide against a panel of human cell lines, namely, Colo205, Hop62, MCF7, PC3, SiHa, ZR-75-1, A-2780, DWD, K562, DU145, SW 480 and HCT 116. The cytotoxic effect of dibutyltin(IV) salicylaldehyde thiosemicarbazone was also studied against two mouse tumour cell lines namely, EAC and SAR-180. The results were compared with clinically tested drugs.