

# CONTENTS

	<b>Pages</b>
Preface	i - ii
Acknowledgements	iii - iv

## **CHAPTER 1**

### **ORGANOTIN COMPOUNDS – A SHORT REVIEW ON THE NATURE OF BONDING AND OTHER RELATED PROPERTIES**

1.1 Introduction	1
1.2 Literature	1 - 5
1.3 Bonding in organotin compounds	5 - 6
1.4 Reactivity of organotin compounds	6 - 8
1.5 Structure of organotin compounds	8 - 9
1.6 Applications of organotin compounds	9
1.6.1 Non-biological applications	9
1.6.2 Biological applications	10
<i>References</i>	11 - 14

## **CHAPTER 2**

### **SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL PROPERTIES OF Mn(II), Fe(II), Co(II), Ni(II) AND Cu(II) COMPLEXES OF 3-CYCLOHEXYLPROPANOIC ACID**

2.1 Introduction	15 - 18
2.2 Scope and objective	18
2.3 Experimental	18
2.3.1 Materials	18

2.3.2 Measurements	18
2.3.3 Synthetic procedures	19
2.3.4 Fungicidal activity	20 - 21
2.4 Results and Discussion	21
2.4.1 Synthesis and characterization of transition metal carboxylates	21 - 24
2.4.2 Fungicidal activity of transition metal carboxylates	24
<i>References</i>	25 - 26

## CHAPTER 3

### SYNTHESIS, CHARACTERIZATION AND BIOCIDAL PROPERTIES OF ORGANOTIN(IV) CARBOXYLATES OF CYCLOPROPANE CARBOXYLIC ACID AND 3-CYCLOHEXYLPROPANOIC ACID

3.1 A brief review of organotin carboxylates	27
3.1.1 Synthesis of organotin carboxylates	27 - 37
3.1.2 Structure of organotin carboxylates	37 - 49
3.1.3 Biological Properties of organotin carboxylates	49 - 53
3.2 Scope and Objective	53
3.3 Experimental	53
3.3.1 Materials	53
3.3.2 Measurements	54
3.3.3 Synthetic procedures	54 - 59
3.3.4 X-ray crystallography	59 - 60
3.3.5 Biological studies	60 - 64
3.4 Results and Discussion	65
3.4.1 Synthesis of sodium salt of cyclopropane carboxylic acid	65
3.4.2 Synthesis of sodium salt of 3-cyclohexylpropanoic acid	66
3.4.3 Triorganotin(IV) and diorganotin(IV) complexes of cyclopropane carboxylic acid ( $L^1H$ )	66 - 87
3.4.4 Triorganotin(IV) and diorganotin(IV) complexes of 3-cyclohexylpropanoic acid ( $L^2H$ )	87 - 103
3.4.5 Biocidal activity	104 - 107
<i>References</i>	108 - 117

## CHAPTER 4

### SYNTHESIS, SPECTROSCOPIC CHARACTERIZATION, FLUORESCENCE AND BIOCIDAL PROPERTIES OF SOME DIORGANOTIN(IV) COMPLEXES OF SALICYLALDEHYDE THIOSEMICARBAZONE AND RELATED LIGANDS

4.1 Introduction to organotin(IV) complexes of Schiff bases	118
4.1.1 Interactions of organotin(IV) <sup>rut</sup> with Schiff bases and their derivatives	119 - 132
4.1.2 Organotin(IV) complexes of thiosemicarbazones	132 - 142
4.1.3 Biological activity of thiosemicarbazones	142 - 144
4.2 Scope and Objective	144 - 145
4.3 Experimental	145
4.3.1 General comments	145
4.3.2 Materials	145
4.3.3 Measurements	146
4.3.4 Synthetic procedures	146 - 153
4.3.5 Crystal structure determinations	153 - 154
4.3.6 Biological studies	154 - 156
4.3.7 Crystallographic data and refinement details for 1, 3, 4, 6, 9, & 14	157 - 162
4.4 Results and Discussion	163
4.4.1 Synthesis of Schiff base of salicylaldehyde, substituted salicylaldehyde and naphthaldehyde from thiosemicarbazide	163 - 164
4.4.2 Synthesis of diorganotin(IV) complexes of salicylaldehyde/ substituted salicylaldehyde/naphthaldehyde thiosemicarbazones	164 - 168
4.4.3 Spectroscopic characterization and X-ray crystallography of diorganotin(IV) complexes	169 - 196
4.4.4 Synthesis, spectroscopic characterization and X-ray crystallography of dibenzyltin(IV) derivatives of salicylaldehyde thiosemicarbazones	197 - 202

4.5 Biological properties of diorganotin(IV) complexes of salicylaldehyde thiosemicarbazones	202
4.5.1 Antibacterial activity	202 - 204
4.5.2 Effect of n-Bu <sub>2</sub> SnL <sup>1</sup> (2) on bacterial disease	205
4.5.3 Antifungal activity	205 - 206
4.5.4 Phytotoxic Properties	206 - 208
<i>References</i>	209 - 218

## CHAPTER 5

### CYTOTOXIC ACTIVITY OF DIORGANOTIN(IV) COMPLEXES OF SALICYLALDEHYDE THIOSEMICARBAZONES

5.1 Introduction	219
5.1.1 Antitumour activity of organotin(IV) complexes	219 - 223
5.1.2 Antitumour activity of thiosemicarbazones	224 - 226
5.2 Scope and Objective	226 - 227
5.3 Synthesis and characterization of diorganotin(IV) complexes of salicylaldehyde thiosemicarbazones	227
5.4 Experimental protocol	227
5.4.1 <i>In vitro</i> screening of cytotoxicity of the selected diorganotin(IV) derivatives of salicylaldehyde thiosemicarbazones against human cancer cell lines	227 - 228
5.4.2 Effect of n-Bu <sub>2</sub> SnL <sup>1</sup> (2) on mouse cancer cell line	228 - 229
5.5 Results and Discussion	229
5.5.1 Cytotoxicity of selected organotin compounds against cell lines by Sulforhodamine B (SRB) assay	229 - 241
5.5.2 <i>In vitro</i> screening of n-Bu <sub>2</sub> SnL <sup>1</sup> (2) for antitumour property against mouse tumour cell lines	241 - 243
5.5.3 <i>In vitro</i> screening of n-Bu <sub>2</sub> SnL <sup>1</sup> (2) for antitumour property against human cancer cell lines	243 - 245
<i>References</i>	246 - 251