

CONTENTS

	Page
Acknowledgement	I
Preface	III
Chapter 1	1-22
A short review of organotin compounds.	
§ 1.1. Introduction.	3
§ 1.2. Preparation of organotin compounds - General Principles.	3
§ 1.3. Bonding in organotin compounds.	9
§ 1.4. Structure of organotin compounds - general features.	12
§ 1.5. References.	17
Chapter 2	23-42
A survey of the relevant literatures relating to: a) Organotin and other Gr.(IVB) metal complexes of monothio and dithio carboxylates b) organotin (IV) complexes of 4-Pyridylthio and 2-Pyrimidylthio acetic acid.	
§ 2.1 Introduction.	25
§ 2.2. Preparatory methods of dithiocarboxylic acids and the related thio-acetic acid ligands and their organotin(IV) derivatives - a brief general review.	26
§ 2.3. Structure and bonding.	32
§ 2.4. References.	39
Chapter 3	43-55
Synthesis of new dithiocarboxylic acids : Potential ligands for synthesis of organotin(IV) complexes.	
§ 3.1. Introduction.	45
§ 3.2. Scope and objective.	47
§ 3.3. Preparation and characterisation.	48-52
§ 3.3.1. Synthesis of $\text{Ph}_2\text{C}=\text{C}(\text{Ph})\text{CS}_2\text{H}$.	48

§ 3.3.2.	Synthesis of $\text{Me}_2\text{C}=\text{C}(\text{Ph})\text{CS}_2\text{H}$.	50
§ 3.3.3.	Synthesis of $\text{Me}_2\text{C}=\text{C}(\text{H})\text{CS}_2\text{H}$.	51
§ 3.4.	Results and discussion.	53
§ 3.5.	References.	55

CHAPTER 4 56-96

Synthesis of alkenyltin (IV) compounds.

§ 4.1	Introduction.	58
§ 4.2	Scope and objective.	61
§ 4.3	Experimental and characterisation.	61
§ 4.3.1	Preparation of starting materials.	62
§ 4.3.1.1	Preparation of tribenzyltin chloride.	62
§ 4.3.1.2	Preparation of anhydrous stannic chloride.	63
§ 4.3.1.3	Preparation of $\text{Ph}_2\text{C}=\text{C}(\text{Ph})\text{Br}$.	64
§ 4.3.1.4	Preparation of $\text{Me}_2\text{C}=\text{C}(\text{Ph})\text{Br}$.	68
§ 4.3.1.5	Preparation of $\text{Me}_2\text{C}=\text{C}(\text{H})\text{Br}$.	72
§ 4.3.2	Syntheses of new tin alkenyls.	74
§ 4.3.2.1	Synthesis of $[\text{Ph}_2\text{C}=\text{C}(\text{Ph})]_2\text{SnCl}_2$.	74
§ 4.3.2.2	Synthesis of $[\text{Me}_2\text{C}=\text{CH}]_3\text{SnCl}$.	76
§ 4.3.2.3	Synthesis of $[\text{Me}_2\text{C}=\text{CH}]_4\text{Sn}$.	78
§ 4.3.2.4	Synthesis of $[\text{Me}_2\text{C}=\text{C}(\text{Ph})]_3\text{SnCl}$.	78
§ 4.3.2.5	Synthesis of $[\text{Me}_2\text{C}=\text{CH}]\text{SnMe}_2\text{Cl}$.	80
§ 4.3.2.6	Synthesis of $[\text{Me}_2\text{C}=\text{CH}]\text{Sn}(\text{Ph})_3$.	81
§ 4.3.2.7	Synthesis of $[\text{Me}_2\text{C}=\text{CH}]\text{Sn}(\nabla\text{C}_6\text{H}_{11})_3$.	82
§ 4.3.2.8	Synthesis of $[\text{Ph}_2\text{C}=\text{C}(\text{Ph})]_2\text{Sn}(\text{Me})_2$.	84
§ 4.4	Results and discussion.	87
§ 4.5	References.	94

CHAPTER 5 97-117

Reaction of the dithiocarboxylic acids with organotin(IV) compounds : Some unusual observations.

§ 5.1.	Introduction.	99
§ 5.2.	Scope and objective.	100
§ 5.3.	Experimental and characterisation.	101

§ 5.3.1.	Preparation of $C_6H_5CS_2H$ and reaction of the piperidinium salt of it with Ph_3SnCl .	102
§ 5.3.2.	Reaction of the piperidinium salt of $C_6H_5CS_2H$ with Ph_2SnCl_2 .	104
§ 5.3.3.	Reaction of the piperidinium salt of $(C_6H_5)_2C=C(Ph)CS_2H$ with Me_2SnCl_2 .	105
§ 5.3.4.	Reaction of the piperidinium salt of $(C_6H_5)_2C=C(Ph)CS_2H$ with $(\nabla Cy)_3SnCl$.	105
§ 5.3.5.	Reaction of the piperidinium salt of $(C_6H_5)_2C=C(Ph)CS_2H$ with Bu_3SnCl .	106
§ 5.3.6.	Reaction of the piperidinium salt of $(C_6H_5)_2C=C(Ph)CS_2H$ with $BuSnCl_3$.	107
§ 5.3.7.	Reaction of the piperidinium salt of $(C_6H_5)_2C=C(Ph)CS_2H$ with $[(C_6H_5)_2C=C(Ph)]_2SnCl_2$.	108
§ 5.4.	Results and discussion.	110
§ 5.5.	References.	116

CHAPTER 6

118-16

Syntheses of organotin(IV) compounds with related thio-ligands : (4-pyridyl thio) acetic acid and (2-pyrimidyl thio) acetic acid.

§ 6.1.	Introduction.	120
§ 6.2	Scope and objective.	121
§ 6.3.	Experimental with characterisation.	121
§ 6.3.1	Preparation of starting materials.	122
§ 6.3.1.1	Preparation of sodio-salt of (4-pyridyl thio) acetic acid.	123
§ 6.3.1.2	Synthesis of Triphenyltin (4-pyridyl thio) acetate.	124
§ 6.3.1.3	Synthesis of Diphenyltin Di(4-pyridyl thio) acetate.	125
§ 6.3.1.4	Synthesis of Tricyclohexyltin (4-pyridyl thio) acetate.	126
§ 6.3.1.5	Synthesis of Dimethyltin Di(4-pyridyl thio) acetate.	127

§ 6.3.1.6	Synthesis of Dibutyltin bromo (4-pyridyl thio) acetate.	128
§ 6.3.1.7	Synthesis of Butyltin tri(4-pyridyl thio) acetate.	129
§ 6.3.1.8	Synthesis of Tributyltin (4-pyridyl thio) acetate.	130
§ 6.3.1.9	Synthesis of Tribenzyltin (4-pyridyl thio) acetate.	131
§ 6.3.2.	Synthesis of organotin(IV) complexes of (2-pyrimidyl thio) acetic acid.	133
§ 6.3.2.1.	Preparation of sodio-salt of (2-pyrimidyl thio) acetic acid.	133
§ 6.3.2.2	Synthesis of Triphenyltin (2-pyrimidyl thio) acetate.	133
§ 6.3.2.3	Synthesis of Diphenyltin Di(2-pyrimidyl thio) acetate.	134
§ 6.3.2.4	Synthesis of Dimethyltin Di(2-pyrimidyl thio) acetate.	136
§ 6.3.2.5	Synthesis of Dibutyltin Di(2-pyrimidyl thio) acetate.	137
§ 6.3.2.6	Synthesis of Butyltin Tri(2-pyrimidyl thio) acetate.	138
§ 6.3.2.7	Synthesis of Tributyltin (2-pyrimidyl thio) acetate.	139
§ 6.3.2.8	Synthesis of Trimethyltin (2-pyrimidyl thio) acetate.	140
§ 6.4.	Results and discussion.	142
§ 6.4.1.	Infrared spectra.	142
§ 6.4.2.	UV spectra.	147
§ 6.4.3.	NMR spectra.	148
§ 6.4.4.	Mössbauer spectra.	150
§ 6.4.5.	X-ray crystal structure.	157
§ 6.5.	References.	163
CHAPTER 7		168-17
Preparation of organotin(IV) compounds with carbazic acid.		
§ 7.1.	Introduction.	170
§ 7.2.	Scope and objective.	170
§ 7.3.	Experimental with characterisation.	171
§ 7.3.1.	Preparation of the ligand.	171
§ 7.3.2.	Preparation of organotin(IV) complexes of carbazic acid.	172

§ 7.4.	Results and discussion.	174
§ 7.5.	References.	176

CHAPTER-8 178-200

Study of biocidal properties and activities of the organotin(IV) derivatives of dithiocarboxylic acids and the related ligands.

§ 8.	Introduction to biocidal activity of organotin(IV) complexes.	180
§ 8.1.1.	Introduction to fungicidal activity.	181
§ 8.1.2.	Experimental -material and methods.	184
§ 8.1.3.	Results.	186
§ 8.1.4.	Discussion.	187
§ 8.2.	Study of Phytotoxicity.	190
§ 8.2.1.	Introduction to phytotoxicity.	190
§ 8.2.2.	Experimental- material and methods.	190
§ 8.2.3.	Results.	191
§ 8.2.4.	Discussion.	192
§ 8.3.	Study of antitumour activity.	193
§ 8.3.1.	Introduction to antitumour activities.	193
§ 8.3.2.	Material and methods.	194
§ 8.3.3.	Results.	196
§ 8.3.4.	Discussion.	197
§ 8.4.	References.	198