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ORIGINAL LITERARY WORK DECLARATION

Name of Candidate: **Kelly Tan Ching Yi** (I.C/Passport No: **860815-04-5024**)

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Name of Degree: Master of Science in Analytical Chemistry & Instrumental Analysis

Title of Project Paper/Research Report/Dissertation/Thesis ("this Work"):
SYNTHESIS AND CHARACTERISATION OF ORGANOTIN (IV) CARBOXYLATE COMPLEXES

Field of Study:

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Abstract

Two organotin (IV) carboxylate complexes were prepared by the refluxed synthesized in ethanol and acetonitrile respectively. Both reactions are carried out with organotin (IV) complexes and carboxylic acid in 1:1 stoichiometric reaction. The water molecules formed during the reaction is removed from the mixture by molecule sieve and a Dean and Stark apparatus. Complexes have been characterized by elemental analysis, melting point determination, Fourier Transform Infrared spectroscopy and multinuclear Magnetic Resonance (^{1}H, ^{13}C and ^{119}Sn) studies were carried out to elucidate their structures. The differences [υ(COO)], where [υ(COO)as -[υ(COO)s] was determined indicating complex 1 is bidentate with ligand while complex 2 forms a monodentate with ligand. ^{119}Sn NMR is important in determining the coordination number of tin atom moiety of the complexes obtained. The structure complex 1 shows the Sn atom is five-coordinated and six-coordinated with the coordination sphere is distorted trigonal bipyramid and octahedral. While for the molecular structure of compound 2, the tin atom is four-coordinated in a slightly tetrahedral geometry.

Abstrak

Dua kompleks organostanum (IV) karbosilat telah disintesiskan melalui teknik refluks masing-masing dalam pelarut etanol dan asetonitrile. Kedua-dua reaksi telah dijalankan dengan tindak balas kompleks organostanum (IV) dengan asid karboksilik melalui stoikiometri 1:1. Molekul air terbentuk semasa tindak balas ini dipisahkan daripada campuran dengan 'Molecular sieve' dan alat radas Dean dan Stark. Kompleks yang disintesiskan telah dianalisis dengan melalui analisis peratus kompisisi unsur, penentuan takat lebur, spektroskopi inframerah dan Resonans manget nuklear (^{1}H , ^{13}C dan ^{119}Sn). Daripada analisis tersebut, diketahui bahawa anion karbosilik berikat dengan logam stanum untuk membentuk kompleks dengan menerusi atom oksigen. Spektrum inframerah menunjukkan perbezaan nombor gelombang jalur regangang karbosilat asimetri, dimana [υ(COO)as -[υ(COO)s] dapat memberi gambaran cara pengikatan ion karboksilat dengan ion logam stanum. Nilai υ Δ masing-masing menunjukkan bahawa terdapat kehadiran ikatan bidentat dalam komplek 1 manakala ikatan monodentat dalam komplek 2. ^{119}Sn NMR adalan penting dalam menentukan nombor kooridinasi logam tin. Data menunjukkan bahawa komplek 1 adalah berkoordinasi lima dan enam, dalam bentuk struktur trigonal bipiramid dan oktahedral manakala komplek 2 adalah berkoordianasi empat dan membentuk struktur tetrahedral.

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TABLE OF CONTENTS

List of Table

List of Figure

LIST OF ABBREVIATIONS

α	Alpha
as	Asymmetry
β	Beta
Bu	Butyl
d	Doublet
FTIR	Fourier Transform Infrared Spectroscopy
g/mol	Gram per mole
m	multiplet
Me	Methyl
NMR	Nuclear Magnetic Resonance Sepctroscopy
qn	Quintet
s	singlet
t	Triplet
δ	Chemical Shift in ppm
Δ υ	[υ(COO)as -[υ(COO)s]
υ	Stretching
s	symmetry