

UNIVERSITI MALAYA

ORIGINAL LITERARY WORK DECLARATION

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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 (^1H , ^{13}C and ^{119}Sn) studies were carried out to elucidate their structures. The differences $[\nu(\text{COO})]$, where $[\nu(\text{COO})_{\text{as}} - [\nu(\text{COO})_{\text{s}}]$ 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) karbositat telah disintesis melalui teknik refluks masing-masing dalam pelarut etanol dan asetonitril. 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 disintesis telah dianalisis dengan melalui analisis peratus komposisi unsur, penentuan takat lebur, spektroskopi inframerah dan Resonans magnet nuklear (^1H , ^{13}C dan ^{119}Sn). Daripada analisis tersebut, diketahui bahawa anion karbositat berikat dengan logam stanum untuk membentuk kompleks dengan menerusi atom oksigen. Spektrum inframerah menunjukkan perbezaan nombor gelombang jalur regang karbositat asimetri, dimana $[\nu(\text{COO})_{\text{as}}] - [\nu(\text{COO})_{\text{s}}]$ dapat memberi gambaran cara pengikatan ion karbositat dengan ion logam stanum. Nilai ν_{Δ} masing-masing menunjukkan bahawa terdapat kehadiran ikatan bidentat dalam kompleks 1 manakala ikatan monodentat dalam kompleks 2. ^{119}Sn NMR adalah penting dalam menentukan nombor koordinasi logam tin. Data menunjukkan bahawa kompleks 1 adalah berkoordinasi lima dan enam, dalam bentuk struktur trigonal bipiramid dan oktahedral manakala kompleks 2 adalah berkoordinasi empat dan membentuk struktur tetrahedral.

Acknowledgements

First of all, I would like to express my deepest gratitude to my supervisor, Dr. Tan Guan Huat, for his guidance and supervision as well as patience throughout the course of my research. Without his valuable suggestions and helpful comments, this project would not have been possible. My vote of thanks to the Department of Chemistry of University Malaya as well for providing necessary the facilities during the lab work.

I would also like to take this opportunity to thank all the lab staff and friend for their advices and supports throughout the project. I would like to express my deepest appreciation to my family for their continuous support and encouragement.

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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
$\Delta \nu$	$[\nu(\text{COO})_{\text{as}} - [\nu(\text{COO})_{\text{s}}]$
ν	Stretching
s	symmetry