

SYNTHESIS, CHARACTERIZATION AND ANTI-CORROSION SCREENING OF Sb(III) THIACETAZONE COMPLEX

NUR FAIZAH BINTI MOHD FAUZI

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

JANUARY 2017



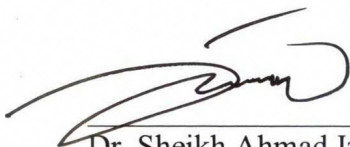
The Final Year Project Report entitled “Synthesis, Characterization and Anti-Corrosion Screening of Sb(III) Thiacetazone Complexes” was submitted by Nur Faizah Mohd Fauzi, in partial fulfillment of the requirements for the degree of the Bachelor of Science (Hons.) Chemistry, in the Faculty of Applied Sciences, and was approved by



Nur Nadia Dzul kifli
Supervisor
B. Sc.(Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan



Ahmad Husaini Mohamed
Co-supervisor
B. Sc.(Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan



Dr. Sheikh Ahmad Izaddin Sheikh
Mohd Ghazali
Project Coordinator
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan



Mazni Musa
Head of Programme
B. Sc. (Hons.) Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
Kuala Pilah Campus
72000 Kuala Pilah Negeri Sembilan

Date : 2/2/17

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURE	vi
LIST OF ABBREVIATIONS	vii
ABSTRACT	ix
ABSTRAK	x
CHAPTER 1 INTRODUCTION	
1.1 Background of Study	1
1.2 Problem Statement	4
1.3 Significance of Study	5
1.4 Objectives of Study	5
CHAPTER 2 LITERATURE REVIEW	
2.1 Synthesis of thiosemicarbazone ligand and complexes	6
2.2 Characterization method	7
2.2.1 Fourier Transform-Infrared (FTIR)	12
2.2.2 Ultraviolet-Visible (UV-Vis)	14
2.2.3 Nuclear Magnetic Resonance (NMR)	16
2.2.4 X-Ray Crystallography	18
2.3 Applications	18
2.3.1 Hg Removal	18
2.3.2 Corrosion Inhibitor	18
CHAPTER 3 METHODOLOGY	
3.1 Materials	20
3.1.1 Chemicals	20
3.1.2 Apparatus	20
3.1.3 Instruments	21
3.2 Methods	21
3.2.1 Synthesis of Sb(III) thiacetazone	21
3.3 Characterization	22
3.3.1 Melting point	22
3.3.2 Fourier Transform-Infrared (FTIR)	22
3.3.3 Ultraviolet-Visible (UV-Vis)	22

3.3.4	Elemental Analysis (CHNS)	23
3.3.5	Molar conductivity	23
3.3.6	Gravimetric Analysis	23
3.4	Corrosion Inhibition Study	24
3.4.1	Preparation of solutions	24
3.4.2	Gravimetric method	24

CHAPTER 4 RESULTS AND DISCUSSION

4.1	Synthesis of Sb(III) complex	26
4.2	Physico-chemical Analysis	27
4.3	Infrared Spectral Data	30
4.4	UV-Vis Spectra	33
4.5	Gravimetric Analysis	34
4.6	Molar Conductivity Measurement	36
4.7	Corrosion Inhibition Study	36

CHAPTER 5 CONCLUSION AND RECOMMENDATIONS

5.1	Conclusion	44
5.2	Recommendations	46

CITED REFERENCES	47
-------------------------	-----------

APPENDICES	52
-------------------	-----------

<i>CURRICULUM VITAE</i>	55
--------------------------------	-----------

ABSTRACT

SYNTHESIS, CHARACTERIZATION AND ANTI-CORROSION SCREENING OF Sb(III)THIACETAZONE COMPLEX

Thiacetazone ligand and Sb(III) complex were synthesized by condensation process. The ligand and complex were characterized using melting point, Fourier Transform-Infrared (FTIR), Ultraviolet-Visible (UV-Vis), CHNS Analysis, Molar Conductivity and Gravimetric Analysis. The corrosion inhibitor study for ligand and complexes were also conducted. The complex was assigned the formula $[\text{Sb}(\text{TAC})_3]\text{Cl}_3$. The melting point of ligand was around 229 - 332 °C and for the complex was around 218 - 220 °C. In the $[\text{Sb}(\text{TAC})_3]\text{Cl}_3$, the ligand act as bidentate through *N,S*-bidentate coordination. For FTIR, the coordination of ligand via the major shifting of (C-N) and thionic (C=S). The UV-Vis shows two types of transition in both ligand and complex which are $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions. The calculated percentage of Sb(III) in the complex was 11.4 % and the molar conductivity of complex was 3:1 electrolyte. For anti-corrosion, ligand shows better inhibitor efficiency in H_2SO_4 at 0.1 M concentration compared to HCl. Meanwhile, the inhibitor efficiency for the complex in H_2SO_4 at 0.001 M concentration shows better efficiency compared to HCl.