

# **CONTENTS**

	Page
List of Tables.	
List of Figures.	
<b>1. INTRODUCTION</b>	
1.1 Definition of corrosion.	1
1.2 Electrochemical theory of corrosion.	1
1.3 Polarization.	1
1.4 Types of corrosion.	2
1.5 Corrosion monitoring techniques.	6
1.6 Metallurgy and corrosion types of stainless steels.	11
1.7 Inhibition of stainless steel corrosion in aqueous solution.	14
1.8 Crown ethers as corrosion inhibitors.	36
Aim of the present work.	45
<b>2. EXPERIMENTAL</b>	
2.1 Materials and solutions.	46
2.2 Experimental techniques.	48
2.2.1 Loss in mass technique.	48
2.2.2 Galvanostatic polarization technique.	49
2.2.3 Scanning electron microscopy (SEM).	52
2.2.4 x-ray photoelectron spectroscopic analysis (XPS).	53
<b>3. RESULTS AND DISCUSSION</b>	
<b>SECTION (A)</b>	
3.1 Loss in mass technique.	54
3.1.1 Effect of the crown ethers concentration on loss in mass values.	54
3.1.2 Effect of crown ethers on the corrosion rate of stainless steels.	66
3.1.3 Degree of surface coverage and percentage inhibition efficiency.	68
3.1.4 Adsorption isotherms.	72
3.1.5 Effect of temperature and thermodynamic parameters of activation.	82

# **CONTENTS**

## ***SECTION (B)***

3.2	Galvanostatic polarization	110
3.2.1	Adsorption isotherms	112

## ***SECTION (C)***

3.3	Scanning electron microscopy. (SEM).	128
-----	--------------------------------------	-----

## ***SECTION (D)***

3.4	x-ray photoelectron spectroscopic analysis (XPS).	145
-----	---	-----

## ***SECTION (E)***

3.5	The use of quantum chemical calculations for the study of corrosion inhibitors	159
-----	--	-----

## ***SECTION (F)***

3.6	Effect of alloying elements	167
3.7	Chemical structure and corrosion inhibition	169
	Conclusion	174
	Appendix	176
	Reference	177
	Summary	I
	Arabic summary	1