

**UNIVERSITI TEKNOLOGI MARA**

**MICROBIAL INFLUENCED  
ACCELERATED LOW WATER  
CORROSION (ALWC): SPECIES  
ISOLATION AND IDENTIFICATION**

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## ABSTRACT

Accelerated Low-Water Corrosion (ALWC) leads to degradation of maritime steel structure. This study is performed to isolate, identification, and study the growth of the microbes that induced ALWC. The sample of corrosion was taken from the jetty in Port Klang, Selangor, Malaysia. The rust collected was spread on agar containing artificial sea water medium. After 72 hours, five types of colonies grew around the rusts. The colonies were then cultured in five different petri dish containing artificial sea water medium and were left for 72 hours at temperature 27°C. The pure colonies were then gram stained and it is found that the creamy, creamy white and yellow colonies were gram negative bacteria meanwhile the dark pink and light pink colonies were gram positive bacteria. The gram negative and positive bacteria were then tested with API Kit to identify their species. It was found that the yellow, creamy, creamy white, dark pink, and light pink are *Pseudomonas aeruginosa*, *Ochrobactrum anthropic*, *Pseudomonas luteola*, *Sphingomonas paucimobilis*, and *Burkholderia cepacia* respectively. It was found that the *Pseudomonas aeruginosa* has the shortest life span meanwhile the longest life span is *Sphingomonas paucimobilis*, *Burkholderia cepacia*, and *Pseudomonas luteola*.

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# TABLE OF CONTENTS

	<b>Page</b>
<b>AUTHOR'S DECLARATION</b>	i
<b>ABSTRACT</b>	ii
<b>ACKNOWLEDGEMENT</b>	iii
<b>TABLE OF CONTENTS</b>	iv
<b>LIST OF TABLES</b>	vii
<b>LIST OF FIGURES</b>	viii
<b>LIST OF ABBREVIATIONS</b>	ix
<b>CHAPTER ONE: INTRODUCTION</b>	1
1.1 Abstract	1
1.2 Background of Study	1
1.3 Objectives	3
1.4 Problem Statement	3
1.5 Scope of Research	3
<b>CHAPTER TWO: LITERATURE REVIEW</b>	4
2.1 Abstract	4
2.2 Characteristic of Accelerated Low Water Corrosion (ALWC)	4
2.3 Microbial Induced Corrosion	5
2.4 Corrosion Zone	8
2.4.1 Atmospheric Zone	9
2.4.2 Splash Zone	10
2.4.3 Tidal Zone	11
2.4.4 Low Water Zone	11
2.4.5 Immersed Zone Corrosion	12
2.4.6 Embedded Zone	12
2.4.7 Concentrated Corrosion In All Zones	12
2.5 Effects of ALWC	13
2.5.1 Concentrated Corrosion In All Zones	13

# CHAPTER 1

## INTRODUCTION

### 1.1 ABSTRACT

This chapter is to introduce briefly about Accelerated Low Water Corrosion (ALWC), the objectives of the research project, the problem statement, and scope of research. ALWC is a type of corrosion which occurs below low-water level and in tidal waters on steel maritime structures. ALWC is induced by microbial induced corrosion (MIC). There are various types of microbial that can cause ALWC. Three objectives are made based on the problem statement. The three objectives of this research is to prove and determine the microbial that influenced the ALWC, to determine the metal related to the corrosion, and to study the mechanism of ALWC.

### 1.2 BACKGROUND STUDY

Corrosion is a natural phenomenon that occurs on unprotected steel structures in any location. Accelerated Low Water Corrosion (ALWC) is a corrosion phenomenon that typically occurs at or below low-water level, and in tidal and brackish waters on steel maritime structures. ALWC is associated with bacterial activity and it is in a form of microbial induced corrosion (MIC). In advanced stage, ALWC can cause the structure infected to collapse. Although there are some other mechanisms that can cause accelerated corrosion on steel maritime structures at low water, the characteristics of the pattern of damage on steel structures is most similar to ALWC (J.E Breakell, *et al*, 2005).

ALWC phenomenon has been noted in literature as in the first half of the 20<sup>th</sup> century. Average rate of ALWC can be 0.3 to 1.0 mm/side/year or more over time to the point of complete perforation of steel plate. However, there are possibilities that the rates can be higher once ALWC has initiated on a structure. ALWC can lead to a loss of 33% to 66% of the asset value. The process will compromise the integrity of the corroded structures and lead to costly repair or replacement (J.E Breakell, *et al*, 2005). If is left untreated, ALWC may cause pre mature weakening, perforation and soon the collapse of maritime structures.