

UNIVERSITI TEKNOLOGI MARA

**STUDY ON POTENTIAL OF
BIOSURFACTANT RHAMNO NR22
ON DEMULSIFICATION OF
INDUSTRIAL EMULSION**

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ABSTRACT

Chemical synthesized demulsifier in oil industry and illegal dumping of waste motor oil from workshop industry have caused environmental issues. Rhamnolipid biosurfactant produced from *Pseudomonas aeruginosa* NR22 (Ps. NR. 22) has unique properties to demulsify the unwanted emulsion by lowering the interfacial tension of the emulsion. The ability to demulsify and separate the water-oil emulsion in waste motor oil from local workshop by running several demulsification test was studied. The utilization of Kay's and PPGAS minimal with glucose as carbon substrate has enhanced the production of biosurfactant. 410 ml of foam that lasted for 5 hours long were observed on the biosurfactant which was 51% of total volume implied the stability of the biosurfactant. Characterization from FTIR technique showed the chemical bond presented and provided similar result compared to the commercial biosurfactant. From the bottle test, 35% of demulsification percentage was calculated which demonstrated the separation of oil and water phase. A maximum of 9.4cm diameter of clear zone was obtained after performing oil drop area test within 4 hours of production. A positive result shown from oil drop collapse test proved the interfacial activity. All these results showed Rhamno NR22 biosurfactant has a great potential to be applied as a high efficiency and eco-friendly demulsifier for unwanted emulsion in various industries.

Keywords— Biosurfactant, demulsification, rhamnolipid, *Pseudomonas aeruginosa*.

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TABLE OF CONTENT

CONTENTS	PAGE
CHAPTER ONE : INTRODUCTION	1
1.1 Research Background	1
1.2 Problem Statement	2
1.3 Objectives	3
1.4 Scope of Rresearch	3
CHAPTER TWO : LITERATURE REVIEW	4
2.1 Introduction	4
2.2 Biosurfactant in Instance	5
2.3 Properties of Biosurfactant	6
2.4 Application of Biosurfactant	8
2.5 Types of Biosurfactant	9
2.5.1 Glycolipids	10
2.6 <i>Pseudomonas aeruginosa</i> Producing Rhamnolipids as Biosurfactant	11
2.7 Emulsions	14
2.8 Demulsification	16
2.9 Biosurfactant as a Demulsifier	19
CHAPTER THREE : METHODOLOGY	21
3.1 Materials	21
3.2 Methodology	21
3.3 Production of Biosurfactant Rhamno NR22	22
3.3.1 <i>Pseudomonas</i> Agar	22
3.3.2 Preparation of Kay's Minimal	22
3.3.3 Preparation of PPGAS Medium	23
3.3.4 Production of Biosurfactant Rhamno NR22	24
3.4 Extraction of Biosurfactant Rhamno NR22	26
3.5 Characterization of Biosurfactant	26
3.6 Demulsification Test	27
3.6.1 Bottle Test	27
3.6.2 Oil Drop Collapsing Test	28
3.6.3 Oil Displacement Test	28
Flow of Overall Method	29
CHAPTER FOUR : RESULTS AND DISCUSSION	31
4.1 Production of Biosurfactant Rhamno NR22	31
4.2 Characterization of Biosurfactant Rhamno NR22	36
4.3 Demulsification Test	39
CHAPTER FIVE: CONCLUSION AND RECOMMENDATION	44
References	45

CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Biosurfactant is defined as biological surface-active compounds which are mainly produced by aerobic microorganism in an aqueous media with the presence of carbon source feedstock [1]. Biosurfactants are widely used in various industries including pharmaceutical, cosmetic, as detergent formulation as well as in oil industry. As in oil industry, biosurfactants have been proven of its applications such as microbial enhanced oil recovery (MEOR), oil storage tank cleaning, enhancing oil transportation and extraction [2]. Biosurfactants are defined as biological surface-active compounds which are mainly produced by aerobic microorganism in an aqueous media with the presence of carbon source feedstock, such as carbohydrates, hydrocarbons, fats and oil [1].

The most well-known and common source of biosurfactants are glycolipids, which consist of rhamnolipids, sophorolipids and trehalolipids. Rhamno NR22 is one of the type of rhamnolipids produced from a cultured bacteria that is called *Pseudomonas aeruginosa* [3]. Rhamnolipids defined as one (for mono-rhamnolipids) or two rhamnose (for di-rhamnolipids) that are linked to one or two molecules of hydroxydecanoic acid which is widely used to produce biosurfactant. It has many other properties that gives a reasonably benefits as a biosurfactant such as unique functional group and its ability to reduce the surface tension in chemicals [4].

Biosurfactants have its special characteristics such as low toxicity, specificity as it allows detoxification specific pollutants, relative ease of preparation, tolerance to certain parameters (ie: temperature, pH, salinity) and biodegradability as of its simple chemical structure[4]. Due to its properties, biosurfactant-producing microorganisms