

**UNIVERSITI TEKNOLOGI MARA**

**SYNTHESIS OF LOW MOLECULAR WEIGHT  
DNA LADDER**

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## **ABSTRACT**

DNA ladder is an important tool in Gel Electrophoresis to determine the size of DNA fragment of (Polymerase Chain Reaction) PCR products. It has two types which is low molecular weight and high molecular weight DNA ladder. The objective of this research is to synthesize low molecular weight DNA ladder. It is also known as 100bp DNA ladder. There are several methods to synthesize low molecular weight DNA ladder. In this research, the method used is by PCR amplification of lambda phage DNA. It is done by designing PCR primer for each length of 100bp ladder. Then, PCR process is done and continued by running gel electrophoresis. After that, the gel is screened through UV transilluminator. As a result, there are several successful PCR product which are 200bp, 300bp, 400bp, 600bp, 700bp, 800bp and 1000bp. The remaining shows failure of PCR process although the procedures are repeated for several times. The reason of failure is maybe due to contamination of reagents used. Although there are failure for some of the PCR amplification, but the method to synthesize of low molecular weight DNA ladder using PCR amplification is really useful to reduce laboratory cost compared buying it from the commercial DNA ladder.

## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

DNA ladder is most commonly used to determine the size of DNA fragments. There are two or more DNA fragments of known size comprised by a DNA ladder. As we know, DNA ladder usually reagent in molecular biology, which used for DNA electrophoresis. The basic principles the DNA sample and DNA ladders are loaded in adjacent well of an agarose gel. Then, the DNA is separated by electrophoresis through the gel. The gel is stained with ethidium bromide and exposed to ultraviolet light. The sample DNA is then recognized by comparing its migration with the bands of known size in DNA ladder. There are two types of DNA ladder, which is low molecular weight (LMW) DNA ladder and High molecular weight DNA ladder. Production of DNA ladder is done commercially and available by several company such as New England Biolab, Fermentas, Promega, Boehringer-Mannheim and etc.

#### 1.2 Objective of the Research

- 1) The main objective is to synthesize the low molecular weight (LMW) DNA ladder.
- 2) To mix all the LMW DNA ladder and run them into one well to be compared to commercial LMW DNA ladder.