THE STABILITY OF DNA IN CHOLINE CHLORIDE- MALONIC ACID DEEP EUTECTIC SOLVENT AT DIFFERENT CONCENTRATION

NUR FIKRIYAH BINTI ARIFFIN

Final Year Project Report Submitted in

Partial Fulfilment of The Requirements for The

Degree of Bachelor of Science (Hons.) Applied Chemistry

Faculty Of Applied Sciences

Universiti Teknologi MARA

AUGUST 2022

ACKNOWLEGEDMENT

First and foremost, praises and thanks to God, the Almighty, for His showers of blessings throughout my project successfully.

I would like to convey my heartfelt thanks to Dr. Rizana binti Yusof, Supervisor, UITM Arau, for providing me with a successful thesis guidance throughout several discussions. She has guided me through the process for conducting the study and reporting the results as clearly as possible.

My thanks are also expressed to my wonderful parents for having the vision and desire to educate me. I also would like to offer my profound gratitude to everyone who has assisted me with this project, both directly and indirectly to finish this thesis

ABSTRACT

DNA is one of the most essential macromolecules in cells, holding the genetic information needed for living beings to grow and function. Finding a medium in which DNA is both soluble and stable over a long length of time is a tough task. As a result, deep eutectic solvents (DES) were proposed as a novel solvent for this study to replace water or aqueous solutions. The purpose of this research is to identify effect of different concentration of DES on DNA as storage medium using a UV- Visible Spectrophotometer. DES was prepared by heating malonic acid and choline chloride at ratio 1:1 and 80 °C until a clear liquid emerged. Following that, a little amount of calf thymus DNA was dissolved and homogeneously mixed in deionised water in an ice bath (4 °C) for 24 hours. For UV-Vis, 100 μm DNA was produced and combined with various concentrations of hydrated DES: 25%, 50%, and 75%. The pure DNA concentration was 0.0875846 M. The purity of DNA is 1.89 using the A_{260}/A_{280} calculation. 25% displays the closest peak with control, a concentration of 25% was determined to preserve the stability of DNA. FTIR analysis revealed a few functional groups in pure DNA, pure DES solution and DNA in DES solution.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Background of study

Deoxyribonucleic acid (DNA) is one of the most important macromolecules in cells, containing the genetic information required for living creatures to develop and operate. Although DNA is structured in a helical stranded pattern, it may take on several three-dimensional conformations. As a result of this structural polymorphism (Zhao & Qu, 2013), DNA is made up of four distinct deoxynucleotide monomers and is used as a generic material with sequence programmability. Each monomer is made up of one of four nitrogen-containing nucleobases (cytosine [C], guanine [G], adenine [A], or thymine [T]), deoxyribose, and phosphate. Figure 1.1 shows the structure of DNA.

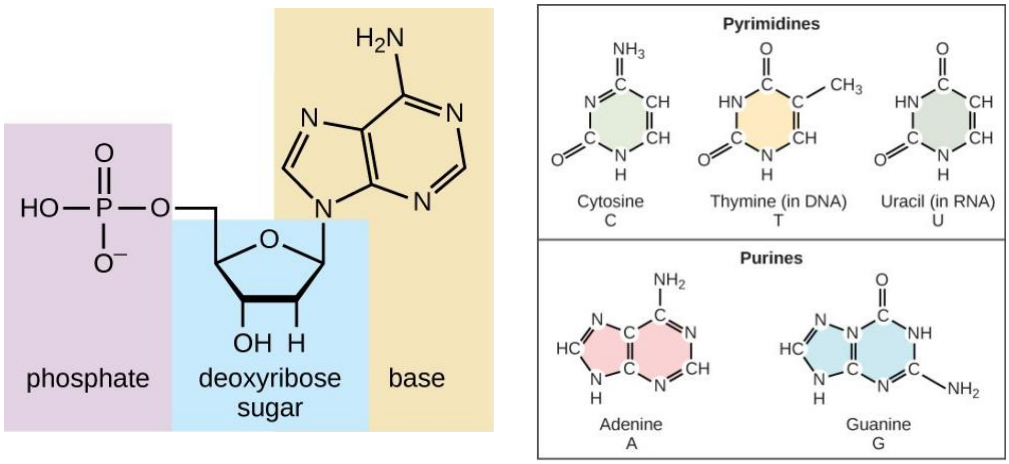

Figure 1.1 Structure of DNA (Dong et al., 2020)