UNIVERSITI TEKNOLOGI MARA

MOISTURE UPTAKE IN NATURAL RUBBER VIA GENETIC ALGORITHM

NADRAH BINTI ABD HAMID

This report is submitted in partial fulfillment
of the requirements needed for the award of
Bachelor of Chemical Engineering (Hons.)
Chemical and Process

Faculty Of Chemical Engineering

July 2017

ABSTRACT

This study was conducted to determine the behavior of moisture content in different shape of natural rubber and to implement the use of Genetic Algorithm on the behavior of moisture uptake in natural rubber. The time taken of water to absorb into different shapes of natural rubber and weight percentage of water absorbed inside the rubber at a given time were taken during the research. Two samples of natural rubber in cube and sphere shape were prepared. The dry weight of samples were taken before immersed them in water and the wet weight of sample were taken daily until the day of 21, which the equilibrium state has been reached. As a result, it has been find out that the different shape of natural rubber has affected the behavior of the natural rubber. The sphere sample has a small percentage of water absorption with value of 0.78% compared to square sample. This is due the large surface area with large volume of each unit of layer and more entry space for water to absorb completely inside the natural rubber. Thus it attained the equilibrium state faster than cube sample and it caused the low tendency of the behavior of natural rubber to change. The use of Genetic Algorithm (GA) method in this research has helped in in obtaining and displaying a result in simplest way in order to further increase the understanding of people towards the results of this research.

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ACKNOWLEDGEMENT

Firstly, I would like to express my sincere gratitude to my supervisor Dr. Sherif Abdulbari Ali for the continuous support, motivation and immense knowledge that he gave to me. His support and guidance helped me in all the time of research and writing of this thesis. Besides that, I would like to thank Dr. Rahida Wati for her helping and guidance during my completion of this research. Without the ideas and knowledge given by both lecturers, this research project would not have been completed as presented here.

I would also like to thank my family especially my parents for being supportive and always there cheering me up and stood by me through the good times and bad. Last but not least, thanks to my friends who were willing to help and give their best suggestions. Without these people, I would never have been able to finish my research.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND STUDY

Natural rubber is a biopolymer material, which has good elastic properties, flexibility and damping behavior but poor chemical resistance and processing capability (Mente P., 2016). Natural rubber refers to a coagulated or precipitated cis-1,4-polyisoprene products obtained from the latex of rubber producing plants (Bushman B. S. et al., 2006). Latex, a milky white liquid can be obtained by tapping process where it is being collected from the bark of certain tree that has been cut. Natural rubber is an elastic type of rubber whereby it returns to its original shape after some stretching force is released.

There are many manufacturing companies that use natural rubber as their raw material to produce several types of rubber product. The products that can be produced from natural rubber are medical gloves, balls, rubber tubes, insulator, gasket and footwear. Furthermore, natural rubber can produce a mixing of cement-latex to protect buildings from earthquake and the mixing of bitumen-rubber can be produced from natural rubber to make road surfaces (Mente P., 2016).

Natural rubber is a hydrophilic in nature, liable to absorb moisture and hence their mechanical properties get degraded over a period of time (L. Radhika and M. Ashok, 2016). From the stated statement, it shows that there is a disadvantage that comes from natural rubber itself. Generally, moisture uptake or water absorption is a process that takes place according to Diffusion and Fick's Law (L. Radhika and M. Ashok, 2016). Diffusion is a transportation of molecules or atoms from a part of system to another system.

In moisture uptake process, diffusion takes place when the molecule of water absorb into the surface of natural rubber then diffuses into the inside of natural rubber. During diffusion, the water molecules are free and thus they move independently towards each (Wong K. J., 2013). It will enhance the moisture uptake through the surface of rubber and increase the rate of penetration into the natural rubber.