## UNIVERSITI TEKNOLOGI MARA

# A STUDY ON THE EXTRACTION METHOD AND THE STABILITY OF BLUE PIGMENT FROM VARIOUS NATURAL SOURCE FOR FOOD COLORING

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

**Faculty of Chemical Engineering** 

July 2017

#### ABSTRACT

The demand for natural food colouration keep on increasing annually after the benefits of natural colour which are not only for food colouring but also have abundance of health effect have been revealed. However, there is a major factor that prevent these natural colour from being commercialize which is its stability. Natural colour such as anthocyanin have weakness in heat, light, storage time and many other external factors that usually done in industry. Therefore, this experiment was done to determine the better extraction method and to test the extracted pigment stability in food product. The natural colour sources come from Clitoria ternatea and Melastoma malabathricum, fruits which gives blue colour. The solvent used for the extraction are deionized water and ethanol. The stability test will be conducted on the encapsulated liquid, the encapsulated powder and on the muffins, that contain these encapsulated dye pigment. For the extraction procedure, the pigment that extract using solvent show higher absorbance compared to others. For the stability on encapsulated solution and on powder, higher temperature affects more on colour degradation compared to lower temperature while for storage time, longer time also would affect on colour degradation on powder also muffin. For C. ternatea, the solution extract with ethanol 20% have higher reading on spectrophotometer which is 2.807 compared when extract with deionize water which is 1.69 at 600nm. While for *M. malabathricum*, the solution extract with ethanol 20% also have higher reading on spectrophotometer which is 2.05 compared when extract with deionize water which is 1.706 at 800nm. In powder test, C. ternatea with water extract shows highest reading in chromameter for lightness test. For coordinate a<sup>\*</sup>, *M. malabathricum* extract with ethanol 20% shows highest reading while coordinate b<sup>\*</sup> *M. malabathricum* with deionize water extract have highest reading. The time for testing the sample are at days (0,7,14,21 and 28). The different temperature used are room temperature (25°C) and refrigerator (4°C) while the presence of light is tested by wrapping and unwrapping the sample using aluminum foil. Therefore, it is observed that temperature, storage time and light gives impact on the stability of anthocyanin blue colour.

#### ACKNOWLEDGEMENT

First of all, I like to express my gratitude and merciful to Allah S.W.T because giving me a good health condition during the period to complete this long and challenging journey successfully. The opportunity on doing this research have inspired and taught me lot of new things.

I wish to express my sincere appreciation to my supervisor, Dr. Siti Noor Suzila Bt Maqsood Ul Haque, whose encourage, guidance, support and critics from initial to the final level to develop an understanding. Without her continued support and interest, this research report would not have been the same as presented here.

I also would like to appreciate to all staffs and lecturers in Faculty Chemical Engineering, UiTM Shah Alam especially laboratory assistants, for their cooperation and guidance in my experiments research. Also, my gratitude to those people helps testing my analysis.

I would like to thank to my beloved parents for their support from various love, monetary, and motivation. I am grateful for their support. To those who were involved either directly or indirectly gave co-operation, encouragement, constructive suggestion, and full support that led me to complete this project. Last but not least, I am incredibly thankful to the Faculty of Chemical Engineering for giving me this chance to do this wonderful and interesting project.

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### CHAPTER ONE INTRODUCTION

#### 1.1 RESEARCH BACKGROUND

During the past years, most of the colourant that used in industry came from unnatural sources such as synthetic dye. After a few years, researcher have found that animal can become alternative sources for dye industries because some animals can produce unique dye and also have high stability. The highly stable colourants that are permitted to be used as food colourants comes from synthetic dye or animal-origin (e.g. carmine) (Müller-Maatsch et al, 2016). However, these types of colourant gives more harm than good to human if it is consumed in food products. McCann et al, (2007), stated that several synthetic dyes have been associated with adverse effects on children. Synthetic dye also cause increase in environmental pollution and health hazard (Rajendran et al, 2012). Due to these disadvantages, people tend to change their source of colourant to natural source.

Our environment contains variety of plant that have its own colour and it makes them very beautiful to see. These different colours comes from different chemicals that can be found in them. For example, there are many colour of flowers in this world. These flowers actually contain pigments that give them color which are chlorophyll, anthocyanins, and carotenoids. Chlorophyll is a chemical that give green colour for leaf, anthocyanin gives colour of red, blue and purple for fruits and flowers while carotenoid is a chemical that give yellow, orange and brown pigments mostly for fruits (Chadde, 2012).

One of the most common pigment from natural source that used in food industry is from anthocyanin. These chemical from plant is more attractive than others where it contains blue, red and purple colour. Furthermore, this natural colour have many nutritional values and can treat disease. Anthocyanin for example, it can reduce cancer cell proliferation and inhibit tumor formation (Lila, 2004). However, when comes to food industry, it becomes a challenge because production of food product needs to get through heating process which is a weakness for anthocyanin. According to Sui, (2016), heat