



اَللّٰهُمَّ صَلِّ وَسَلِّمْ عَلٰى
UNIVERSITI
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Cawangan Terengganu
Kampus Bukit Besi

SCHOOL OF CHEMICAL ENGINEERING

CHE 365

FINAL YEAR PROJECT

(REPORT)

TITLE:

**PREPARATION OF STARCH-BASED
BIOPLASTICS**

**FROM LOCAL SWEET POTATO,
TAPIOCA AND PUMPKIN**

WITH PLASTICIZER AND FILLER

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ABSTRACT

A non-renewable resource, petroleum, is used to make a particular kind of plastic known as petroleum-based plastic. Petroleum-based plastic adds to the expanding problem of plastic pollution in seas and on land and takes hundreds of years to degrade. Plastic made from petroleum needs a lot of energy to produce, which increases greenhouse gas emissions. Some polymers made from petroleum may include dangerous compounds that might contaminate food and drink, endangering both human and animal health. Relying largely on plastic made from petroleum is not sustainable in the long run since petroleum is a limited resource. Because of this, efforts have been made to create biodegradable and environmentally friendly materials, such as bioplastic made from plant starch. Among the options, starch is a great replacement for synthetic polymers. This is due to the fact that it is plentiful in nature, cheap, non-toxic, renewable, biocompatible, and capable of possessing qualities similar to plastic. In this investigation, pumpkin, tapioca, and native sweet potatoes were used to extract starch. Then, bioplastic was prepared using the solution casting method. Glycerol and sorbitol were used as plasticizer. The physical properties of bioplastic such as moisture content was carried out. 17 bioplastic samples were produced with different compositions using the Box Behnken Design table. The optimal bioplastic composition is produced with expert design software. The sample has the highest moisture content, which is 21.16%. while sample 17 has the lowest moisture which is 1.52%. However, sample 6 and 17 are not plastic that have the best composition. The value of 0.66% is chosen as the optimal condition for the percentage of moisture content. Starch-derived substances offer a significant amount of potential for use as biodegradable polymers, which would significantly contribute to the protection of the natural environment.

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1.0 BACKGROUND

1.1 INTRODUCTION

Plastic is a synthetic substance created by humans and is generated from fossil fuels like natural gas and petroleum (Zhang et al., 2022). Petroleum and natural gas are refined in the process of making plastic, and the resultant chemicals are subsequently processed to create polymers. To produce the finished plastic item, these polymers are subsequently moulded into different shapes(*Introduction to Plastics*, 2019; *Plasticbook*, n.d.; Rial, 2022). Plastic comes in a wide variety of forms, each with special characteristics of its own. Polyethylene, polypropylene, polyvinyl chloride (PVC), and polystyrene are a few of the most popular forms(Rial, 2022). Depending on the kind, plastic has different characteristics, but in general, it is lightweight, durable, and resistant to UV light, chemicals, and moisture. Plastics are utilised in many different types of items, such as packaging, consumer goods, building materials, medical equipment, and automobile components, to name a few(*Introduction to Plastics*, 2019). Plastic still has a lot of harmful effects on the environment despite being widely used. Plastic accumulates in the environment because it takes a very long time to degrade. Along with contributing to ocean pollution, this trash has the potential to harm ecosystems and species. Additionally, as plastic breaks down, hazardous compounds are released into the environment, endangering both animal and human health(Pinto Costa et al., n.d.). Plastic manufacture and disposal have harmful effects on the environment. Plastic manufacture uses a lot of energy and contributes to climate change by releasing greenhouse gases into the environment. Moreover, the disposal of plastic trash frequently leads to littering, pollution, the release of hazardous compounds into the environment, and other negative effects(marinedebrisnoaagov, 2016; Pinto Costa et al., n.d.; *PLASTICS AND THE ENVIRONMENT Published by Sponsored by Acknowledgement*, n.d.; *Products Made From Oil and Natural Gas Infographic (1)*, n.d.; Tekman et al., n.d.).