

# CURRENT RESEARCH AND DEVELOPMENT IN BIOTECHNOLOGY ENGINEERING AT IIUM

VOLUME IV

Editors:

Ma'an Alkhatib  
Abdullah Al Mamun  
Faridah Yusof



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*(VOLUME IV)*

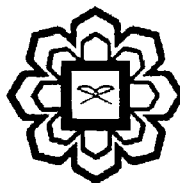
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## CHAPTER 26

### IDENTIFICATION OF SUITABLE RESIN TO BE MIXED WITH COMMERCIALY AVAILABLE CASSAVA STARCH FOR RIGID PACKAGING APPLICATION

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#### ABSTRACT

This project studies the compatibility of two types of resins (PETLIN LDM050X and G452) when mixed with commercially available food grade cassava starch. Three mixing ratios were used (resin: starch) 80:20, 50:50 and 20:80, where >99% purity glycerol were used as plasticizers. The starch was used without any alterations in its structure. The methodology involves cooking of starch-glycerol mixture with appropriate amount of water, drying to minimize the moisture contents, grinding the mixed starch into powder form, combining resins with mixed starch, another grinding step to reduce the mixture into an acceptable size and lastly compounding using twin screw extruder. Testing were conducted to determine the properties of mixed resins which will is intended for rigid packaging purpose, since packaging industry utilizes up to 45% of Malaysia's plastic consumptions. The importance of this study is to provide an alternative for a greener packaging material at a competitive price and to reduce waste dumping problem. The selection of best mixing ratio/ratios is justified from the testing conducted, which is PETLIN LDM050X of 80:20 ratios.

**Keywords:** resin, starch, plastic, packaging material

#### INTRODUCTION

Starch is among natural polysaccharide polymeric materials which is abundant in fruits, roots, and leaves of plant. It is generally deposited in the form of small granules or cells with diameters between 1-100  $\mu\text{m}$  (Junistia *et al.*, 2008). Most of the commercial bioplastics available are derived from corn and potato, but other types of starch such as cassava, sweet potato, wheat starch are also produced in large amounts (Sugih, 2008). Starch is also susceptible to enzymatic attack and other chemical reactions (Sriroth *et al.*, 2005).

Starch- based bio-plastics represent from 80-90 % of bio-plactis markets (Sarakarn *et al.*, 2000). In this study, starch from cassava is preferred due to high level of purity and produce clear paste when cooked (Sriroth *et al.*, 2003), low production cost and high starch content (Watananonta, 2006). It can also be modified chemically, physically and enzymatically to yield desirable properties. The plant is abundantly available in a tropical country like Malaysia, thus inexpensive. Its degradation yields biomass, CO<sub>2</sub> and water. These elements can be recycled back into food chain cycle, making it renewable.