UNIVERSITI TEKNOLOGI MARA

PREPARATION OF CERAMIC SUPPORT COATING USING TIN (II) OCTOATE: EFFECT OF ETHYLENE GLYCOL AND DIMETHYL FORMAMIDE SOLVENT

ABDUL MUIZ BIN ABDUL JALIL

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

FACULTY OF CHEMICAL ENGINEERING

July 2018

ACKNOWLEDGEMENT

I would like express my gratitude to my supervisor, Dr Norliza Binti Ibrahim for her guidance and assistance in helping me to complete this research project successfully. Her encouragement and enthusiasm in me throughout actually increasing my motivation in doing this research. She always knew where to look for the answers to obstacles while leading me to the right sources, theories and perspectives. Other than that, I also wish to express my appreciation to and Miss Amira Nadzirah Binti Suhaidi who always assist my research project to be in the right path and with her guidance which helped me a lot in completing this research project. Here I would like to thank all the researcher and contributors to this particular field because without their previous researches, I would not able to complete this research due to lack of information and I hope that I can be part of them contributing to this subject matter. Lastly I would like to express my gratitude to my family member and my friends which give morale support in completing this task. And most of all to Allah SWT, who gave me strength and knowledge to do this project, the perseverance and determination to continue doing this project in spite of struggles that come along the way.

ABSTRACT

Tin (II) Octoate usually used as catalyst in condensation polymerization in production of Polylactic acid (PLA). Problem comes as the phase of catalyst same as product and reactant which made catalyst difficult to be recycle and if this catalyst remain in product PLA plastic, the plastic quality will be affected. Experiment has been done to immobilize the Tin (II) Octoate in form of sol gel before coated on solid support which is ceramic. Parameters are chosen to determine the coating which are effect of Ethylene Glycol (EG) and Dimethyl Formamide (DMF) on the preparing the coating solution and this structure are characterized by Adhesion test and Field Emission Scanning Electron Microscopy Energy Dispersive X- ray (FESEM-EDX). The result showed that the coating layer that using Dimethyl Formamide (DMF) as a solvent contain about 36.96% tin (Sn) element which higher that the coating used Ethylene Glycol as solvent which only 11.43% content of tin (Sn) element. This showed that Dimethylformamide solvent is more efficient to be used as solvent and produce better coating characteristic in term of catalyst distribution and strength of catalyst attachment on ceramic support.

TABLE OF CONTENT

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND STUDY

Polylactic acid is a polymer which is compostable which is derived from renewable source such as starch or sugar and polylactic acid is known as PLA. Due to its compostable characteristic, PLA has been viewed as beneficial material to reduce societal solid waste disposal problem. PLA also is an ideal material for food packaging due to its low toxicity characteristic which made PLA can be safely used by consumer (Lim, Auras, & Rubino, 2004). PLA can be synthesis using polymerization of lactic acid (LA) in presence of heavy metal like tin, aluminium, with tin (II) and zinc yielding the purest polymer. These catalyst especially tin (II) octoate will favour the reaction due to covalent metal oxygen bond and free *p* or *d* orbitals (Garlotta, 2001).

Polymerization of lactic acid can be more focused on ring opening polymerization as this process can yield high molecular weight of PLA. In this reaction the purity of two lactic acid monomer is very important which need to be combined together and this process can be conducted in presence of catalyst. The catalyst used is stannous octoate which known as tin (II) octoate and used as an initiator to provide high reaction velocity, high transformation and high molecular weight in mild reaction condition (Sungyeap Hong, 2014). Besides the uses of tin (II) octoate as a catalyst, there are several nontoxic catalyst like magnesium, calcium, zinc, aluminium and alkali metal which can replace tin (II) octoate catalyst in order to preserve environment as tin (II) octoate.