UNIVERSITI TEKNOLOGI MARA

SYNTHESIS OF TIN OCTOATE COATING ON CERAMIC SUPPORT DERIVED FROM CERAMIC WASTE IN PRODUCTION OF POLYLACTIC ACID

AMIRA NADZIRAH BINTI SUHAIDI

MSc

June 2021

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student	:	Amira Nadzirah binti Suhaidi
Student I.D. No.	:	2016477492
Programme	:	Master of Science (Chemical Engineering) – EH750
Faculty	:	Chemical Engineering
Thesis Title	:	Synthesis of Tin Octoate Coating on Ceramic Support Derived from Ceramic Waste in Production of Polylactic Acid
Signature of Student	:	 ……..
Date	:	June 2021

ABSTRACT

Production of polylactic acid (PLA) using liquid tin octotate (homogeneous catalyst) can lead to degradation of PLA after certain time. The aim of this study is to fabricate heterogeneous tin octoate on ceramic support from ceramic waste in the production of polylactic acid. The research began with the collection of ceramic waste collected from sanitary ware company and ceramic support were produced. Next, the support then were coated with tin octoate mixture formulation with variation on sintering temperature, binder, solvent and catalyst concentration. The samples of coating on ceramic support were sent for characterization using EDX and adhesion testing of tape test ASTM D3359. With this analysis, the optimum conditions for the surface coating were formulated using tin octoate of 500ppm, polyethylene glycol (PEG) binder and N,N-dimethylformamide (DMF) solvent and sintered at 200 ℃. Subsequently, the ring opening polymerization of lactide were undergone with different phase of catalyst, initiators and temperature of reaction. The samples of polymerization reaction product were sent for characterization using Fourier Transform Infrared (FTIR) in finding the functional group in the product and UV-Vis Spectrophotometer at absorbance of 232 nm in finding the existence and concentration of the product. The reaction with heterogeneous catalyst achieved highest polymerization rate of 92.4 ppm at 130 ℃ of reaction temperature. Excellence result showed using methanol initiator at polymerization rate of 70.8 ppm of product. This study has proven that the heterogeneous tin octoate with reaction temperature of 130 ℃ and using methanol initiator can be used in the production of polylactic acid.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my MSc and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor Dr Norliza binti Ibrahim.

My appreciation goes to the assistant science officers, assistant engineers, laboratory assistants and lecturers who provided the facilities and assistance during sampling. Special thanks to my colleagues and friends for helping me with this project.

Finally, this thesis is dedicated to my mother and a very dear late father for the vision and determination to educate me. This piece of victory is dedicated to both of you. Alhamdulilah.

TABLE OF CONTENT