UNIVERSITI TEKNOLOGI MARA

MECHANICAL AND THERMAL PROPERTIES OF COMPOSITE BOARD PREPARED BY USING POLYPROPYLENE AND CARDBOARD WITH ADDITION OF MALEIC ANHYDRIDE (MA) AS COUPLING AGENT

NURUL FATIHAH BINTI ZURI

BACHELOR OF ENGINEERING (HONS) CHEMICAL

JANUARY 2019

ACKNOWLEDGEMENT

This thesis becomes a reality with the kind support and help of many individuals. I would like to extend my sincere thanks to all of them. Foremost, Thanks to Allah the Al-Mighty for His blessing during the completion of my Bachelor Degree Research Project and for the wisdom His bestowed upon me, the strength, peace of mind and good health in order to finish this research.

It is a genuine pleasure to express my deep sense of thanks gratitude to my supervisor Prof Madya Dr Farid Mulana for his keen interest on me at every stage of my research and the inspiration, timely suggestion with kindness and dynamism have enable me to complete my thesis. I also want to thank the Faculty of Chemical Engineering UiTM Shah Alam which included all the other lecturers and staffs that involved in my research project.

This thesis is dedicated to my late parents, Zuri Bin Othman and
and uncle and aunty, Sani Bin Othman and Rohayu Binti Othman that have been taken care of me since I was losing my parents. Thank you for the prayers, love and tremendous support and motivation throughout my life that kept me inspired to keep working on my research project and also given me the opportunity of an education from the best institutions. I also want to thank my sibling (Husaini, Anis and Amira) and the whole family for the prayers and support.

Deep thanks to my best friend, Nurul Aliad who has always helped me and believed that I could do it. Thank you for be with me since 2012 through thick and thin. I am very thankful to have you every time you comforting me whenever I face problem. For my dearest partner, Mohd Azril Shazwan I would like to thank you for being an impressive listener supporter whenever I have problems and obstacles.

Last but not least, I also want to give appreciation to everyone that involved in my research project either directly or indirectly because without all the helps and supports, I will not have what I have today. I will not forget the helps from all my friends and colleagues that kept sharing their knowledge and information with me.

ABSTRACT

Worldwide issues about solid paper waste are very typical these days. There is disposed of solid paper waste has reached 67 million tons that wound up in landfill. The solid paper waste such as cardboard will be mix with propylene to enhance the strength between the two component and with addition of MA (maleic anhydride) as the coupling agent to enhance the strength of composite board. The experiment started with the number of ratio of polypropylene as the matrix while cardboard as filler. The ratio starts with none of coupling agent present which are 40:60, 60:40, 50:50 and 75:25. The experiment continues with different ratio of matrix: filler: coupling agent. They are 40:50:10, 50:40:10, 60:30:10 and 75:15:10. The testing and analysis is includes tensile and bending testing. The research is about to indicate the effectiveness of the coupling agent that will be use and the suitable ratio of matrix and the filler with amount of the compatibilizer that will produce a good composite board. The result showed that there are increased of the bond within the polymer and cardboard resulted from mechanical testing and thermal analysis.

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Composite board comes with a variety of type and also shades that provide long lasting protection beyond wear and tear. Commonly, it has been used for a variety of furniture, domestic building projects, trimming, exterior shutters and other home products. It's an ideal material preference due to the many advantages. Composite board or additionally acknowledged as Wood plastic composites (WPC) have obtained great attention beyond industry in recent years [19]. There are many demand of composite board production in order to produce a lot of type products from household to construction materials. The wide range of application give the composite board a wide acceptance by the global market due to conversion of the existing plastic processing techniques.

Cardboard, saw dust and rice husk are the example of the wood fibre that contained in the composite board. Composite board is the product from combination from two type of material which are thermoplastic and wood fibre. At specific temperature thermoplastics can be in mouldable condition where they cool down they will become in solid condition once again. Matrix and filler is the main component in the composite board. The adhesion between those two components need to be strong attached to each other that can produce a flexible composite board. In the composite board. Basically, the filler will fill with the wood fibre while the matrix contained of thermoplastics such as polyester, polypropylene, polyethylene, and polystyrene. The ratio of the between