UNIVERSITI TEKNOLOGI MARA

TENSILE, FLOW AND THERMAL PROPERTIES OF BIODEGRADABLE PLA/KENAF FIBRE COMPOSITE

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ABSTRACT

This research was conducted to study the flow, chemical, mechanical and thermal properties of biodegradable PLA/Kenaf fibre composite. The PLA resin compounded with kenaf fibre via twin screw extruder with different composition of kenaf from the prepared formulation. The PLA composite of different kenaf composition was then tested for its flow, chemical, mechanical and thermal properties by using testing equipments such as Melt Flow Tester, FTIR, Tensile Tester and Differential Scanning Calorimetry (DSC).

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CHAPTER ONE
INTRODUCTION

This chapter explains a brief background of plastic drinking straws, biodegradable materials such as PLA and kenaf fibres, objectives, problem statement, and the scope of this research study.

1.1 Research Background

Plastic drinking straws are typically petroleum-based materials, commonly made from polyethylene (PE) or polypropylene (pp) mixed with colorants and plasticizers. Plastic straws are not biodegradable. It will break down into small pieces called micro plastics and keep accumulating in the oceans which unintentionally getting consumed by fish and trapping sea creatures. This environmental concern is clearly proven by a group of marine biologists whom helped remove a plastic straw from a sea turtle's nose in Guanacaste, Costa Rica (Brown, 2017). Stated in *The Star Malaysia* newspaper, 2018, Malaysians produced approximately 38,000 tonnes of waste daily and use up to 31 million plastic straws every day. Hence, the Federal Territories Ministry Secretary of Malaysia, General Datuk Seri Adnan Md Ikhsan, announced that the ban on the use of plastic drinking straws will be effective on January 1st, 2020 and will be included in the conditions for business licenses starting from January 1st, 2019. He also stated that straws made from biodegradable material could be used as the replacement of the conventional plastic straws ("Plastic straw ban effective 2020, ministry clarifies," 2018).

Biodegradable materials are commonly made of polyhydroxybutyrate (PHB), poly(lactic acid (PLA), polycaprolactone (PCL), and poly(butylene adipate terephthalate) (PBAT). Researchers mostly interested in discovering the used of PLA in producing bio-based plastics such as trays, bottles or films in food packaging industry(Soroudi & Jakubowicz, 2013). The used of PLA is an intended approach to substitute commonly used petroleum-based plastics made from polyethylene, polypropylene and polystyrene.

PLA is the most abundantly produced biodegradable polymers which is renewable, recyclable and has easy processability and good strength which can be applied in producing biodegradable straw. Besides, PLA is also a stiff and brittle bio-polymers (Avolio et al., 2018)