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BLENDING OF LLDPE WITH SiO_2 VIA EXTRUSION

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ABSTRACT

Environmental pollution problems are becoming severe nowadays especially at the dumpsite. Thus it is imperative to develop new materials such as producing plastic that is ecological friendly to environment yet it has been found that there are limited research on the blending of LLDPE with inorganic material such as SiO2. This work is done to investigate the synthesis of LLDPE/SiO2 composite at different ratio and to investigate the characterization of composite by using FTIR and the mechanical properties of tensile and elongation at break. The composite is produced through extrusion process by using twin-screw extruder and being analyzed by using FTIR, TGA and the universal tester machine. The result demonstrated that the composite with lowest SiO2 filler content which is 4% has the best mechanical properties. The production of this composite will be useful to the industry as the mechanical properties of the composites has been enhanced hence producing a better plastic materials.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

In recent years, uncontrollable environmental pollution is becoming worse especially at the dumpsite area worldwide. Thus, many researchers have come with an idea to produce a more ecological friendly materials to the ecosystem yet great in its physical and mechanical properties which will be able to overcome and solve these environmental problems.

Biocomposites are made up of from an individual polymer matrix and fibre reinforcement component which remain bonded together by physical or chemical interactions, but retain their individual physical or chemical identities. Natural fibres are used as reinforcement that provides strength and rigidity imbedded in matrix polymers (Moliner et al., 2018). Matrix polymers are generally thermoplastic polymers derived from petroleum such as polypropylene (PP), low-density polyethylene (LDPE), high-density polyethylene (HDPE), and also polystyrene (PS). But these polymers are not easily degrading in natural environment thus become the problems to environment.

One of the powerful method in producing new materials are by blending polymer with inorganic materials that is called polymer composites or filled polymers (Chaichana et al., 2007). It is known that blending is important to obtain polymer materials with best properties and also improve their processing ability and also their costs. Based on previous research in this field, most polymer are not in a homogenous system anymore but in a state, which is multiphase complex systems that are obtained through blending process.

Polymers that had been reinforced by the inorganic fillers have attracts industrial interest because of the modification on the important mechanical and physical properties (Urrego Yepes et al., 2017). Silicon Dioxide (SiO2) is recognized as an inert diluent and is used as an enhancing agent for thermoplastic polymers (Wei et al., 2006). This filler has expanded the rangeability of applications in the usage of polymers.