UNIVERSITI TEKNOLOGI MARA

BLENDING OF SiO_2 WITH LLDPE VIA EXTRUSION 2

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ABSTRACT

Linear low density polyethylene (LLDPE) was blended with filler SiO_2 at a ratio up to 6% by extrusion to study the mechanical characteristics of the product and compared it with other journal. The maleic anhydride (MA) was grafted into LLDPE-SiO_2 to determine the possible reaction. The LLDPE-g-MA composite filled with SiO_2 were extruded and melt-pressed in order to prepared samples from characterization and mechanical properties test. The FTIR results showed the interaction between LLDPE-g-MA and SiO_2 and it also will affect the mechanical strength. The result obtained from this study showed that the LLDPE/SiO_2-g-MAH composite was successfully prepared. It showed 2% wt. of SiO_2 have the highest tensile strength while 4% wt of SiO_2 is the highest ductility. For the flexural test, flexural modulus and strength are increase with the wt.% of SiO_2 increase. From this study, it is found that SiO_2 and MA can improve the strength of polymer but must be at the right amount.

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INTRODUCTION

1.1 Research Background

Polymer is one the most popular material in the chemical industries since last thirty years. Polymer is a material that come from a combination of many molecules that bond together and form long chain. There are two types of polymer which are thermoset and thermoplastic. According to Amin & Amin, (2011), thermoset is a product of polymer that undergo chemical reaction to become insoluble material while thermoplastic is a plastic that will change properties depending on the process. If the thermoplastics was heated, it will be soft and harden when cooled.

In order to make the usage of polymer can be increase and at the same time it will be cost effective, composite polymer have been introduced. Composite can be defined as blend of two or more materials that consists of filler and matrix (Chimiche, 2012). Filler is a strong material while matrix is a material that hold the filler (polymer). Silicon dioxide (SiO2) is one of the most common inorganic composite that been used in polymer blending process. Dioxide nanoparticles have been proved by recent study about the ability of it to improve the mechanical and thermal properties of various of polyolefins A composite polymer will keep their filler and binder identities and at the same time the properties of it will change.

Polyethylene, is one of type of thermoplastics. Polyethylene(PE) was globally used because of its good properties such as inert to chemical and easy to process (Khanam & AlMaadeed, 2015). It has been used in many applications such as pipe, sheets and electrical wire insulator. There are three main types of PE which are high density polyethylene (HDPE), low density polyethylene (LDPE) and linear low density polyethylene (LLDPE). A composite also been introduced to polyethylene where the properties of mechanical and physical of it are better than normal polyethylene.