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Studies on Some Mechanical Properties of Pvc-Wood Fibre Composite

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ABSTRACT

In this study some mechanical properties of PVC-Wood fibre composite were investigated. The wood fibre was gotten from a mahogany tree. The sample was moulded and shaped at a temperature of 150^{o}C using a hadraulic hot press and pressure of 3bar for 5mins and the mechanical properties were studied base on varying the wood fibre contents from 0% to 50%. The hardness test carried out using the durometer hardness tester show a decrease in the hardness of the composite as the wood fibre is varied from 0%, 10%, 20%, 30% 40% and 50% and the impact strength of the composite decreases as well in that order. The tensile strength conducted using the Mensato Tensometer show a decrease at 10% wood fibre, while an increase in the wood fibre to 20% show an increase in the tensile strength on further addition of the wood fibre a decrease is noticed. This decrease in tensile strength decreases the strain of the PVC-wood fibre composite and hence increasing the modulus of elasticity of the PVC-wood fibre composite as the wood fibre is been added.

1. Introduction

In the last 20 years, natural organic fillers have been regularly applied in the global market. Polyvinyl chloride–Wood composite are recently popular in many applications, such as construction industries [1]. The reason is the desirable properties of the composite, such as the relative low cost and the abrasiveness [2]. Furthermore, the composites are environmentally friendly and recyclable [1]. Studies have pointed out the main problems, the strength of the composites decrease, the leaching of the additives and the deterioration of the physical properties of the blend [3]. The wood additives are susceptible to thermal degradation; therefore it was only suitable for some type of plastic, such as PVC, PE and PP. But in this case it was very difficult to reach strong adhesion between hydrophilic cellulose and hydrophobic polymer (PVC). Studies have used three general opportunities to enhance dispersion and compatibility of cellulose with polymers: fiber, matrix and interface treatment. The advantages of wood are: low density, excellent mechanical properties and good biodegradation. But unfortunately, it has negative aspects; UV radiation, biological attack, degradation from high temperatures and the air moisture content. Therefore the service lives of the composites are needed to be extended [4]. However, current levels of their usage and disposal generate several environmental problems. A major portion of plastic produced each year is used to make disposable items of packaging or other short-lived products that are discarded within a year of manufacture. These two observations alone indicate that our current use of plastics is not sustainable [5]. Recycling is one of the most important actions currently available to reduce these impacts and represents one of the most dynamic areas in the plastics industry today. Recycling of packaging materials has seen rapid expansion over the last decades in a number of countries. Advances in technologies and systems for the collection, sorting and reprocessing of recyclable plastics are creating new

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