PAPER MILL SLUDGE AS FILLERS IN POLYPROPYLENE THERMOPLASTIC COMPOSITES

BY :

JAMALUDIN KASIM, AMRAN SHAFIE, SHAIKH ABDUL KARIM YAMANI & SYED YUSAINEE SYED YAHYA

MEI 2002

Tarikh : 2/5/02

No. Fail Projek :

Penolong Naib Canselor (Penyelidekan)
Biro Penyelidekan dan Perundingan (BRC)
UiTM, Shah Alam

Ybhg. Prof.,

LAPORAN AKHIR PENYELIDEKAN " PAPER MILL SLUDGE AS FILLERS IN POLYPROPYLENE COMPOSITES"

Merujuk kepada perkara diatas, bersama-sama ini disertakan 3 naskah Laporan akhir Penyelidekan berkenaan.

Sekian, terima kasih.

Yang benar,

Prof. Madya Dr. Jamaluddin B. Kasim
Ketua
Projek Penyelidekan

TABLE OF CONTENTS

ABSTRACT

Paper mill sludge was collected from Union Paper Mill Sdn. Bhd., Bentong in the form of wet paste, oven-dried and grounded into powder form to be use as filler in the manufacture of polypropylene thermoplastic composites. Three different particle sizes (<0.15, 0.15 and >0.15 mm sieve size) was blended into polypropylene at 10 to 50% filler loading and a 3% maleated anhydride polypropylene was added as a coupling agent. The composite properties of modulus of rupture, tensile strength and flexural modulus decreased significantly while the elongation at break and water absorption increases with bigger particles. Increasing the filler content from 10 to 50% showed a significant decrease in the modulus of rupture, tensile strength and elongation at break. However the modulus properties of tensile and flexural, and the water absorption properties increased significantly. Addition of maleated anhydride polypropylene does not show any improvement towards the composite properties. The blended admixture could be use as a starting raw material in the manufacture of various thermoplastic products that does not require high strength properties.

1.0 INTRODUCTION

Nowadays, research and development are fast generating new technology for using lignocellulosic fibers blended with polyolefin plastics to produce an array of high-performance reinforced composite products. This latest development provides a strategy for producing advanced materials that take advantage of the enhanced properties of both lignocellulosic materials and plastics. These new composites will give better benefits such as lightweight and improved acoustic, impact and heat reform ability properties (Krzysik and Youngquist 1991; Youngquist et al. 1992). A great variety of applications are then possible because of the many alternatives configurations of the products. Potential products include; storage bins, housing structures, furniture components, automobile components, wall panels, flooring materials and roofing system, and packaging applications (Youngquist et al. 1992).

Works on suitability of fibers and wastes materials as fillers for plastic composites have been centered on lignocellulosic materials such as wood-flour (Woodhams et al. 1984, Myers et al. 1993). These materials have the potential for use as reinforcing fillers in thermoplastics (Sanadi 1994). Lignocellulosic materials have the advantage of being low cost, low density and less abrasive, and thus significant material cost saving. However, their main disadvantages are high moisture absorption and low processing temperature requirement.

At present, the Malaysian paper industry is a multi-million dollar industry with their products enjoying very high demand domestically as well as internationally. However, in producing the various products a lot of wastes are generated and if no