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EXTRACTION AND USAGE OF NATURAL POLYMER MATERIALS FROM SUGARCANE WASTE TO DEVELOP DEGRADABLE COMPOSITE MATERIAL FOR PACKAGING APPLICATIONS

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Polymer based products are finding an important role in different applications today. Polymers fulfill the every aspect of daily life and it is hard to visualize modern society without synthetic and natural polymers. Polymer products can be lightweight, hard, strong, and flexible, and may have special thermal, electrical, or optical characteristics. They have very wide range of applications due to low cost, high specificity and adaptability. However, most plastics are durable and degrade very slowly after the usage. These polymers have strong chemical bonds that make them so durable and tend to make them resistant to most natural processes of degradation. These non - degradable polymer based products create lot of environmental problems after the usage. Bio -based polymers offer important contributions by reducing the dependence on fossil fuels and through the related positive environmental impacts such as reduce carbon dioxide emissions and environmental pollution .The objective of this research is to extract cellulose- hemi cellulose from sugarcane waste to produce degradable composite materials for packaging applications. Cellulose- hemi cellulose mixtures are predominant constituent in cell walls of most plants. Cellulose- hemi cellulose was extracted using sugarcane waste in this research. Extracted materials were veri fied using FTIR spectroscopic techniques. Extracted percentage of cellulose- hemi cellulose was 49.6 wt.%. Extracted product was mixed with Low Density Polyethylene (LDPE) by differing cellulose- hemi cellulose concentration 1 wt%. to 6 wt% using laboratory type internal mixer. The degradability of LDPE with cellulose – hemi cellulose biodegradable composite was studied for 90 days in under buried condition. Degradability of the developed composite material was evaluated by tensile test, soil burial test and water absorption test. The experimental results of 6 wt%. cellulose – hemi cellulose containing samples indicated that 47% reduction of tensile strength after 90 days. Percentage elongation of the composites displayed a gradual decrease up to 90 days during the soil burial test. Elongation properties gradually reduced with increase of cellulose – hemi cellulose concentration from 1 wt%. to 6 wt%. The 6 wt%. cellulose – hemi cellulose containing sample showed the maximum elongation reduction and it was 58% after the 90 days of soil burial test. There was a significant increase of weight loss property during the soil burial test. Maximum weight loss (3.7%wt.) was observed by 6% wt. cellulose – hemi cellulose containing sample. Water absorption properties significantly increased with the time up to 90 days. The highest water absorption (63%) was observed in 6% wt. cellulose – hemi cellulose containing sample after 90 days. These experimental results clearly showed the degradation of developed composite within

tested time period. This developed cellulose – hemi cellulose biodegradable composite material can be used as an alternative material to conventional synthetic polymer to protect the environment.

Keywords: Cellulose- hemi cellulose, LDPE, biodegradable