GREEN COMPOSITES FROM NITRILE BUTADIENE RUBBER AND CASSAVA STARCH

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Abstract: Filler reinforced rubber composites are of immense importance both in the industrial field and in the area of research and development. Particulate filling has been used extensively in rubber industry to improve various properties because it is effective yet inexpensive. The properties like tensile strength, elasticity, ductility, impact strength, abrasion resistance etc. of rubber can be improved by the incorporation of particulate fillers. Acrylonitrile butadiene rubber (NBR) is a special purpose synthetic rubber having exceptional resistance to most of the oils and solvents, which makes it one of the apt candidates in industry for making oil hoses. The nutritive reserves of cassava is made up of starch, which is one of the most important products synthesized by plants that is consumed as food and used in industrial processes. The present work deals with the development and characterization of green composites of NBR containing different loading of cassava starch. The properties of NBR have been found to improve upon the incorporation of cassava starch. The studies show that with increase in the loading of cassava starch in NBR, the tensile strength increases progressively up to 25 phr. The tensile modulus value is increased with the amount of filler loading. The tensile strength decreased after the soil burial for one month due the biodegradability of cassava starch and palm oil which was used as plasticizer. The swelling characteristics of NBR/Cassava starch composites have been studied which indicated improved solvent resistivity of the composite.

Keywords: Composites, NBR, starch.

Introduction

Polymer composites are heterogeneous structural materials which are made up of a polymeric matrix containing reinforcing agents and are often better suited for specific applications than any of the original components. They have a premier role among engineering materials with the advantages such as light weight, corrosion resistance, high fatigue strength and faster assembly. Growing environmental and social concern and the high rate of depletion of petroleum resources have forced the search for new composites and green materials, compatible with the environment. In the context of eco–friendly materials, recyclability of the material is one of the major problems. Recyclability of the composites will lead to cost effective products as well as a remedy for the increased amount of waste materials. Green composites can replace all hazardous and waste producing counterparts. Life cycle analysis should be done for all newly synthesized materials and thus the biodegradability can be measured. This will help us to develop eco–friendly and acceptable materials.

In recent years bio-based polymer composites have been the subject of many scientific and research projects, as well as many commercial programs [1-3]. Biodegradable polymers are designed so that degradation happens by the enzymatic action of living micro-