Ain Shams University
Faculty of Science
Chemistry Department

Influence of gamma irradiation on the properties of some synthetic rubber-based filler composites

A Thesis
Submitted for the Degree of Master of Science
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"Chemistry Department"

By

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B.Sc. in Major Chemistry, Faculty of Science
Ain Shams University
2006

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Approval Sheet

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بِسْمِ اللّهِ الرَّحْمنِ الرَّحِيمِ

قَالُواْ سُبْحَانَكَ لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ
الْعَلِيمُ الْحَكِيمُ

صدق اللَّهُ العظيم

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Aim of the work

Recycling of waste rubber is very important problem due to its huge amount and their negative impact on environment. To eliminate or reduce waste rubber from the environment and to reduce costs of some rubber goods, attempts are being made to reuse waste rubber. Especially, the nature of waste rubber exists in thermosetting state. The aim of this work is to burnt waste rubber completely at 600 °C in a muffle , then the ash residue obtained after burning process collected and used as a filler in preparing NBR rubber composites after treated by silane (VTES) and acrylate monomer (PETiA). Also, modified the physical and chemical properties of Acrylonitrile Butadiene Rubber (NBR) composites using gamma radiation and treated rubber ash.

Filler play an important role for polymer reinforcement cost effective end products. The present work investigates the impact of gamma irradiation doses (from 25 up to 150 kGy) on NBR loaded with treated and untreated WRA as reinforced filler over range of content upto 40 phr.

In this context, some physico-mechanical testing, namely TS, elongation at break, elastic modulus, hardness, TGA,IR, X-ray diffraction (XRD) Soluble Fraction, (SF), Determination of cross-link density (ν) investigations were implemented.

It was found that applied fillers revealed expectedly different mechanical properties appreciably depending critically on the microstructure, i.e. aspect ratio and degree of dispersion of the filler and adhesion at the filler-matrix interface.