Abstract

The studies of spectral and physical properties of Nitrile rubber-polypropylene blends in the present work can be summarized as follow:

1-The effect of nitrile butadiene rubber(NBR): Polypropylene(PP) ratio has been studied by using the gel method and mechanical properties, scanning electron microscope to obtain the best ratio of such blend which reflects the compactability of of the rubber-plastic blends. The study showed that the best ratio is 60:40 (NBR/PP).

Different polyfunction monomer (compatibilizer) have been used to test the suitable one to enhance the electron irradiation cross linking in such blend. It is found that 1,6 hexan dial diocrylate (HDDA) gives higher contribution to crosslinking under electron irradiation.

The (DSC), (FTIR), (TGA) and tensile strength studies were used to study the expected compactability of such blends under electron irradiation.

2-The effect of HAF carbon black on the electrical conduction and dielectric properties of electron irradiation NBR/PP (60/40) blend was studied in the temperature range (30-100C^0) and frequencies range (500-$4x10^6$) The conductivity dependence exhibits power law relationship with power S ($0.5 < S < 1$).The values of $S<1$ suggest hopping conduction process between filled and unfilled states while the values higher than one imply the contribution of different conduction process.

The electrical conductivity, in general, increases by increasing carbon black concentration for the different irradiation doses. This has been discussed according to decrease of the carbon particle and/or aggregates separation distances which reduce the electron hopping paths. The electrical conductivity of NBR/PP carbon black loaded blends changed irregularly with the variation of electron irradiation dose except 50 and 150 KGy. The values of conductivity decreases by increasing

temperature. This is discussed on the bases of the increase of conduction path (hopping distance) as a result of the thermal expansion of the blend which leads to an increase of carbon particles or aggregates separation distance.

The study of the effect of electron irradiation dose, carbon black concentration and temperature on the dielectric parameters, permitivity and dielectric loss illustrates that a higher values of έ and ε" for irradiation samples are obtained. In addition maximum values of έ or ε" are obtained at 50 kGy. In general έ and ε" decreases by increasing frequency which reflects the little response of έ or ε" by increasing frequency. The maximum in έ or ε" at 50 KGy is attributed to the maximum polarization as a result of the optimum bond enhancement as such dose. The higher values of έ or ε" are discussed according to the interfacial polarization.

3-The effect of carbon black concentration and electron irradiation dose on the mechanical properties is studied, the study show an increase radiation dose. Where as it decrease, in general, by increasing carbon concentration. The strain at break showed a maximum around 50 Phr of carbon black. It also showed maximum strain at 50 kGy radiation dose .