

Induction of Electrical Conductivity in Polyaniline Nanocomposites film using γ - irradiation Doping in Polyvinyl-alcohol Matrix

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Abstract

Radiation effect as one of the physical phenomena that take place on the exposed media, was being applied to prepare conductive nano-polymer membrane consisting of polyvinyl alcohol (PVA) and aniline hydrochloride (AniHCl). The maximum applied radiation dose was 50 kGy. The effects of radiation led to polymerization of aniline hydrochloride monomer into nano-polyaniline particles in the range of 100 nm which was detected by scanning electron microscopy SEM. The nanocomposite polyaniline has observable green colour, the intensity of which was increased following the radiation dose. The colour and polymerization was confirmed by using double beam UV- visible spectroscopy that revealed an absorbance band at 790 nm due to polyaniline formation and another peak at 320 nm due to Cl⁻ ions which was detached from the monomer (AniHCl) by radiation to form the polaron species. The absorbance of 790 nm band was increased following the radiation dose indicating more formation of Polarons. The electrical conductivity was measured by using an impedance analyzer and found to be increased with dose and blend concentration AniHCL. The maximum obtained conductivity due to doping by AniHCl was 1×10^{-4} S/m at 28.6 wt. % concentration of AniHCl. Then by applying the radiation dose up to 50 kGy the dc conductivity was increased up to 1.17×10^{-1} S/m.

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