

Preparation of IPNs and Effect of Swift Heavy Ions Irradiation on their Physico-Chemical Properties

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Abstract : Superabsorbent are three-dimensional networks of linear or branched polymeric chains which can uptake large volume of biological fluids. The ability is due to the presence of functional groups like -NH₂, -COOH and -OH. Such cross-linked products based on natural materials, such as cellulose, starch, dextran, gum and chitosan, because of their easy availability, low production cost, non-toxicity and biodegradability have attracted the attention of Scientists and Technologists all over the world. Since natural polymers have better biocompatibility and are non-toxic than most synthetic one, therefore, such materials can be applied in the preparation of controlled drug delivery devices, biosensors, tissue engineering, contact lenses, soil conditioning, removal of heavy metal ions and dyes. Gums are natural potential antioxidants and are used as food additives. They have excellent properties like high solubility, pH stability, non-toxicity and gelling characteristics. Till date lot of methods have been applied for the synthesis and modifications of cross-linked materials with improved properties suitable for different applications. It is well known that ion beam irradiation can play a crucial role to synthesize, modify, crosslink or degrade polymeric materials. High energetic heavy ions irradiation on polymer film induces significant changes like chain scission, cross-linking, structural changes, amorphization and degradation in bulk. Various researchers reported the effects of low and heavy ion irradiation on the properties of polymeric materials and observed significant improvement in optical, electrical, chemical, thermal and dielectric properties. Moreover, modifications induced in the materials mainly depend on the structure, the ion beam parameters like energy, linear energy transfer, fluence, mass, charge and the nature of the target material. Ion-beam irradiation is a useful technique for improving the surface properties of biodegradable polymers without missing the bulk properties. Therefore, a considerable interest has been grown to study the effects of SHIs irradiation on the properties of synthesized semi-IPNs and IPNs. The present work deals with the preparation of semi-IPNs and IPNs and impact of SHI like O⁷⁺ and Ni⁹⁺ irradiation on optical, chemical, structural, morphological and thermal properties along with impact on different applications. The results have been discussed on the basis of Linear Energy Transfer (LET) of the ions.

Keywords : adsorbent, gel, IPNs, semi-IPNs

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