

Preparation and characterization of organic montmorillonite-polyvinyl alcohol-co Polyacrylic nanocomposite hydrogel for heavy metal uptake in water**E A H A Gomaa¹, N A Mazaid², M Mohsen¹ and R Mohammed¹**¹Ain Shams University, Egypt²National Center for Radiation Research and Technology, Egypt

In the present work, preparation of organic montmorillonite-polyvinyl alcohol-co-Polyacrylic (OMMT-PVA/AAC) nanocomposite hydrogel is performed with different OMMT (clay) amounts ranging from 1.3 to 15% using γ irradiation as initiator to induce crosslink network structure. The effect of clay amount and absorbed dose on gel fraction and swelling percent has been investigated. It is found that the gel fraction increases up to 92% with increasing the loaded clay to 15% OMMT, whereas the swelling percentage (%) reaches its maximum value at an amount of nanoscale clay of 4 ml and at an absorbed dose of 4 kGy. The thermal stability of PVA/AAC hydrogel and OMMT-PVA/AAC nanocomposite hydrogel has been determined by thermogravimetric analysis (TGA), which indicated a higher thermal stability of the nanocomposite. The FTIR spectral analysis has identified the bond structure of the PVA/AAC hydrogel and the OMMT-PVA/AAC nanocomposite hydrogel. The nanostructure of the composite as well as the degree of exfoliation of clay is studied by X-ray diffraction (XRD) and transmission electron microscope (TEM). Its free volume parameters (size and fraction) are investigated by means of positron annihilation lifetime spectroscopy (PALS). The results have shown that these parameters are correlated positively with swelling %. After loading the hydrogels and hydrogel nanocomposites with different heavy metals (Ni, Co), UV spectroscopy is applied to determine the metal ion concentration before and after treatment. SEM has characterized their surface morphology. The distribution of heavy metals on the hydrogels is determined by EDX. The factors affecting the heavy metal uptake, such as contact time, pH and metal ion concentration of solutions are studied.

Biography

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