PREPARATION AND CHARACTERIZATION OF HYDROGELS BASED ON CLAY AND SYNTHETIC POLYMERS FORMED BY ELECTRON BEAM IRRADIATION

REHAM HUSSEIN HELAL HUSSEIN

irradiation based on different ratios of poly (vinyl alcohol)r AM). The hydrogels were compounded with different contents of monomer (sodium montmorillonite clay (MMT) or Organo-montmorillonite clay. Composites with sodium montmorillonite (MMT) and Organo-montmorillonite clays were also prepared. The research work covered the following points:(A)Characterization of Poly(vinyl alcohol/Acrylamide Hydrogels (PVA/AM) Prepared by Electron Beam Irradiation.(B)Characterization of Poly(vinyl alcohol)/Acrylamide/Sodium Montmorillonite Clay Composites Prepared by Electron Beam Irradiation.(C)Characterization of Poly(vinyl alcohol)/Acrylarnidel Organo-Montmorillonite Clay Composites Prepared by Electron Beam Irradiation.The composites were characterized by XRD spectrosco pythermogravimetric analysis (TGA). The effect of both temperature and pH on the degree of swelling of PVA/AM hydrogels were also studied. The results obtained through this work can be summarized through the following points:(A) Characterization of Poi yin 1 alcohol/Acr lamide H dro els PVA/AM Pre ared by Electron Beam Irradiation.In this part, we study the gel fraction of crosslinking polymer and the effect dose on el fraction. The gel fraction increases with increasing irradiati radiation gdose up to 40 kGy of electron beams due to the increased free radicalselectron beam irradiation.While the X-ray diffraction is an important for examining the crystalli structure of polymer composites it gives valuable information about the, changes structure, intensity and width of polymer crystals.Thermogravimetric analysis (TGA) was used to investigate experimentally the thermal stability of the hydrogels based on pure PVA and PVA/AM hydrogels of different composition. However, the thermal stability was found to increase with increasing the ratio of AM monomer in the initial solutions. The derivative of the rate of reaction (DTGA) curves for the hydrogels illustrated the multiple stages of thermal decomposition of the hydrogels based on either pure PVA polymer hydrogel or PVA/AM copolymer hydrogels. The values of Tura, clearly indicated that the thermal stability of PVA/AM copolymer hydrogels increases with increasing the ratio of AM component in the initial solutions.In the Equilibrium swelling with different temperatures and different pH, it can be seen that the degree of swelling of all the hydrogels increases withincreasing the ratio of AM component in the initial solutions.In the Equilibrium swelling with different

temperatures and different pH, it can be seen that the degree of swelling of all the hydrogels increases with increasing swelling time, regardless of temperature. However, the degree of swelling was found to increase by increasing both the temperature up to 60°C, and with increasing the ratio of AM in the initial solutions meanwhile, it was found to decrease with increasing electron beam irradiation dose. Moreover, the degree of swelling was found to increase with increasing the pH value up to 1 1, and at low pH values, the copolymers are in a relatively collapsed(B) Characterization of Poly (vinyl alcohol)/Acrylamide/Sodium Montmorillonite Clay Composites Prepared by Electron Beam irradiation.Gel Fraction of the hydrogels based on PVA/AM of different ratios and PVA/AM/MMT composites with different contents of MMT with different dose of electron beam irradiation. It can be seen that the gel fraction of PVA/AM hydrogels increased with increasing the irradiation dose up to 40 kGy, but decrease with increase of the content of MMT clay. It seems that -MMT particles block limited number of sites leading to a decrease in gel fraction.X ray diffraction XRD reports that the effect of PVA/AM hydrogel composition ;norpacp with incre.asincr of AM monomer ratio in the initial solution was associated