

## Competitive Adsorption of Al, Ga and In by Gamma Irradiation Induced Pectin-Acrylamide-(Vinyl Phosphonic Acid) Hydrogel

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**Abstract :** Pectin-Acrylamide- (Vinyl Phosphonic Acid) Hydrogels were prepared from their blend by using gamma radiation of various doses. It was found that the gel fraction of hydrogel increases with increasing the radiation dose reaches a maximum and then started decreasing with increasing the dose. The optimum radiation dose and the composition of raw materials were determined on the basis of equilibrium swelling which resulted in 20 kGy absorbed dose and 1:2:4 (Pectin:AAM:VPA) composition. Differential scanning calorimetry reveals the gel strength for using them as the adsorbent. The FTIR-spectrum confirmed the grafting/ crosslinking of the monomer on the backbone of pectin chain. The hydrogels were applied in adsorption of Al, Ga, and In from multielement solution where the adsorption capacity order for those three elements was found as - In>Ga>Al. SEM images of hydrogels and metal adsorbed hydrogels indicate the gel network and adherence of the metal ions in the interpenetrating network of the hydrogel which were supported by EDS spectra. The adsorption isotherm models were studied and found that the Langmuir adsorption isotherm model was well fitted with the data. Adsorption data were also fitted to different adsorption kinetic and diffusion models. Desorption of metal adsorbed hydrogels was performed in 5% nitric acid where desorption efficiency was found around 90%.

**Keywords :** hydrogel, gamma radiation, vinyl phosphonic acid, metal adsorption

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