Zirconium (IV) phosphate/poly(gelatin-cl-alginate) Nanocomposite as Ion Exchanger and Al³⁺ potentiometric Sensor

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Zirconium (IV) phosphate/poly(gelatin-cl-alginate) (ZP/PGA) nanocomposite ion exchanger was studied as potentiometric sensor for the detection of aluminium ions in aquatic system. ZP/PGA has been analysed by X-ray diffractometer (XRD), Fourier transform infra-red spectrogram (FTIR), thermo-gravimetric analysis (TGA), field emission scanning electron microscopy (FESEM) and high resolution transmission electron microscopy (HRTEM). TGA and XRD analysis revealed that ZP/PGA nanocomposite was highly thermo-stable and semi-crystalline in nature. The pH results show the bifunctional nature of ZP/PGA nanocomposite. Distribution studies concluded the greater sensitivity of material for aluminium ions ($K_d=65$). Thus, the assembly of potentiometric sensor for the estimation of Al³⁺ using ZP/PGA was attempted. Linear Nernstian response was detected over wide concentration. The binary separations such as Ni²⁺-Al³⁺, Zn²⁺-Al³⁺, Co²⁺-Mg²⁺, Cu²⁺-Mg²⁺, Cd²⁺-Pb²⁺, Co²⁺-Pb²⁺, Zn²⁺-Cu²⁺, Ni²⁺-Cd²⁺ have been attempted onto ZP/PGA column. The efficiency of ZP/PGA was investigated for remediation of methylene blue (MB) and methylene green (MG) under solar irradiations. ZP/PGA also showed good antimicrobial activity for *E. coli*.

Keywords: Nanocomposite, heavy metals, ion selective electrode, photocatalysis, antimicrobial.

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