Gelatin-zirconium Dioxide Nanocomposite as a Ni (II) Selective Potentiometric Sensor: Heavy Metal Separation and Photocatalysis

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The present work represents the synthesis of gelatin-zirconium dioxide nanocomposite (GT/ZONC) ion exchanger by sol-gel method. GT/ZONC was characterised by various techniques such as FTIR, XRD, SEM and TEM. To understand the ion-exchange capabilities of the material different physicochemical properties such as effect of eluent concentration, elution behaviour, thermal stability, pH titration and distribution coefficient were studied. XRD pattern confirms the semi crystalline nature of nanocomposite with low intensity peaks. TEM results confirmed the formation of material in the nano-range with particle size of 36nm. pH titration studied showed the monofunctional nature of the material. The distribution coefficient results revealed that the GT/ZONC was highly selective for Ni (II) ions. Some binary separation of metal ion pairs such as Ni^{2+} - Zn^{2+} , Cu^{2+} - Al^{3+} , Pb^{2+} - Cu^{2+} , Co^{2+} - Ni^{2+} , Cd^{2+} - Pb^{2+} , Mg^{2+} - Cd^{2+} , Zn^{2+} - Mg^{2+} , Co^{2+} - Al^{3+} were accomplished onto GT/ZONC column. GT/ZONC was investigated for the photocatalytic degradation of methylene blue and degraded 82% of MB within 5 hrs of solar irradiation. Ni (II) ion selective membrane electrode was fabricated with a quick time response and wide pH working range.

Keywords: Gelatin, zirconium dioxide, nanocomposite, ion selective electrode, heavy metals, methylene blue

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