

## Thermodynamic properties and adsorption behaviour of hydrogel nanocomposites for cadmium removal from mine effluents

Fosso-Kankeu E  
Mittal Hemant  
Waanders F  
Sinha Roy Suprakash

### ABSTRACT:

This research paper reports on the utilization of the hydrogel of gelatine (GL) and its hybrid nanocomposite with clinoptilolite for the adsorption of  $\text{Cd}^{2+}$  ions from an aqueous solution and multimetal ions from mine effluents. The hydrogel was synthesized using the graft co-polymerization of acrylamide (AAM) onto GL and the hybrid hydrogel nanocomposite was prepared by incorporating clinoptilolite within the hydrogel matrix. The synthesized polymers were characterized using different characterization techniques such as FTIR, XRD, SEM and TGA. The adsorption behaviour of the synthesized adsorbents for the adsorption of  $\text{Cd}^{2+}$  was studied using different adsorption parameters such as pH, temperature and adsorbent dosage. Adsorption kinetics followed the pseudo-second-order rate equation, whereas, the adsorption isotherm followed both the Freundlich and Langmuir isotherm models. The thermodynamics studies revealed that the adsorption processes were spontaneous and endothermic in nature. Moreover, the synthesized adsorbents were also successfully utilized for the adsorption of different metal ions from the mine effluents.