Surface modification of sporopollenin by immobilization method for removal of metal ions

Ilkay Hilal Gubbuk

1Selcuk University Department of Chemistry Campus 42031 Konya/TURKEY
e-mail: ihilalg@gmail.com

Sporopollenin of Lycopodium clavatum spores was used for the sorption experiment. Sporopollenin (Sp) immobilized, glutaraldehyde (GA) is employed as a sorbent in sorption for selected heavy metal ion (Figure 1). Surface structure of the immobilized sporopollenin was examined by Fourier Transform Infrared Spectroscopy (FTIR), thermal analysis (TGA), and elemental analysis. Several factors, including solution pH, solution concentration, and reaction temperature were studied.

For the batch method, the optimum pH range for Co(II) has occurred at pH≥5.5 and Ni(II), Cu(II) at pH≥5. All the metal ions can be desorbed with 10 cm$^3$ of 0.5 mol dm$^{-3}$ of EDTA solution. Langmuir, Freundlich and Dubinin-Radushkevich (DR) isotherm equation were applied to the experimental data. Thermodynamic parameters i.e., ΔG, ΔS and ΔH were also calculated for the system. Sporopollenin with its polymeric structure would be a candidate sorbent as a low cost adsorbent for removal of heavy metal ions from aqueous solutions [1,2].

Figure 1. Suggested model of the possible mode of metal ion (M) complexation by the SP-APTS-GA.

References

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