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BOOK OF ABSTRACTS

The ion exchange properties of nanocrystalline anatase with grafted phosphate groups

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The ion exchange properties of anatase titanium dioxide obtained by sol-gel method using a solution of $[Ti(OH)_6]^{3+}\cdot 3Cl^-$ complex compound as precursor are investigated in the work. The thermostimulated process of water dissociation in the core of complex and increasing of hydroxylation degree of titanium atoms of precursor result in the formation of $Ti(OH)_4\cdot 2H_2O$ molecules, which due to condensation converted to TiO_2 particle of 3-5 nm in size. Chemical grafting of phosphate groupings HPO_4^{2-} and HPO_4^- on the titanium dioxide surface significantly enhances ion exchange capacity of the sorbent as to heavy metals and strontium. TiO_2-sorbent was produced in the form of microspherical xerogel. The concentration of $SrCl_2$ in neutral solution (pH = 6,5-7,0) was 0.0001 and 0.01 mol/l. When the weight ratio between water and sorbent was 200, 0.1 and 0.5 mg·eq/g of strontium ions respectively was removed from solution, which was 99 and 55 % of their initial concentration. The partition coefficient of sorbent Kd were $3.8\cdot 10^4$ and $1.2\cdot 10^2$ ml/g respectively for these concentrations of $SrCl_2$. Coefficient K_d is a peculiar figuctor of ion exchanger, which indicates the volume of solution that can be cleaned one gram of sorbent. The sorption value is 2 mg·eq/g when removing of strontium ions from the solution with $SrCl_2$ concentration 0.1 mol/l. The sorbent removed 1.5 mg·eq/g of Ba^{2+} ions and 1 mg·eq/g of Cd^{2+} ions from solutions containing 0.1 mol/l of $BaCl_2$ and $CdCl_2$.

Lamellar titanium phosphate $Ti_2O(OH)(PO_4)[(NH_2)_2\cdot PO_4]$, similar in chemical nature, removed only 0.2 mg·eq/g of Sr^{2+} and Ba^{2+} ions from 0.1 M solution of metal nitrate.

Thus, the sorption capacity of ion exchanger obtained significantly exceeding this value for titanium phosphate. It can be used, for example, for water purification from heavy metal ions, strontium, uranium and transuranic elements.

The polymer hydrogels based on the cross-linked polyacrylamides as dressing materials

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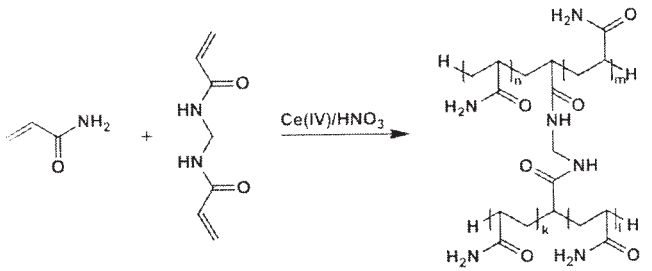
Skin generally needs to be covered with a suitable dressing immediately after it is damaged. Unfortunately, there is no single suitable for all types of wounds; therefore, to design an effective wound dressing the condition of wound and its surrounding skin should be considered. High performance wound dressings should provide enable effective oxygen circulation, absorbing excess exudates from the wound without leakage to the surface of dressing and allowing water vapor transmission at aneffective rate to prevent wound desiccation. Polymeric hydrogels of natural and synthetic nature are promising materials for this purpose.

In our work the synthesis and study of physical and chemical properties of chemically cross-linked hydrogels based on acrylamide were carried out. Cerium-ion-induced ($Ce(IV)/HNO_3$) redox initiation method was used for the synthesis of the polyacrylamide. Polyacrylamide was cross-linked due to linking agent N,N′-methylene-bis-acrylamide of different concentration and series of copolymers of various numbers of linkages were synthesized.



The equilibrium water absorption (EWA%) and the equilibrium water content (EWC%) were studied for all the prepared samples. Chemically cross-linked polymers is characterized by satisfactory mechanical properties, chemical and thermal resistance, high ability to absorb water, therefore they should be perspective materials for nanochemistry and nanotechnology (as nanoplatforms or matrices for metal nanoparticle preparation); for biomedical (drug delivery) and technological (manufacture of wound dressings) applications.