Zeolite supported biopolymers: potential remediation agents for Mo^{6+} and Mn^{2+} in wastewaters.

Ana Lucia Ramalho Mercê [1], Ana Paula Franco [1], Raúl Bonne Hernandéz [1], Judith Felcman [2] , Denise Alves Fungaro [3] & Aurora López-delgado [4]

[1] LEQ – Laboratório de Equilíbrio Químico – LEQ – DQ
Universidade Federal do Paraná – Curitiba – PR – Brasil.
http://www.quimica.ufpr.br/~anamerce
[2] Departamento de Química –
Pontifícia Universidade Católica do Rio de Janeiro – PUC- RJ.
Rio de Janeiro – RJ - Brasil
[3] Laboratório de Química dos Solos e Processos de Adsorção
IPEN – Instituto de Pesquisas Energéticas e Nucleares
São Paulo – SP – Brasil.
[4] Centro Nacional de Investigaciones Metalúrgicas CENIM.CSIC.
Madrid – España.

Zeolite synthesized from fly ash supported with carboxymethylcellulose and with chitosan were employed to remediate industrial effluents. Tests were performed using both a wastewater from stainless steel pickling process and a synthetic solution containing Mo^{6+}, Fe^{3+}, Mn^{2+} and Ni^{2+}.

Pickling process is the last step in the steel industry to clean the surface of the final product. Many chitosan (CT) derivatives and carboxymethylcellulose (CMC) have the ability to bind strongly heavy and toxic metal ions. Zeolite was obtained from a coal-fired power plant located in Brazil.

Zeolite-incorporated biopolymers provided films which were ground and used in the remediation assays. The chemical and morphological characterization was performed by SEM, DRV-VIS, FTIR and XRD.

Batch remediation experiments were performed using zeolite and the supported materials in concentration of 1g/L, for 90 min and pHs ranging from 3 to 5. The results have showed that zeolite alone reduced the Mo^{6+}, content as the pH increased, thus for pH 2.0 and pH 5.0 a metal reduction of 25 and 68% were obtained. For zeolite-supported CMC, the metal reduction was at pH 5.0, >99%. In the case of zeolite-supported CT a metal reduction >73% was obtained. For Mn^{2+} the percentage of metal reduction was lower. Accordingly, zeolite-supported those biopolymers can be considered as an effective low cost adsorbent to remove Mo^{6+} and Mn^{2+} from wastewaters.