Removal Pb^{2+} from water sample, by using Natural Zeolites of Aftar mine (Semnan, Iran)

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Zeolites are naturally occurring hydrated Aluminosilicate minerals [1]. The isomorphous replacement of Si^{4+} by Al^{3+} produces a negative charge in the lattice. The net negative charge is balanced by the exchangeable cations (sodium, potassium, or calcium). These cations are exchangeable with certain cations in solutions such as lead [2, 3].

This study represents usage zeolite Aftar mine in ability the zeolites in the removal of lead from water sample. For this purpose, the first crushed zeolites and using the mesh sieve ASTM.E-11 standard classification in size by 1 mm, 0.71 mm and 0.25 mm for use in testing were falling head.

According to falling head test, and calculated parameter such as K (Permeability) water samples (with concentrations of certain lead) the cross of the zeolite and ICP-OES analysis on them. The results show that zeolite of Aftar mine be able removal lead. XRF analysis on the zeolite shows that After passing the water sample in the composition of zeolites lead sensible.

PbO	K_2O	Na_2O	CaO	Fe_2O_3	Al_2O_3	SiO_2	Components
0	1.93	1.46	2.78	1.19	10.96	70.85	Before
0.38	1.89	1.64	1.83	1.18	10.94	71.75	After

Table 1: XRF analysis of the zeolite samples before and after removal lead

[1] Badillo-Almaraz *et al*. (2003) *Instrum. Methods Phys. Res.* **B 210**, 424. [2] Barer. (1987) Academic Press, New York. [3] Breck (1964) *Chem. Edu.* **41**, 678.

Biogeoelectric networks in marine sediments – A 'first cut' study

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Electric Currents in Marine Sediments

A recent study showed that electric currents can run through marine sediments coupling hydrogen sulphide oxidation at depth and oxygen reduction at the sediment surface [1]. A microbially assisted composition of bacterial nanowires and possibly semiconductive minerals was suggested to play a role in the electron transfer. However, this concept remained hypothetical.

Evaluating the Type of Electron Transmission

We hypothesised that an electric network is entirely composed of solid conduits, performing true electronic conductance (in contrast to electron shuttling).

To test this hypothesis, we first cut horizontally through electrically active sediment systems using a very thin platinum filament. Monitoring proton and oxygen consumptions revealed that the electrochemical reduction of oxygen was instantaneously interrupted by the cut. Moreover, the electric field was equally affected upon cutting.

In a second approach, polycarbonate filters embedded in the sediment were found to obstruct the development of an electric connection, although diffusion of electron shuttles were not impeded by the filters.

Conclusion

The results provide strong evidence that the conductive elements in marine sediments comprise a solid matrix of electronic conduits. Thus, our findings support the proposed involvement of microbial nanowires and semiconductive minerals, i.e. the occurrence of biogeoelectric networks in marine sediments.

[1] Nielsen *et al*. (2010) *Nature* **463**, 1071–1074.