Rare earth elements in lake sediments in Poland

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127 sediment samples were collected from profundal zones of 87 lakes of the following lakeland areas: Greater Poland, Pomerania, Masuria and Łęczna-Włodawa. In the samples the content of REE, Sc and Y were determined by ICP-MS method, the content of Ba, Cr, Co, Cu, Pb, Zn, Ni, V, Sr, Ca, Mg, Fe, Mn, K, Na, P and S - by ICP-OES method, after aqua regia digestion, Organic carbon were also determined (TOC) by means of coulometric titration method

The REE content in analyzed sediments ranged from 4.40 to 127.44 mg/kg, the average content was 35.78 mg/kg while the geometric mean - 24.68 mg/kg. The average REE contents of individual elements were as follows: La - 6.65 mg/kg, Ce - 15.43 mg/kg, Pr - 1.74 mg/kg, Nd - 6.93 mg/kg, Eu - 0.26 mg/kg, Sm - 1.36 mg/kg Gd - 1.24 mg/kg, Tb - 0.17 mg/kg, Dy - 0.92 mg/kg, Ho - 0.17 mg/kg, Er - 0 , 45 mg/kg, Tm - 0.06 mg/kg, Yb - 0.35 mg/kg and Lu - 0.05 mg/kg. The concentrations of rare earth elements in studied lake sediments are comparable to the concentrations found in sedimentary rocks. REE concentrations in the sediments are most similar to their concentrations in limestone rocks; however they are lower in comparison to the REE concentrations in sandstones and clay rocks. The results showed differences in the content of REE in lake sediments in various parts of Poland. The geometric mean of REE content in the lake sediments of Pomeranian, Greater Poland and Łęczna-Włodawa Lake Districts were similar and were respectively 21.70, 20.70 and 21.50 mg/kg, while the sediments of Masuria Lake District had a higher geometric mean of REE content – 29,54 mg/kg.

The content of REE in lake sediments shows a strong correlation with the Al (r = 0.96), K (r = 0.96) and Mg (r = 0.86) contents, a high correlation with the Fe (r = 0.68), a significant correlation with the P (r = 0.42), S (r = 0.40) and organic carbon (r = 0.38) contents. Among the trace elements analyzed REE concentrations showed a very strong correlation with the concentration of Ni (r = 0.92), V (r = 0.94), Co (r = 0.94) and poor correlation with the content of Zn (r = 0.31), Pb (r = 0.34), and Cu (r = 0.33). REE contents in sediments also showed a negative high correlation with calcium (r = -0.79) and strontium content (r = -0.53).

Redox in silicate melts: in-situ XAS investigation of 2 redox couples

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The silicate melts are important materials for earth sciences, in particular for the volcanology and mass transfers and also for glass industry (glass making, ceramics and nuclear waste management). Such melts are very complex materials generally containing more than ten oxides. The presence of multivalent elements within the glass compositions can significantly affect both glass properties (rheological properties [1] for example) and technological processes. In particular in the field of nuclear waste storage where solubility, crystallization and incorporation of heavy elements are of prime importance. Consequently, the control of oxydoreduction reactions proves to be necessary for managing both vitrification processes and structural changes intervening in temperature within glasses. Magnien *et al*.. [2] have shown that redox can be control at high temperature by diffusion of O_2 and O^{2-} whereas at low temperature, around the glass transition temperature by diffusion of cations according with Cook and Cooper [3]. But all these studies are made with only one redox couple, but what happens by mixing redox couple?

XANES spectroscopy is a powerful tools to investigate valence, coordination number, short and middle range order in mineral, glass and melts.

We have investigated redox of Cr and Ce silicate glass and melts at high temperature by using XANES at the Cr K-edge and Ce L3 edge. These results represent a first step to understand mixing redox couple in silicate melts and how they interact at different temperature and under different control atmosphere. These results will be present and discuss.

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