Element composition of limescale and its application in environmental studies

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Numerous research works reveal that quality of drinking water is defined by its chemical composition. One of the important public health value in water is hardness. We can observe a process of limescaling at its high rate. As Ca^{2+} and CO_3^{2-} are dominant components in freshwater, limescale is predominantly made of carbonates. In our opinion these media could be useful in environmental studies.

We collected and processed a database (> 700 samples) on chemical composition of drinking water limescale in several regions of Siberia, Urals and Kazakhstan that characterized by different natural and anthropogenic conditions. Analytical methods used include NAA, ICP-MS, XRD, SEM, fission radiography.

Rationing of chemical elements average concentration in the limescale to that obtained from water of Lake Baikal taken as background value shows that each territory has its geochemical specialization.

Thus, chemical elements common for all regions are Zn, Fe, Ag, which concentration coefficients (CC) range within wide limits. Moreover, Zn takes the leading role in all geochemical series.

The revealed geochemical specifics of the limescale correlate sufficiently with the geological structure and metallogeny of territories. The good example is the mountain-folded regions, such as Gorny Altai (CC>1 for Cr, As, Sb), Baikal region (6<CC<16 for U). These data correlate rather well with the geological data. Rifting processes in Baikal region manifest themselves also in element composition of the limescale. In such areas, CC had the highest values, moreover list of elements with CC>1 is 18 of 28 studied especially rare earth and radioactive elements.

Anthropogenic load also finds its reflection in chemical composition of the limescale, especially in the vicinity of industrial plants (e.g. nuclear reactors,) or tailings (e.g. Dzhida W-Mo district, Novo-Ursk Ag-Au deposit, Komsomolsk Au deposit).

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