Stability of Selenites in near-surface environments

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Since the discovery that acute and chronic livestock poisoning was caused by selenium assimilated by forage crops from soil, there has been continual study of the geologic occurrence and geochemistry of this element oxygenated aqueous environments.

The most selenites were formed at chemical weathering of ores by oxygenated waters establishes conditions of increased Eh and low pH. The most recent thermodynamic data available [1,2] were used for the construction of Eh-pH diagrams from reactions which are balanced equations of Eh-pH relationships among species which are thermodynamically stable within the ranges of oxidation potential and pH considered for each reaction.

The estimation of activity of the components in natural waters which are formed out of zones natural and anthropogenous pollution by selenium and waters which are formed in an oxidation zone was done. Calculation and construction of diagrams Eh–pH was spent by means of software package Geochemist's Workbench (GMB 9.0). Eh–pH diagrams of systems Me–Se–H_2O (Me=Co, Ni, Fe, Cu, Zn, Pb) have been constructed for the average content of these elements in underground waters and for their contents in acidic waters of the oxidation zones of sulfide deposits. Eh-pH stability relationships have been determined for selenites (chalcomenite, cobaltomenite, alpheldite, mandarinoite, molibdomenite) and in order to interpret conditions of formation of these minerals and to compare their geologic stabilities in ore deposits.

These parameters define migration of selenium and its precipitation in the form of various solid phases. The understanding of mechanisms of their behavior in the near-surface conditions is one of actual problems of modern mineralogy and geochemistry and it is very important for the solving of some environmental problems.

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[2] Charykova M.V., Krivovichev V.G., Lelet M.I., Yakovenko O.S., Suleimanov E.V., Depmeier W., Semenova V.V., Zorina M.L. American Mineralogist. 2014. Vol.99. P. 742–748