

Solubility of mimetite-vanadinite solid solution series – preliminary results

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Mimetite $Pb_5(AsO_4)_3Cl$ and vanadinite $Pb_5(VO_4)_3Cl$ belong to the apatite supergroup. These minerals are isostructural with pyromorphite $Pb_5(PO_4)_3Cl$ and form with it a ternary system within the apatite group of $P6_3/m$ symmetry. The crystal structure of mimetite and vanadinite can incorporate numerous admixtures. The most common anionic substitution in the nature is replacement of arsenic with phosphorus and vanadium. Results of laboratory experiments show that mimetite and vanadinite form continuous isomorphic series.

Mimetite, vanadinite and other lead apatite characterize by high stability in the earth-surface environments. This is the main reason why synthetic apatite minerals are used to immobilization of heavy metal appearing in contaminated soils and hazardous industrial wastes [1, 2]. Pyromorphite and mimetite very often are applied for this purpose. Therefore, the influence of vanadium's substitution on the solubility of these minerals is so important to check.

The solubility of the synthetic mimetite, vanadinite and their solid solutions was measured in dissolution experiments at 25°C and at pH values between 2.00 and 6.00. Solutions were periodically sampled and were stirred two times a week. All experiments were conducted in triplicate. Pb(II) and V(V) concentrations were measured using atomic absorption spectroscopy (AAS). The content of As(V) and Cl were determined by UV-Vis spectrophotometry. The preliminary results show that the solubility of mimetite-vanadinite solid solution series increases with decreasing pH.

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[1] Ma *et. al* (1993) *Environ. Sci. Technol.* **27**, 1803-1810. [2] Twidwell *et al.* (1994) *J. Hazard. Mater.* **36**, 69-80.