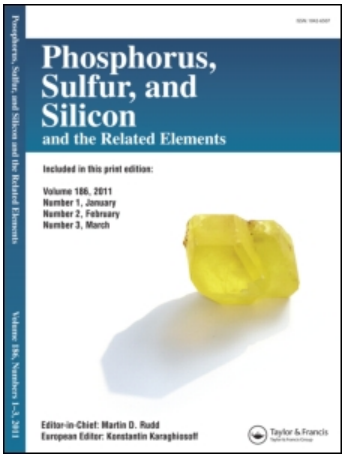

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Mechanochemical Synthesis of Phosphates and Phase Transformations of Natural Apatites by Mechanical Action

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MECHANOCHEMICAL SYNTHESIS OF PHOSPHATES AND PHASE TRANSFORMATIONS OF NATURAL APATITES BY MECHANICAL ACTION

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The mechanochemical method is a promising way of synthesizing new and complicate phosphorus compounds and processing phosphate rocks in order to obtain the fertilizers. Apatites with general compositional formula - $Me_{10}(RO_4)_6Z_2$, where Me - Ca^{2+}, Ba^{2+}, Cu^{2+}, Pb^{2+}, Mn^{2+}, Fe^{2+}, Al^{3+}; RO_4 - PO_4^{3-}, CO_3^{2-}, AlO_2^-, SiO_4^{4-}, SO_4^{2-}, ZrO_4^{4-}; Z - F^-, OH^-, Cl^-, CO_3^{2-}, O^-, S^{2-}, $HCOO^-$ and isomorphous mixtures by mechanical action in planetary mill at room temperature were synthesized. Duration of the synthesis varied from 5 min. to 30 min. The initial components for synthesis were phosphates, oxides, chemical elements (Si, S, Al, Cu, Pb, Fe) and organic compounds. The synthetic apatites are promising materials for the production of bioceramic, catalysts, ion-exchangers and laser glasses.

The structural distortions of the activated natural fluorapatites $Ca_{10}(PO_4)_6F_2$ to amorphous and high pressure phases by the method of high resolution electron microscopy were established, and transformations of fluorapatite into carbonatfluorapatites of B-, AB-types and into β-$Ca_3(PO_4)_2$ were observed.

The anion condensation of tripolyphosphate in planetary mill was discovered according to scheme: $Na_5P_3O_{10}$ - II → $Na_6P_4O_{13}$ → $Na_7P_5O_{16}$ (1).

(1) E.A.Prodan, M.V.Chaikina, V.A.Sotnikova-Yushik, G.V. Peslak, V.L.Shapkin, Izv. Sib. Otd. Akad. Nauk SSSR. Ser. khim. 5, 84, (1981).