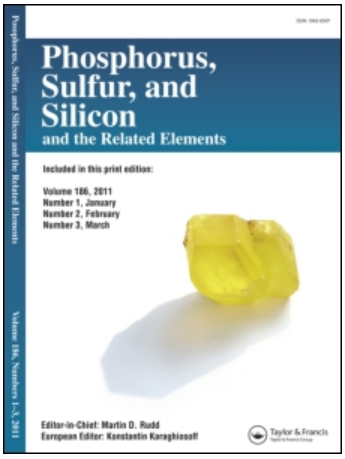

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Transformation of Calcium Dihydrogenphosphate in Mixtures with Apatite Concentrate Upon Heating

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TRANSFORMATION OF CALCIUM DIHYDROGENPHOSPHATE IN MIXTURES WITH APATITE CONCENTRATE UPON HEATING

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The present work is related to an investigation of the chemistry of the phosphoric acid - thermal processing of apatite into a phosphate animal feed áupplement. Dried mixtures of H_3PO_4 with apatite concentrates of various mineral content and chemical composition as well as mixtures based on $Ca(H_2PO_4)_2 \cdot H_2O$, $Ca_2P_2O_7$ and $Ca(PO_3)_2$ were used. The investigation was carried out by chemical, thermal, chromatographic and X-ray diffraction methods.

By means of an X-ray and calorimetric analysis mainly amorphous calcium dihydrogenphosphate (CDHP) was found to be formed in the first stage of the treatment (interaction of H_3PO_4 with the concentrate). To determine the structure and composition of CDHP dehydration products samples of starting mixtures for calcination and mixtures of CDHP with an apatite concentrate were heated up to 550°C and studied by X-ray and chromatographic methods. The condensed phosphates (CP) formed, as well as the diphosphates (DP) appeared to be too X-ray-amorphous. The P_2O_5 content in the CP of various samples being almost the same as that added with H_3PO_4 (8.5-9.5 % P_2O_5), we concluded that CDHP dehydration products had practically not reacted with apatite. Relatively high $P_2O_7^{4-}$ contents - 2.0-5.1 % P_2O_5 - indicated the presence of HPO_4^{2-} in starting heating mixtures. When the heating temperature was raised to 800°C, the CP content decreased due to reactions between CP and the concentrate minerals. No reaction between carbonates and CP was detected. Thus, dolomite and calcite decompose, CaO and MgO react with CP at various rates. The interaction of $Ca(PO_3)_2$ and $Ca_2P_2O_7$ with hydroxyfluorapatite begins at the temperature of 780-800°C and proceeds approximately at the same rate.