

Summary

This thesis is focused on crystal chemistry and crystal structure of apatites from alkaline rock of the Bohemian Massif. Fifteen samples of volcanic rocks, mostly of the Cenozoic age was selected for the study. Sample No. 5 is of the Silurian age. Sample No. 15 originates from volcanic rock of the Cenozoic age from the Slovak Western Carpathians. This sample was chosen for this study due to its substantially different chemical composition. The contents of major and minor elements in apatites were measured on an electron microprobe, the contents of some minor and trace elements were determined by laser ablation inductively coupled plasma mass spectrometry. Selected samples were investigated by cathodoluminescence (CL) spectrometry. Crystal structure of studied apatites was characterized by X-ray diffraction and Raman spectroscopy. It was found that dominant anion at position X is fluorine. The OH content calculated on the basis of the fully occupied position X is significant in some samples. The amount of Cl is generally low. The exception is the sample No. 15 where Cl reached up to 0.6 apfu ($Z = 2$). Studied apatites contain many substitutions but they are generally of minor extent. Strontium, iron and REE at position M belong to the most common and most important substituents for calcium in studied samples. Magnesium is the most important substituent for calcium in samples No. 10 and No. 14. Silicon substitution for phosphorus in tetrahedral coordinated position is typical. The CL properties are probably caused by rare earth elements and/or Mn contents. Due to low resolution of spectra and overlaps of individual bands of different REE it was not possible to determine the specific band of REE causing the cathodoluminescence. Rare earth elements probably caused the laser induced photoluminescence detected in the Raman spectra. It was found the presence of CO_3 in tetrahedral and X position by deconvolution of Raman spectra. The band at 1070 cm^{-1} caused by presence of CO_3 in tetrahedral position and band at $\sim 1100\text{ cm}^{-1}$ is caused by the presence of CO_3 in X position. These bands were, in various intensity, observed in all measured apatite spectra. It was found the very intense band at 1070 cm^{-1} in samples No. 10 and No. 14. Observed intensity of the band caused by presence of CO_3 in X position is often very low. There is not possible to determinate amount of CO_3 in samples without reliable calibrations by Raman spectroscopy. It is only possible to check its presence. The crystal structure of samples No. 2, No. 4, No. 8, No. 10 and No. 14 was refined by Rietveld method using the program JANA2006. The unit cell parameters of the studied apatites correlate with data presented for end-member of fluorapatite composition.