

Ikait - málo známý minerál zaledněných jeskyní: výskyt v občasném sezónním zalednění jeskyně Koda (Český kras)

Ikaite - little known mineral of iced caves: occurrence in seasonal cave ice formations of the Koda Cave (Bohemian Karst)

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Abstract

Metastable carbonate phase ikaite ($\text{CaCO}_3 \cdot 6\text{H}_2\text{O}$) was determined by an X-ray powder diffraction to be a dominant mineral phase formed on a surface of seasonal cave ice formations in the Koda Cave in Bohemian Karst (Czech Republic). In one of the samples also the possible presence of a mineral rapidcreekite ($\text{Ca}_2(\text{SO}_4)(\text{CO}_3) \cdot 4\text{H}_2\text{O}$) was indicated by powder XRD. Koda Cave is a horizontal, tunnel-like cave 17 m long, located in forested SE slope at elevation of 374 m a.s.l. Seasonal cave ice formations, stalactites and stalagmites, form in the cave from dripwater during frost periods of the winter season. The dripwater is of usual calcium-bicarbonate chemistry (Ca^{2+} 92 mg · l⁻¹; HCO_3^- 287 mg · l⁻¹) characterized by increased sulfate (29.8 mg · l⁻¹) and total phosphorus content (0.232 mg · l⁻¹); presence of sulfate anion may also support the occurrence of rapidcreekite. Ikaite crystals accumulate on a surface of ice formations especially during periods characterized by ice formation accompanied by ice evaporation. Ikaite crystals, up to 0.5 mm long, form yellowish accumulations especially on the apical parts of ice stalactites and on their ablation edges. The $\delta^{13}\text{C}$ (up to +11.7 ‰ V-PDB) and $\delta^{18}\text{O}$ (up to -0.3 ‰ V-PDB) values of ikaite are among the highest measured so far in the cold-climate carbonates. These unusual isotope data result from a strong kinetic isotope fractionation during rapid water freezing and ice evaporation.

Key words: ikaite, ice cave, cryogenic carbonate, Bohemian Karst, central Bohemia, Czech Republic