https://doi.org/10.46861/bmp.28.058 PŮVODNÍ PRÁCE/ORIGINAL PAPER

Strusky a železo z experimentální tavby železa realizované na hradě Buchlově (jv. Chřiby) v roce 2018

Slags and iron from experimental smelting of iron realized at the Buchlov Castle (Chřiby Mts., Czech Republic) in 2018

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Dolníček Z, Kandrnál L, Ulmanová J, Vratislavská E, Hojač P (2020) Strusky a železo z experimentální tavby železa realizované na hradě Buchlově (jv. Chřiby) v roce 2018. Bull Mineral Petrolog 28(1): 58-68 ISSN 2570-7337

Abstract

During experimental smelting of iron in a replica of historical shaft furnace, which was held at the Buchlov Castle in 2018, charcoal and Mn-enriched pelosiderite-limonite iron ore from the locality Strážovice near Kyjov were used. The obtained furnace slag is practically completely formed by glass phase; only rare small domains also contain olivine. The glass phase is compositionally heterogeneous and contains 0.7 - 10.7 wt. % MnO, whereas olivine corresponds to fayalite with elevated contents of tephroite (ca. 12 mol. %), forsterite (ca. 4 mol. %) and dicalciumsilicate (1 mol. %) components. The produced metallic iron is also compositionally heterogeneous, rich in phosphorus and in places it contains small spherical inclusions of pyrrhotite. The phase composition of slag differs significantly from those of typical iron slags. The reason can be seen either in anomalous chemical composition of used ore (the elevated contents of Mn could potentially act as an inhibitor of crystallization), or in too high temperatures during smelting (the phase relations in metallic iron suggest temperatures exceeding 1500 °C) in combination with rapid cooling of the furnace content after finishing of smelting. Both phase composition of slag as well as chemical composition of individual slag phases and metallic iron are significantly different from those of local historical artefacts from the period of usage of technology of direct production of iron. These findings do not support the idea that local pelosiderite iron ores were used for production of iron already during this early period.

Key words: *archaeometallurgy, experimental iron smelting, slags, phosphorus-rich iron, pelosiderite, limonite, Chřiby Mts.*

Obdrženo 28. 1. 2020; přijato 3. 4. 2020