Petrologie a mineralogie porcelanitů mostecké pánve - produktů fosilních požárů neogénní hnědouhelné sloje

Rocks and minerals formed by fossil combustion pyrometamorphism in the Neogene brown coal Most Basin, Czech Republic

Vladimír Žáček[1)], Roman Skála[2),3)] a Zdeněk Dvořák[4)]

[1)]Česká geologická služba, Klárov 3, 118 21 Praha 1
[2)]Geologický ústav AV ČR, v.v.i., Rozvojová 269, 165 00 Praha 6
[3)]Ústav geochemie, mineralogie a nerostných zdrojů, PřF UK, Albertov 6, 128 43 Praha 2
[4)]Doly Bílina, ul. 5. května 213, 418 29 Bílina

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Abstract

Porcellanite is a term conventionally used for multicoloured jasper-like rocks, formed from clays by pyrometamorphism. In the territory of the Most Basin, however, all pyrometamorphic rocks produced by natural fossil combustion of a Neogene coal seam are traditionally marked by the term „porcellanites“. The Most Basin (also known as the North Bohemian brown-coal Basin) is situated in the northwest of the Czech Republic and with the annual production of ca 50 millions metric tons of brown coal represents the main energy source of the Czech Republic. The previous authors mentioned 65 localities of combustion pyrometamorphic rocks scattered in the region of the Most Basin in the territory of about 1400 km^2. The pyrometamorphic complexes form flat-lying or shallow-dipping deposits and they have size ranging from several hundreds metres up to several kilometres and the thickness varying from several metres up to about 35 m. This paper brings mostly unpublished data on mineralogy of pyrometamorphic rocks formed from thermally altered carbonates present in a subordinate amount in a sedimentary sequence.

These rocks studied in detail represent buchites, slags and paralavas which are strongly different from typical glassy porcellanites; the main differences comprise coarse-grained structure, chemical composition, presence of more or less macroscopic mineral phases, and frequently high magnetic susceptibilities (10^{-1} - 10^{-2} SI). Most common mineral assemblages formed from siderite contain olivine + magnetite + anorthite ± orthopyroxene or sekaninaite + tridymite + fayalite + Ti-hercynite. Aggregates of massive magnesioferrite accompanied by hematite were locally found. Most exotic assemblages are hosted by Si-undersaturated calcareous paralava from the Želénky porcellanite deposit. This rock is characterized by high concentrations of Ca and Fe, moderate Mg, and low Si, Al and alkalis. High temperatures (experimentally 980 - 1150 °C or even higher) with high oxygen fugacity accompanied with extremely high concentrations of Fe_2O_3 and CaO and lack of silicon resulted in crystallization of esseneite, melilites rich in gehlenite and ferrigehlenite components, kirschsteinite, variety of spinels including magnesioferrite, three ferrites (srebrodolskite, unnamed $CaFe_4O_7$, and barium hexaferrite $BaFe_{12}O_{19}$) and some additional phases. In pyrometamorphic rocks of the Most Basin nearly 50 minerals and unnamed phases were identified till now: anatase, anhydrite, ankerite, apatite, aragonite, barite, calcite, celsian, chalcopyrite, cordierite, corrundum, cristobalite, diopside, esseneite, fayalite, forsterite, garnet, goethite, Ca-graftonite, gypsum, hematite, hercynite, ilmenite, K-feldspar, kirschsteinite, metakaolinite, maghemite, magnesioferrite, magnetite, melilites, monazite, mullite, orthopyroxene, perovskite, plagioclase, pyrite, quartz, sekaninaite, sillimanite?, spinel, srebrodolskite, tridymite, calcium silicate - Ca_2SiO_4, calcium ferrite - $CaFe_4O_7$, barium hexaferrite - $BaFe_{12}O_{19}$, and several poorly identified phases.

Key words: *porcellanite, buchite, pyrometamorphism, esseneite, kirschsteinite, srebrodolskite, barium hexaferrite, cordierite, spinels, Most Basin, Czech Republic*