MINERALOGY, PETROLOGY AND METAMORPHISM OF THE TALC AND MAGNESITE DEPOSIT NEAR GEMERSKÁ POLOMA IN EASTERN SLOVAKIA

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Magnesite – talc rocks occur in the central part of the Spiš – Gemer Ore Mts. near Gemerská Poloma village. They are part of the Early Paleozoic of the Gemericum. The magnesite-talc rocks form a lens-shaped body that occurs between overlying phyllites and underlying Permian granitoides. Both phyllites and magnesite-talc rocks have tectonic contact with granite. Besides magnesite, dolomite, talc and quartz, the magnesite talc rocks contain chlorite and pyrite. *Talc* occurs here in massive and intergranular forms. It has white- to light-green color with black bituminous mixture. *Magnesite,* a nearly monomineral rock, is dominantly medium grained and has light to dark gray color. Its intergranular spaces are filled with talc and small amounts of pyrite at their contact. The term „*soapstone*“ is used here to represent a metamorphosed rock formed by the talc, chlorite, carbonates and quartz. The underlain granite consists of quartz, micas, plagioclase > K – feldspar, chlorite, eventually apatite. Metamorphic minerals in granite are phengitic white mica, phlogopite and chlorite. At contact with magnesite-talc body is granite strongly affected by mylonitization.

Magnesite has X_{Mg} = Mg/(Mg+Ca+Mn) = 0,953 – 0,997 and its relatively rich in siderite content ($FeCO_3$ = 4,8%), where Fe exchanges with Mg. The Fe-variety of magnesite, called as „breunnerite“, has siderite content ranging from 6,94 up to 12,99%. *Talc* has nearly ideal composition with maximum contents of Al = 0,03 and Fe_t = 0,09 a. f. u. *Chlorite* associated with talc, dolomite, eventually with magnesite and quartz has ratio of X_{Mg} = Mg/(Mg+Fe) = 0,87 – 0,93. Conversely chlorite in the assemblage with phengite in metagranodiorite, is rich in Fe (FeO = 6,0 – 6,5%) and has X_{Mg} = 0,81 – 0,83. Metamorphic white mica is phengite with content of Si = 3,32

– 3,34 a. f. u. and Na/(Na+K) = 0,047 – 0,063. It occurs together with phlogopite and tourmaline of dravite composition with Mg = 2,9 – 3,1 a. f. u. (X_{Mg} = 0,86).

Petrographic analyses in the talc deposit as well as in surrounding rocks suggest three metamorphic processes (Variscan metamorphism, Permian contact metamorphism and Alpine metamorphism) in the study area. The older Variscan metamorphism occurred in greenschist facies conditions, but mineral assemblages of this event were mostly destroyed by younger process. Permian contact metamorphism affected formation of spot-like structures in phyllites (the spots consist of chlorite and biotite). Metasomatic processes related to this event are turmalinization, silicification, steatitization (replacement of magnesite to talc) and locally formation of Fe-metasomatites. Assuming crystallization depth of the granite about 1 – 1,5 kbar, a temperature of 400 ^{o}C can be calculated using X_{CO2} = 0,8 mol%. Considering P-X_{CO2} and T-X_{CO2} relations, the talc forming reaction (3 Mgs + 4 SiO_2 + H_2O = Tlc + 3 CO_2), calculated for a_{Mgs} = 1.0 occurred at X_{CO2}=0.8. The corresponding pressure and temperature obtained using TWEEQ program for talc forming are ca 400 °C and 1 kbar.

The Alpine metamorphism is characterised by formation of phengite (Si = 3,34 a. f. u.), coexisting with chlorite and phlogopite in metagranodiorite. Equilibrium curve of the reaction clinochlore + 4 celadonite = muscovite + 3 phlogopite + 7 quartz + 4 H_2O was calculated using Ax and Thermocalc programs. The activity models used in this program are Ms = 0,5; Clin = 0,44; Phl = 0,56; Cel = 0,18. P-T conditions of Alpine metamorphism, in the zone of intensive mylonitization, calculated using mineral composition in the metagranodiorite are 7 kbar at 420 ^{o}C.

Key words: talc-magnesite deposit, metamorphism, Gemerská Poloma, Slovakia