Hill near Burgrabice. The quartzites are of low metamorphic grade (Olejniczak and Puziewicz 1999), whereas the amphibolites (Puziewicz, in print) and gneisses were metamorphosed under medium-grade conditions (Kalińska and Puziewicz 1997; Puziewicz in print). In this paper I discuss the petrology of the gneisses occurring in the Polish part of the Žulová pluton cover.

Two varieties of gneisses occur in the discussed area. The first one comprises paragneisses of flaser, layered and augen-layered, locally migmatitic structure, whereas the second one is formed by layered, leucocratic microcline gneisses.

The paragneisses consist of quartz, plagioclase, various amounts of alkali feldspar, biotite and subordinate garnet and accessory zircon. This group of gneisses contains significant amount of biotite. The amount of dark components in the CIPW norm (hypersthene, magnetite and ilmenite) reaches 16 %. Weak layering is due to the presence of discontinuous streaks of biotite. The latter occurs as small, isolated plates or clots. The alignment of plates in the clots defines two directions diagonal to the layering. It was not possible to decide whether this is the S-C structure or remnants of older foliation. Biotite in the two samples studied in detail slightly differs in chemical composition.

The first sample contains oligoclase (23–24 mol.% An in cores and 20–22 mol.% in rims); the grains are unzoned or weakly (2–3 mol.% An) zoned. Biotite has variable Fe/(Fe+Mg) ratio ranging from 2.63 to 2.78. Biotite plates within the individual clot have usually similar Fe/(Fe+Mg) ratio and titanium content. The latter is also variable (2.59–3.40 wt.% TiO_2. Garnet contains 70–72 mol.% almandine. The rest is pyrope (from 17 mol.% in core to 12 mol.% in rims and spessartine (from 10 mol.% in cores to 16 mol.% in rims). The amount of grossular is 2 mol.%.

The second sample contains homogeneous (27–28 mol.% An) or weakly normally zoned (29 to 26 mol.% An) plagioclase. The Fe/(Fe+Mg) ratio of biotite is constant (0.47–0.50). Titanium content is low compared to the former sample and equals 1.87 to 3.02 wt.% TiO_2. The alignment of plates in clots has no profound effect on their composition. The BSE imagery shows that most of the plates are loosened, which leads to lowering of totals in microprobe analyses. Sporadically the plates contain thin (<3 μm) inliers of muscovite. The garnet contains 66 mol.% almandine in cores and 62 mol.% in rims. Pyrope content decreases to the rims (16 → 10 mol.%) whereas that of spessartine increases from the cores (15 mol.%) to the rims (24 mol.%). The amount of grossular is 3 mol.%.

The mechanical loosening of biotite makes garnet–biotite thermometry dubious. The calculation for the three pairs in which biotite analyses are closest to anhydrous total of 96 wt.% yielded temperatures from ca. 530 °C (biotite in fissure in garnet) to 660–680 °C. Similar results were obtained for the first sample (670–700 °C), with some results in the range of ca. 600 °C. Pressure of 3–5 kbar was assumed for the calculations; among many algorithms for garnet–biotite thermometry that of Ferry and Spear (1978) was used, mainly to make the results comparable to those of Rozkošný and Souček (1989). The critical discussion of thermometric calculations is beyond the scope of this paper, it should be stressed, however, that:

(1) the mechanical and possibly chemical decomposition of biotite may result in chemical disequilibrium of biotite–garnet pairs, thus making any thermometry highly dubious;

(2) the algorithm of Ferry and Spear (1978) is based on the distribution of Fe and Mg only. More realistic algorithms, taking into account Ti and Al(VI) in biotite, should be used. The calibration of Ganguly and Saxena (1984) with the biotite activity model of Patino-Douce et al. (1993) gives, e.g., the temperatures of 620–660 °C for the second of the samples.

Gneisses of the Polish part of the Žulová pluton cover were subjected to the amphibolite-facies metamorphism. It was possible to decipher the results of only one metamorphic event. The temperature and pressure of that event cannot be precisely estimated. By analogy with neighbouring amphibolites, a relatively low (<4 kbar) pressure can be assumed. The temperature might have been high (up to 660 °C), but more precise data are needed to confirm this temperature estimate.

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