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SKARNS AND SKARN MINERALISATION IN THE CRACOW-LUBLINIEC REGION (SOUTHERN POLAND)

INTRODUCTION

Skarns and skarn-like rocks as well as the ore mineralization ocuur in the Myszków and Zawiercie (the Małopolska Block) and Koziegłowy (the Upper Silesia Block) areas. Skarns were formed due to the thermal – metasomatic metamorphism of the Early and Late Palaeozoic carbonate deposits, that was initiated during the Variscan intrusions of acid magmatic rocks – granites, dacite and rhyolite porphyries (Harańczyk et al., 1980; Markiewicz, 1998).

METHODS

Petrologic investigations presented here are based on samples of rocks from 17 boreholes. About 200 samples were analyzed by optical microscopy. Electron microprobe and spectral laser analyses were used to identify crystalline phases in the inclusions. Chemical analyses were carried out in the Central Chemical Laboratory of the PGI in Warsaw (by XRF, AAS, ICP-AES method).

RESULTS

The studied rocks were classified as exoskarns (Einaudi, Burt, 1982) and infiltrating skarns.

They are formed in skarned zones of the width ranging from several centimeters to several dozen meters and occur several dozen to several hundred meters from the granites, dacite and rhyolite porphyries. The skarns form: lenses, veins and nest impregnations. The garnet, pyroxene, amphibole skarns, skarn-like rocks and marbles were found in the studied regions.

Garnet skarns build several meters insertions and nests of brown colour in rocks from boreholes RK-1 (Zawiercie region) and Pz-10 (Myszków region). The main mineral of the skarns is the xenoblastic andradite, 0,1-0,5 mm in diameter and chemical formula: Ca3.12 Mn0.01 Na0.02 Al0.22 Ti0.02 Fe1.67 [Si1.06 O4]3. It usually forms the massive textures, locally with grains of pyroxenes, quartzite and calcite.

The pyroxene skarns form irregular, brecciated inserts of green – grayish colour and they were found in each studied region. These skarns have a heterogra-

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nular texture. They consist of pyroxene (augite and diopside). Amphiboles, epidotes, quartzes and albites occur subordinately. Pyroxenes occur as heterogranular aggregates or individual grains 0,5 m in diameter and extincton angle z/γ = 38o- 42o. Quartz is observed in the contact zones between pyroxene grains. Very fine nods of olive-green epidote occur sporadically.

The amphibole skarns occur at the contact zones with the pyroxene skarns. They consist of light-green fibrous amphiboles of the tremolite-actinolite assemblage and extinction angle z/γ = 16o- 18o.Minerals are arranged in fans or bunches. Fine-flacky chlorite and talc occur subordinately. This chemical composition of amphiboles and Mg/(Mg + Fe2+) ratio between 0,6 and 0,7 is typical for actinolite (Leake, 1978).

Skarn – like rocks. These are clay – mudish rocks impregnated by skarn minerals, that occur in many forms: individual grains, nests, lenses, massive impregnations. These rocks have xenoblastic textures and mineral components are between 0,2 and 0,1 in diameter. They occur in boreholes: RK-1, RK-2, RK-3, 24-WB and 37-WB. They consist of the following association of skarn minerals: pyroxenes, amphiboles, epidotes, garnets, chlorites.

Marbles. White – grayish marbles occur between skarn zones and zones of unaltered calcareous rocks. They are built mainly of calcite and have massive texture. Crystals are 0,5 mm in diameter. Granulated calcareous mass of the dolomite composition occur among large grains of calcite.

Rich mineralization was ascertained in skarns and skarn-like rocks. It is associated with the magnetite-chalcopyrite formation, closlly related to the Palaeozoic porphyry copper and molibdenite formation of the studied regions (Harańczyk, 1980; Ślósarz, 1985; Truszel, Markowiak, 1999; Truszel, Markowiak, 2000).

Massive or nest aggregations of the coars – crystalline magnetite, hematite and chalcopyrite are associated with the andradite, pyroxene and amphibole skarns. The thickness of the mineralized zones varies between a few cm and several tens of centimeters.

Molybdenite is found in skarns only sporadically and is in the form of fine flackes. Scheelite, which is present in the form of large aggregates that are a few mm in diameter, is more common than molybdenite. Chalcopyrite and pyrite are found filling the space between magnetite grains.

Magnetite, pyrite, hematite and sphalerite were the principal ore minerals found in both skarn-like rocks and veins. More rarely, scheelite, pyrrholite, galena, ilmenite, marcasite, cubanite, bismuthinite, native Bi and Bi sulphosalts were identified.

CONCLUSIONS

– The products of contact thermal-metasomatism on carbonate rocks represented by andradite, pyroxene and amphibole skarns, skarn-like rocks and marbles have been found in the Cracow-Lubliniec area, in Myszków, Zawiercie and Koziegłowy.

– The main components of the skarns: garnets, pyroxenes, amphiboles and epidotes suggest the temperature range of metamorphism between 350^{o}C and 550^{o}C (Zharikov, 1998).

– Succesion of the ore mineralization is seen by the replacement of magnetite with chalcopyrite and pyrite. The presence of scheelite alonogside sulphides emphasises the significant variations in the physico – chemical conditions of the stage of mineralization.

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