EXPERIMENTAL SIMULATION OF THE MINERALIZATION MECHANISM INSIDE OPEN CAVITIES

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Mineral filling of open crack cavities may be caused by two main mechanisms: sedimentation of matter from hydrothermal solutions entering given crack from the outside (hydrothermal veins), or using matter from the country rock (Alpine vein). The carried out experiments are to understand the particularities of the second mechanism.

The initial specimens had complex structure: intervals of different composition imitated carbonaceous (limestone, dolomite) and silicate (granodiorite-porphyry, hornfels) rocks, as well as sourses of ore components (the pulverized mixtures of ore minerals). 1m solutions of NaCl, NaCl+KCl at temperature of 550°C were used.

During the experimental procedure the split-shaped cavities were formed in three cases: 1) within forming bimetasomatic columns (because of dissolution of country rock minerals and their redeposition at wollastonite, garnet or pyroxene compact zones, fig. 1, cavities Cv_1) , 2) because of total dissolution of thin intervals of quartz among granitoid rock, fig. 2, and 3) variously oriented crack-like cavities because of ejection of matter (fig. 1, cavities Cv_2). The new mineral formations, including ore, arises in cavities of all these three types. Ore deposition in the first type cavities ("hollow" zones of bimetasomatic columns) can be explained because of reduction in solubility of ore components as a result of silicate and carbonaceous rock pores solution mixture. This process is the special case of bimetasomatic interaction and is not discussed here. The two other processes are more interesting in the framework of this study.

The cavity among changed granodiorite-porphyry (that is transformed into potash feldspar rock with small admixture of clinopyroxene) was arisen as a result of total dissolution of quartz and has thin finest clinopyroxene crystals edging (fig. 2). This clinopyroxene noticeably differs from the initial one: it contains 32-36% of hedenbergite against 28% of the country rock one and johannsenite - 10-12% against 8% accordingly. In the other cases in addition to pyroxene the edging contains wollastonite and ga
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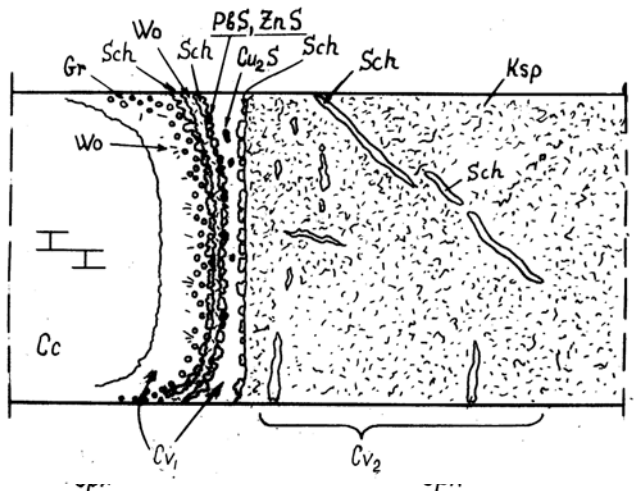

Fig. 1. Two types of experimental cavities : Cv_1 - in the neighborhood of bbimetasomatic column, Cv_2 - in the neighborhood of endomorphic contact of grano-diorite-porphyry
The cavity (Cv) mineralization arisen
se of quartz and leaching amongst the
lorite-porphyry. Sketch of the part of
ich: *Cpx* – clinopiroxene. Experiment
9. Sketch of the part of specimen
Changing. Nomenclature of miner-
als: Gr – garnet, Ksp – potash feld-
spar, Sch – scheelite, Wo – wolla-
stonite. Experiment AT-113. Sketch
of the part of specimen

The experimental conditions exclude the possibility of infiltration import of matter. It is to suggest that mineral formation takes place because of diffusion import of matter. This process directs strictly axipetal: from the country rock to the open cavity, from both its boards equally.

The diffusion is possible only if the gradient of concentration exists. It means, that solubility of minerals in the pore solution is lower than in the pore channels of country rock. It can be explained by the fact that main part of the fluid volume is in the close contact with crystalline phases and thus surface effects take place. The directed diffusion brings to the mineral deposition in the cavity, so the vein body is forming.

At various cases (vs. temperature, salt concentration, mineral composition of enclosing rocks, its porosity and shape, composition of ore components in situ) various proportion among components' solubility are possible. It is the reason for multiplicity of veins composition. They may contain (in addition to vein minerals such as quartz, calcite et cetera) rare ore minerals though its constituent elements are present in the surrounding rock in small amounts. An allocation of gold is indicative (fig. 2): the initial matter contained the insignificant impurity of gold (small charges of sulfide minerals of Darasun gold deposit were used). It is to note, that in the neighborhood within the skarn column no gold is detected although active deposition of sulfides (galena, sphalerite, covellite et cet.) takes place.

The effect of cavity silting becomes most intensive if the ore mixture contains wolframite. Mass of scheelite deposition takes place both in the skarn columns area and in outer space within the endomorphic potassium feldspar rock (fig. 2). In the last case the veinshape cavities become points of scheelite deposition. These cavities as usual are close to limestone and are the result of ejection of matter while skarn column formation. Many of them are oriented prallel to the contact, but some of them are perpendicular or diagonal to the contact. The scheelite
ition is caused by two effects: cross diffusion of
ten and calcium and the described above effect
rings to the deposition of scheelite in the open
es.