

EXPERIMENTAL DATA FOR METAMORPHOGENETIC PEGMATITE PROBLEM

Ezhov S.V. (Moscow State Geological Prospecting University)
EzhovSV@mail.ru

There are no genetic problems with pegmatites located within parent granite mass. According to A.E.Fersman so pegmatites are products of wet residual magma portions crystallization. Another matter of pegmatites placed in metamorphic rocks. Frequently there is not at all any sufficiently large granite intrusives fit to be considered as a mother source.

The data of two sorts of experiments allows offering the way for solution of the problem.

1. During of experiments for bimetasomatism investigation the arising of veins-shape cavities in wall rocks frequently was discovered. The cavities usual forms near by open edge of ampule, but often form inside specimens (fig. 1a). Cavities arise as in silicate (grandiosity-porphyry), so in carbonate (limestone) rocks. In some experiments the cavities were formed as a result of thin lamines of ready soluble minerals complete dissolution. The wall of cavities often are covered by grewed crystals of some minerals from wall rocks – clinopyroxene or wollastonite (fig 1b), some times there were formed ore minerals (scheelite, chalcocite, native gold). This process is caused by difference of minerals solubility in pore fluid (where share of intergranular skin is high) and in open space fluid (where the intergranular skin is absent). When the solubility of some mineral in pore fluid rise above of solubility in open space fluid (it means that there the concentrations of the corresponding components are higher) the conditions for this components diffusion movement to the cave are created. In moment of rock-cavity border crossing, when diffusion components enter to area of lower solubility, the components as redeposition mineral crystals are deposited. The process goes until the caves complete filling. This sort experiments modeled the genesis of Alpine veins.

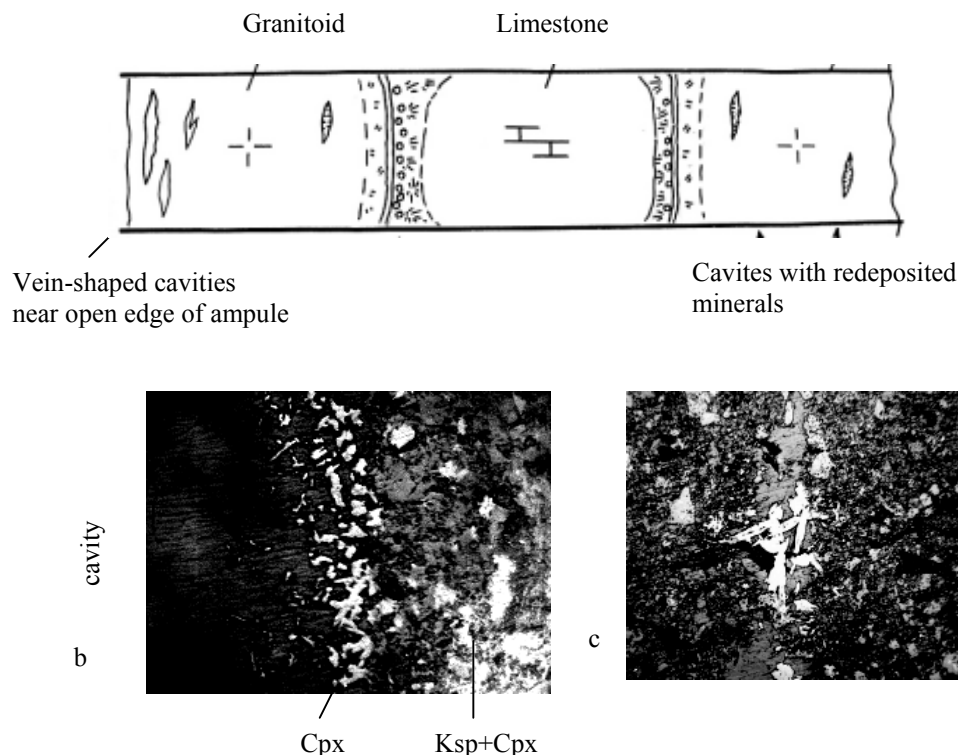


Fig.1. Experimental filling of cavities in wall rocks by clinopyroxene crystals. a – samples structure scheme (fragment), b – the crust of fine clinopyroxene crystals on the cavity wall in altered granodiorite-porphyry, c – lens-shaped cavity filled with large clinopyroxene crystals.

2. When the sulphides of copper and lead (chalcopyrite and galena) as a part of initial specimen were used under conditions of high temperature (550-600°C) the sulphide melt arised. The product of melt crystallization seems as galena and chalk cite fine symplektitic intergrowth (fig. 2a, b). The perforated at full length ampules were used. The melt appeared as at the place of initiate sulphides localization so at other parts of the specimen, some times far from primary sulphides (fig.2c). At the last

case melt droplets raised on carbonaceous rocks surface (contact limestone or dolomite with open fluid). The compositions of neighbor drops are the same, but gradual change (lead-copper correlation) of composition occurred when transport distance increase.

All this indicates that the melt in genetic meaning is analogous to crystalline phase: melt drops as a crystals arises on geochemical barrier (border of carbonate rock), the drops grows by absorption of diffusive particles from the environment fluid, and as for crystals so for drops the quantities of absorbed components corresponds to the strong stoichiometrical correlation.

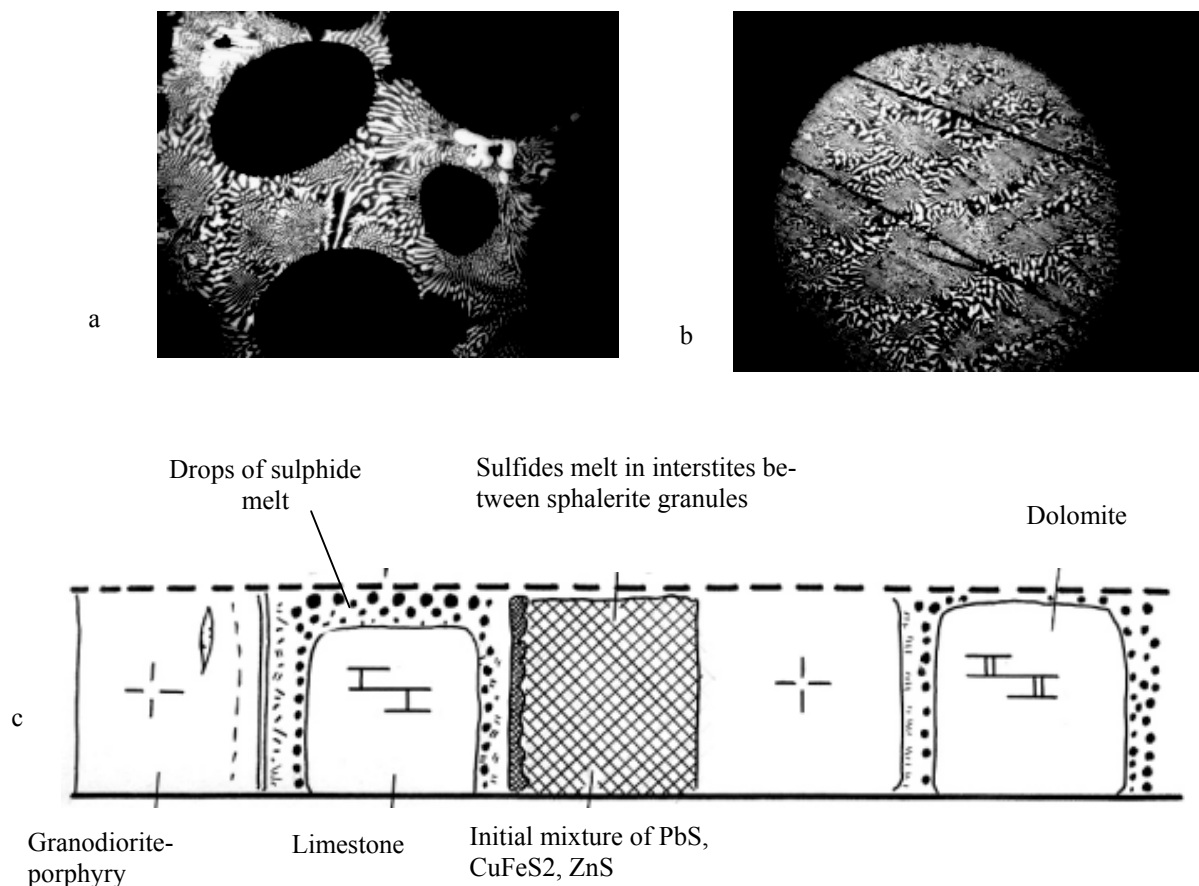


Fig. 2. Sulphides melt in experiment. a – melt in the interstitial space between sphalerite granules, b – The structure of melt drop, c - sample structure scheme

Genetical analogy melts with crystals showed probable interpretation of pegmatites melt formation in tectonic cavities among metamorphic rocks were exposed to amphibolite facies agents. The components that were diffusing through country rock pores when enters into tectonic cavity separated not as crystalline individuals but as melt close to granite eutectic by its composition. Under tectonic stress melts may be flowed for some distance, but on the whole the process is autochthonous. Later on when temperature falled the melts crystallized and formed pegmatites bodies. Pegmatites belonging to that or other type (micaceous, ceramic, rare-metall) are caused not only thermodynamical conditions of melt formation, but wall rocks geochemical peculiarities (association lithium pegmatites with amphibolites, micaceous with aluminiferous gneisses and so on).