BEHAVIOR OF GRANITE MELT UNDER FLUORINE - PHOSPHORUS ENRICHED CONDITIONS

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Melting of granitic compositions at T=800 C and P=2 kbar with high fluorine and phosphorus concentrations in a complex H-O-C fluid results in depolymerization of the melt structure. These conditions provide development of layered solidification textures resulted either from the differentiation of a F-P-rich melt during a superliquidus evolution or controlled by nucleation and growth kinetics during non-equilibrium rapid cooling by self-organization. The three vertical zones of the run product are chemically and texturally different. The separation of SiO2-rich melt during the superliquidus evolution resulted in crystallization of quartz in the middle part of the capsule after quenching, whereas the lower zone is impoverished in quartz. The upper zone is free of quartz and characterized by micrographic intergrowth textures and abundant dendrites at the upper-middle zone transition, which is obviously the result of quenching. The experiment also produced berlinite dissipated in the middle – lower zones. The rest of the melt was crystallized in the form of globular aggregates of non-stoichiometric compositions. The roundish aggregates enveloped by thin films are enriched in fluorine and extremely depleted in silica (0.31-0.83 wt.% versus 18-50.34 wt.% in the other compositions). That may be the evidence of liquid immiscibility due to enrichment of the residual melt by volatile-rich fluid with high fluorine concentration.. On the other hand, such relationships may form during subliquidus evolution or even quenching under non-equilibrium regime.