Cluster Differentiation of Magmatic Melts in the Superliquidus Conditions

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Experimental research have shown that interaction of nearest to natural complex hydrogen-bearing magmatic fluids in superliquidus conditions with silicate melts causes their depolymerization resulted in of the formation of fluctuated micromolecular groups - clusters of 10 nm and higher in sizes. The clusters are open systems in relation to melt capable to receive from an external medium a negative entropy, in an outcome there are unequilibrum states with a high degree of the ordering, so-called dissipative structures. Clusters are intermediate state between liquid and crystal. According to electron microscopy data the clusters consist of a central ordering core of molecules, apparently, surrounded by ligands, such as Cl, F, Cr2O3, P2O5, OH, etc. The atoms in the ligand layer are highly mobile, so that the structure as a whole develops a solid-like core with a liquid-like surface. As it was experimentally shown under certain critical thermodynamical conditions the aggregates of clusters are capable to the gravitational movement, the cryptic and contrasting layering of melts being form. The different basic-ultrabasic layering, ijolite urtite-nepheline syenite, peraluminous granite-silicic granite superliquidus magmatic layering and apatite, chromite, ilmenite, quartz liquid separation from the silicate melts have been simulated under pressure of H-O-C-S fluid system at control of gas species fugacities. Depending on the composition of the fluid dissolved in the melt more basic or ore liquids with light volatiles may get accumulated either at the top or bottom of the sample. These ratios are often observed in nature.