

# Hydrosilicate liquids in late- magmatic mineralization: experimental results and natural evidence

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The final stages of magmatic crystallization in volatile-rich granite and pegmatitic systems frequently result in formation of silicate liquids of unusual compositions with high H<sub>2</sub>O content.

Those liquids are believed to be a result of immiscibility.

Our experiments have shown that the silicate liquids can form at the magmatic-hydrothermal transition at 520 – 600°C, when aqueous fluids rich in alkalis, boron and fluorine coexist with the latest portions of silicate melts and magmatic minerals [1]. The experimentally obtained liquids quench into solid vitreous phases, however, detailed studies of the structural state of H<sub>2</sub>O suggest that at the experimental conditions they are structurally similar to a hydrous silica gel. The formation of gels is considered to be typical for systems where the fluid is able to dissolve elevated amounts of SiO<sub>2</sub>, e.g. alkaline and fluorine aqueous solutions.

These gels tend to concentrate rare elements, boron and alkaline metals via absorption/desorption mechanism.

We suggest that the natural analogue of the experimentally obtained hydrosilicate liquids is the substance of crystallised silicate melt inclusions found in miarolitic and near-miarolitic quartz of the tourmaline-rich pegmatites. The inclusions contain mica-dominated crystalline aggregates and high-density boric-acid rich aqueous bubbles [2]. The crystalline aggregates begin melting at about 600°C and some inclusions homogenize at 620 – 650°C. The quenched glasses of these inclusions are strongly peraluminous and have unusually low silica content, and high concentrations of H<sub>2</sub>O, F and B. Additionally, these inclusions have extremely high concentrations of Cs, Ta, Nb, Be and sometimes Li. The liquids, represented by the reported inclusions, may play an important role in concentration of rare elements in the pegmatitic process and formation of pegmatitic assemblages enriched in Li, Cs, Be, Ta and Nb. *This study has been supported by RFBR grants 04-05-64389 and 04-05-64109.*

## References

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