

## Bubble nucleation and growth in H<sub>2</sub>O-CO<sub>2</sub> bearing, ultrapotassic melts

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Rising magmas are subjected to volatile exsolution due to decompression, which induces bubble nucleation, growth and coalescence. Although degassing strongly depends on melt and volatile composition, similar magmas can feed eruptions with different degree of explosivity, which in turn appears to be well-correlated with decompression rate. A better knowledge of volatile degassing mechanisms holds the key to improve the understanding and forecasting of hazardous events related to explosive volcanism.

Solubility and decompression experiments were performed on a synthetic, leucititic composition from the Pozzolane Rosse eruption of the Colli Albani Volcanic District.

Solubility experiments were conducted in an internally heated pressure vessel at 1250°C, at intrinsic redox conditions ( $\log f_{O_2} = \text{NNO}+3$ ) and pressures of up to 300 MPa with molar fractions of water of 0, 0.2, 0.4, 0.6, 0.8 and 1. Results show that the solubility of water is increasing with pressure from 3.74 wt% at 100 MPa to 7.29 wt% at 300 MPa, whilst CO<sub>2</sub> solubility varies from 2940 ppm at 100 MPa to 8460 ppm at 300 MPa.

Decompression experiments were performed at 1250°C using an internal heated pressure vessel equipped with a continuous decompression system. In a first step, H<sub>2</sub>O-CO<sub>2</sub> saturated melts with  $X_{H_2O}^{fl}$  of 1, 0.5, 0 were synthesized at 200 MPa for approx. 4 days. The quenched glasses were crystal and bubble free. They were cut into smaller sections and again encapsulated under vacuum into Au<sub>75</sub>Pd<sub>25</sub> capsules for the decompression experiments. Prior to the decompression, the samples were maintained at an initial pressure of 200 MPa and 1250 °C for approx. 4 days for re-equilibration. Then, a relatively fast decompression rate (1 MPa/s) was applied to bring the system to a final pressure of 150, 100, 50 or 30 MPa and immediately drop quenched to a glass. The 2D structure of the experimental products was investigated with SEM, whilst the volatile content of the glass/melts was analyzed using FTIR spectroscopy.

First results show that CO<sub>2</sub> is the first volatile to exolve with a supersaturation pressure below 100 MPa. Comparing our solubility data with the volatile contents of the decompressed glasses, we suggest that the degassing happens at disequilibrium conditions, with water being trapped in a metastable state in the melt.

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