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A low-pressure–high-temperature technique for the piston-cylinder

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ABSTRACT

A method for conducting successful low pressure (0.3–0.5 GPa) and high temperature (900–1200 °C) experiments in the 19 mm piston-cylinder is presented. The technique is capable of running high fluid/melt experiments with minimum hydrogen loss, attaining precise, reproducible pressures (±10%), and has fast initial quench rates (>150 °C/s). These abilities are invaluable when conducting low pressure, fluid-saturated experiments such as phase equilibria, volatile solubility, and dynamic degassing experiments that are relevant to sub-volcanic magma chamber processes. A double capsule construction is also described that uses a solid oxygen buffer, and minimizes both contamination of the sample by carbon and the loss of iron in the melt to the capsule walls.

Keywords: Piston-cylinder, volatile, solubility, experiment, calibration, fluid, carbon dioxide, H_2O