

Reduction of water loss from gold-palladium capsules during piston-cylinder experiments by use of pyrophyllite powder

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ABSTRACT

Water loss was measured from H₂O-undersaturated granitic melts in Au₇₅Pd₂₅ capsules during 6–43 h piston-cylinder experiments using NaCl-pyrex glass-crushable alumina assemblies at 1050 to 1200 °C and 1.0 GPa. Experiments performed when capsules were surrounded only by alumina demonstrated severe water loss, in some cases more than 70% of the initial water added. It has long been known that surrounding capsules with pyrophyllite powder reduces water loss, but the efficacy of this technique has not been quantified previously. Our results confirm that by surrounding Au₇₅Pd₂₅ capsules with pyrophyllite in the assembly, the loss of water is significantly reduced at 1200 °C, 1.0 GPa. When ~5.6 wt% H₂O is added to the sample, the loss of water decreases from ~60 to less than 20% relative by pyrophyllite addition, a value slightly higher than the uncertainty of SIMS analysis (10% relative). When about ~2 wt% H₂O is added to a sample, the use of pyrophyllite in the assembly causes the loss of water to drop from more than 70 to 0% relative (no H₂O loss within analytical uncertainty).