

H₂O loss during piston-cylinder experiments

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ABSTRACT

The capsule materials Au, Ag₇₅Pd₂₅, and Pt, were tested for permeability to C-H-O fluids in a piston-cylinder apparatus at 10 kbar and 900–1100 °C. The capsules were embedded in boron nitride. After the experiments, the C-H-O fluids were analyzed by gas chromatography to determine the oxygen content of the capsules.

No significant loss of oxygen was observed in any capsule material at temperatures ≤1050 °C. At 1100 °C, however, which is above the melting point of Au and Ag₇₅Pd₂₅ at 10 kbar, oxygen loss from Pt capsules amounted to between 12 and 80%, over a period of 6 days. These results were confirmed by experiments performed using pure H₂O as the fluid.

Water loss during piston-cylinder experiments is a serious problem. A temperature of about 1050 °C represents the upper thermal limit for constant H₂O-containing systems.