

Rates of oxidation in CSPV experiments involving H₂O-bearing mafic magmas

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A difficulty in performing experiments on near-liquidus hydrous mafic melts in gas-medium cold-seal pressure vessels (CSPV) is the tendency for H₂O in the fluid phase to dissociate and H₂ to diffuse through capsule material, leading to progressive oxidation of sample material. Consequences include premature stabilization of Fe-Ti oxide phases and commensurate deviation of the liquid line of descent toward silica enrichment. Methodologies commonly employed to mitigate the oxidation problem, not without their own drawbacks, include incorporating CH₄ into the pressurizing gas, limiting run duration to 24 hours, enclosing samples in Au-alloy capsules, and incorporating solid buffering assemblages to serve as indicators of *f*O₂ excursion. Using the Co-Pd-O system as an *f*O₂ sensor [2], we examined the rate of oxidation of basaltic andesite at 1010 °C and P_{H₂O}=150 MPa pressurized with a mixture of Ar and CH₄. Our time-series reveals that oxidation occurs at very high rates of 3-4 log units within 48h. Both the variability of *f*O₂ and magnitude of dehydration-oxidation are considered unacceptable for phase equilibrium work. Incorporation of additional CH₄ serves only to offset the progressive oxidation trend toward a lower absolute range in *f*O₂. However, incorporation of a substantial mass of Ni metal powder as an O₂ getter to the outer capsule successfully (a) prevents oxidation within 48h, and (b) stabilizes *f*O₂ at the NNO buffer.

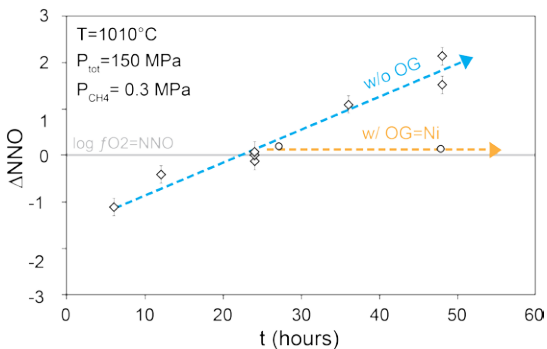


Figure 1: Rates of *f*O₂ variation in basaltic-andesite

[1] Berndt *et al.* (2002) *Am. Mineral* **87**, 1717–1726.

[2] Taylor *et al.* (1992) *Am. Mineral* **77**, 284–295.

The chemistry of some minerals from the Shir-Kuh granitoidic batholith, South-West of Yazd, Central Iran

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The S-type granitoidic batholith of Shir-Kuh (135 Ma) which is part of central Iran is located in SE of Yazd and consists of three main granodioritic, monzogranitic and leucogranitic units. The systematic changes in the composition of plagioclase reveal that the granodiorite is a calcic core plagioclase-rich, the monzogranite a differentiated melt, and the leucogranite a late residual melt. Totally, all biotites have high Al^{VI} (3.2 to 6.2 apfu) which is characteristic of peraluminous granites. The high almandine component of garnet is similar to those in other peraluminous plutons and, in particular, to the magmatic garnets. Muscovite appears as both primary and secondary-looking grains. Monazite occurs as two types of chemically crystals: monazite and brabantite [CaTh (PO₄)₂]. The observed homogeneous grains of Th and U poor monazite and tiny microcrystals of brabantite inside the apatite indicate dissolving apatite during anatexis. Little hematite (less than 10%) composition which included within restite biotite consists with the idea that the Shir-Kuh granite is generated from the sedimentary source materials contained graphite. Considering the mineral assemblages presented in the batholith, the fact that some biotite may represent restite and the mean temperature of 820°C in agreement with the zircon saturation thermometry, such liquids may have formed at a temperature 750 to 850°C by dehydration melting of biotite.