Effects of quench methods on $\text{Fe}^{3+}/\text{Fe}^{2+}$ ratios: Reply

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We appreciate Fudali's (1988) careful reading of our paper (Dyar et al., 1987) that describes a comparative study of $\text{Fe}^{3+}$ and $\text{Fe}^{2+}$ measurements of experimentally produced silicate glasses using Mössbauer and wet-chemical techniques. Calculations we previously performed to test the sensitivity of $f_{O_2}$ values (determined by the method of Kilinc et al., 1983) to errors inherent in the analysis of $\text{Fe}^{3+}$ and $\text{Fe}^{2+}$ have been reviewed. We used the chemical analysis reported by Tatlock et al. (1976) for U.S. Geological Survey rhyolite rock standard RGM-1, and a temperature of 1000 °C for test calculations. Values of Fe$_2$O$_3$ and FeO were incrementally changed, and $f_{O_2}$ was calculated for each set of values. These tests confirm the observation made by Fudali that the statement in our paper ascribing a 1 log unit $f_{O_2}$ change to a 10% error in the ratio $\text{Fe}^{3+}/\text{Fe}^{2+}$ is incorrect. We regret the fact that this error could not be corrected before publication.

Fudali's final comment about the potential problems posed for petrochemical interpretations by the inherent difficulties of accurately measuring $\text{Fe}^{3+}$ and $\text{Fe}^{2+}$ in silicate glasses is gratifying. The observations of Fudali and coworkers (1987) amplify our concerns (Dyar et al., 1987) about accurately measuring $\text{Fe}^{3+}$ in reduced glass compositions containing low concentrations of $\text{Fe}^{3+}$.

REFERENCES CITED


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