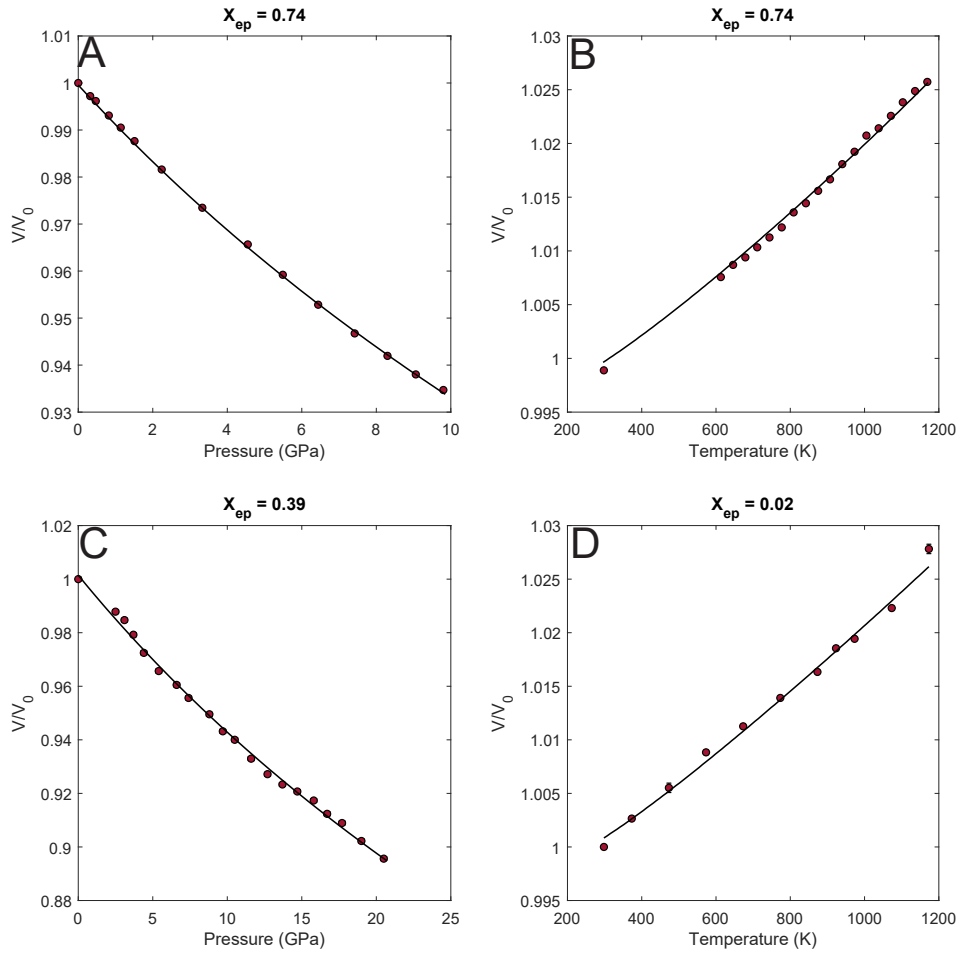
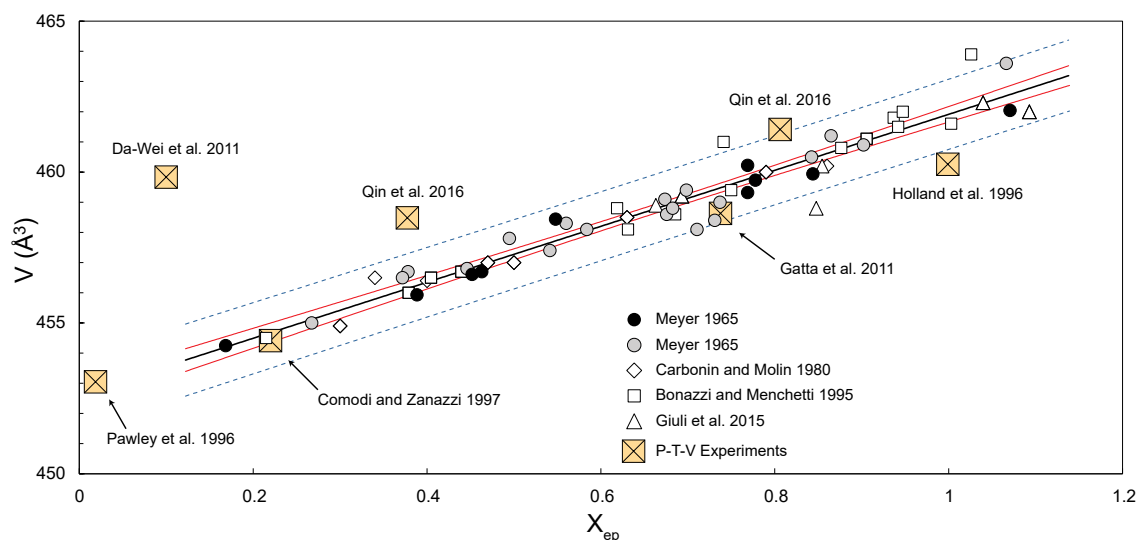


**SUPPLEMENTAL FIGURE S1. (a)** Raman spectra of a Herkimer quartz standard (red) and LdC-31C (blue) at 0.1 MPa and ambient temperature. Inset shows the band positions ( $\omega$ ) of the  $464\text{ cm}^{-1}$  band of Herkimer quartz (red) and the LdC-31C quartz inclusion (blue). **(b)** Schematic illustration of how  $P_{\text{incl}}^{464}$  and  $P_{\text{incl}}^{\text{mod}}$  are calculated at elevated temperature.  $P_{\text{ent}}$  is then calculated from both  $P_{\text{incl}}$ .



**SUPPLEMENTAL FIGURE S2.** Fits to epidote ( $X_{ep} = 0.74$ ) (a) P-V and (b) T-V data of Gatta et al. (2011) with the Tait 3rd order EoS and thermal pressure term. Fits to clinozoisite (c) P-V ( $X_{ep} = 0.39$ ; Qin et al. 2016) and (d) T-V ( $X_{ep} = 0.02$ ; Pawley et al. 1996) data with the Tait 2nd order EoS ( $\kappa'_0 = 4$ ) and thermal pressure term. P-V-T data is shown in red circles and solid black lines are the fits.



**SUPPLEMENTAL FIGURE S3.** Compilation of the dependence of the molar volume ( $V$ ) on composition ( $X_{ep}$ ) and the  $V$ - $X_{ep}$  values calculated from P-V-T experiments (orange squares) of almost pure monoclinic epidotes. The  $V$ - $X_{ep}$  relationship is nearly linear, as suggested by Franz and Liebscher (2004). The plot is based on the selection by Franz and Liebscher (2004) of systematic  $V$ - $X_{ep}$  studies of almost pure Al-Fe<sup>3+</sup> solid solution epidotes. Reference  $V$ - $X_{ep}$  data of Al-Fe epidotes is taken from Meyer (1965, 1966); Carbonin and Molin (1980); Bonazzi and Menchetti (1995); and Giuli et al. (2015). P-V-T experiments are from Holland et al. (1996); Pawley et al. (1996); Da-Wei et al. (2011); Gatta et al. (2011); Comodi and Zanazzi (1997); and Qin et al. (2016). Experimental data has been re-fit with appropriate EoS' to update molar volumes. The solid black line is the best-fit line to the  $V$ - $X_{ep}$  data, and red and dashed blue lines are the 95% upper and lower confidence and prediction bands, respectively, of the linear regression:  $V \text{ (Å}^3\text{)} = 9.28 (\pm 0.32) \cdot X_{ep} + 452.64 (\pm 0.22)$ .

## REFERENCES CITED

- Bonazzi, P., and Menchetti, S. (1995) Monoclinic members of the epidote group: effects of the  $\text{Al} \rightleftharpoons \text{Fe}^{3+} \rightleftharpoons \text{Fe}^{2+}$  substitution and of the entry of  $\text{REE}^{3+}$ . *Mineralogy and Petrology*, 53, 133–153.
- Carbonin, S., and Molin, G. (1980) Crystal-chemical considerations on eight metamorphic epidotes. *Neues Jahrbuch für Mineralogie (Abhandlungen)*, 139, 205–215.
- Comodi, P., and Zanazzi, P.F. (1997) The pressure behavior of clinozoisite and zoisite: An X-ray diffraction study. *American Mineralogist*, 82, 61–68.
- Da-Wei, F., Mai-Ning, M., Jun-Jie, Y., Shu-Yi, W., Zhi-Qiang, C., and Hong-Sen, X. (2011) In situ high-pressure synchrotron X-ray diffraction study of clinozoisite. *Chinese Physics Letters*, 28, 126103.
- Franz, G., and Liebscher, A. (2004) Physical and Chemical Properties of the Epidote Minerals—An Introduction. *Reviews in Mineralogy and Geochemistry*, 56, 1–81.
- Gatta, G.D., Merlini, M., Lee, Y., and Poli, S. (2011) Behavior of epidote at high pressure and high temperature: a powder diffraction study up to 10 GPa and 1,200 K. *Physics and Chemistry of Minerals*, 38, 419–428.
- Giuli, G., Bonazzi, P., and Menchetti, S. (2015) Al-Fe disorder in synthetic epidotes: A single-crystal X-ray diffraction study. *American Mineralogist*, 84, 933–936.
- Holland, T.J.B., Redfern, S.A.T., and Pawley, A.R. (1996) Volume behavior of hydrous minerals at high pressure and temperature: II. Compressibilities of lawsonite, zoisite, clinozoisite, and epidote. *American Mineralogist*, 81, 341–348.
- Myer, G.H. (1965) X-ray determinative curve for epidote. *American Journal of Science*, 263, 78–86.
- Myer, G.H. (1966) New data on zoisite and epidote. *American Journal of Science*, 264, 364–385.
- Pawley, A.R., Redfern, S.A.T., and Holland, T.J.B. (1996) Volume behavior of hydrous minerals at high pressure and temperature: I. Thermal expansion of lawsonite, zoisite, clinozoisite, and diaspore. *American Mineralogist*, 81, 335–340.
- Qin, F., Wu, X., Wang, Y., Fan, D., Qin, S., Yang, K., Townsend, J.P., and Jacobsen, S.D. (2016) High-pressure behavior of natural single-crystal epidote and clinozoisite up to 40 GPa. *Physics and Chemistry of Minerals*, 43, 649–659.