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LETTER

Pressure dependence of the OH-stretching mode in F-rich natural topaz and topaz-OH

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ABSTRACT

OH stretching vibration modes for F-rich natural topaz (F-topaz) and for fully hydrated topaz (topaz-OH) synthesized at high pressure, were observed using IR and Raman spectroscopies at pressures up to 30.4 GPa and 17.3 GPa, respectively. In F-topaz, the pressure derivative of the frequency of the OH stretching band observed at 3650 cm^{-1} at ambient pressure was 0.91(3) cm^{-1}/GPa, which was consistent with the value recently reported by Bradbury and Williams (2003). On the other hand, in topaz-OH, the pressure derivatives of the bands initially at 3599 and 3522 cm^{-1} were –5.2(2) and –2.56(6) cm^{-1}/GPa, respectively. This contrasting behavior between the two forms of topaz at high pressures suggests that the OH substitution for F in topaz affects the hydrogen-bonding behavior under high pressure.