Vibrational collapse of boroxol rings in compacted B₂O₃ glasses.

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Low and high frequency Raman scattering of B₂O₃ glasses, compacted under GPa pressures, has been performed to investigate structural changes due to increasing atomic packing. Increasing densification determines a progressive decrease of the intensity of the Boson peak and the main band at 808 cm⁻¹, both these modes arising from localized vibrations involving planar boroxol rings (B₃O₆). These observations prove that glass compaction causes severe deformation of boroxol rings thus determining a decrease of groups which preserve their vibrational activity unaltered. Growing glass densification also decreases the excess heat capacity over the Debye prediction below 20 K, this reduction being not accounted for by the hardening of the elastic continuum.