

BULK MODULUS DERIVED FROM VIBRATIONAL FREQUENCY

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The ambient bulk modulus (B_0) and its first pressure derivative (B_0') of a material are fundamentally important to our understanding of elastic properties of mineral. Nearly all the reported data for the pressure dependence of mode vibrational frequencies in the literature were derived by fitting frequency-pressure data using either a linear or a quadratic regression. The value of B_0/B_0' for a material can be calculated directly from the available data of mode vibrational frequency and its pressure dependence, without any assumption, if the latter was derived from a linear regression. Although the linear treatment of the data is statistically sound, it is unjustified physically. If the pressure dependence was derived from a quadratic regression, the ratio of B_0/B_0' can also be calculated. In this case, however, the mode Grüneisen parameter must remain constant within the pressure range of interest.