

phonon

Elementary excitation in the quantum mechanical treatment of vibrations in a crystal lattice. An energy bundle that behaves as a particle of energy $h\nu$, with ν the vibration frequency and h the Planck constant.

Notes:

1. A phonon can be considered as an acoustic mode of thermal vibration of a crystal lattice (or liquid helium II).
2. Every harmonic vibration can be decomposed in phonons, which are the elementary vibrations. The total number of phonons in a system that has internal vibrations (e.g., a crystal) is related to the temperature of the system.
3. The concept of phonons provides a simplification in the theories of thermal and electrical conduction in solids.
4. For example, interactions between phonons and electrons are thought to be responsible for such phenomena as 'superconductivity'.

Source:

PAC, 2007, 79, 293 (*Glossary of terms used in photochemistry, 3rd edition (IUPAC Recommendations 2006)*) on page 382