

**Answer on question #51572, Physics, Solid State Physics**

**Question** What are the basic assumptions of Einsteins theory for the specific heat of a solid?

**Solution** basic assumptions are:

Einstein treated the atoms in a crystal as  $N$  simple harmonic oscillators, all having the same frequency  $\nu$ . The frequency  $\nu$  depends on the strength of the restoring force acting on the atom, i.e. the strength of the chemical bonds within the solid. Since the equation of motion for each atom decomposes into three independent equations for the  $x$ ,  $y$  and  $z$  components of displacement, and  $N$  atom solid is equivalent to  $3N$  harmonic oscillators, each vibrating independently at frequency  $\nu$ .