Háskóli Íslands
Raunvísindadeild
Eðlisfræði

Haust 2016

Eðlisfræði þéttefnis I

Dæmablað 1

Skilafrestur 6. September 2016 kl. 15:00

1. **Cohesive energy NaCl** (10)

   (a) What is the cohesive energy with respect to separated ions for crystalline NaCl ? Give the approximate value and a derivation using a very simple model. Lattice constant $a = 5.6$ Å.

   (b) What experimental quantities must be added to or subtracted from the above to give you the cohesive energy with respect to seprated sodium metal and chlorine gas ? Omit small (< 10 %) effects.

2. **Ionic crystal KF** (10)

   In a single molecule of KF, the equilibrium internuclear separation is $r_0 = 2.67$ Å and the cohesive energy ($-E_\mathrm{i}$) relative to seperated ions is 0.50 eV/molecule smaller than the Coulomb attractive energy, because of overlap repulsion. Given that the electron affinity of of fluorine is 4.07 eV/electron and that the first ionization potential of potassium is 4.34 volts, show that the energy necessary to separate the molecule into neutral atoms is $-0.945E_\mathrm{i}$.