# HW1

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1. The ionization energy of lithium is 5.4 eV and the electron affinity of iodine is -. Calculate the cohesive energy of LiI diatomic molecule, if equilibrium separation distance between ions is 0.238 nm.

The cohesive energy = 2.4 – 6 = - 3.6 eV

1. Calculate the total surface area of graphene flakes with a total mass of m = 1 g, if it is known that the distance between the nearest carbon atoms is a = 0.142 nm, and the carbon atomic mass is mC = 1.994·10-26 kg.

Surface of regular hexagon is

For each cell we have 6 atoms each is shared between 3 cells therefore total

concentration of atoms is

count of cells is

I calculated S on one side.

1. Derive the expression and calculate the numerical value of the constant indicated in Wien’s law:

Planck’s formula

represents the amount of radiation energy emitted by the black body surface at temperature T per unit time.

The Wien displacement law: at wavelength to which corresponds the max of surface density of an emitted energy flux.

From Planck function:

Solution:

Substitute in

1. For a particle in a cubic three-dimensional potential box, calculate the degree of degeneracy of the 7th energy level.

Suppose

Divide into parts with corresponding dependencies of x,y,z and substitute

The same for Y,Z =>

energy levels:

1. (1,1,1) n^2 = 3
2. (1,1,2), (1,2,1), (2,1,1) n^2= 6
3. (1,2,2), … n^2 = 9
4. (1,1,3), … n^2=11
5. (2,2,2) n^2=12
6. (3,2,1) … n^2 =14
7. (2,2,3), (3,2,2), (2,3,2) n^2=4+4+9 =17

degree of degeneracy = 3

1. An  electron  is  bound  in  a cubic three-dimensional  infinite  potential well  of  side  1 × 10 -10 m.  Find  the  energy  values  in  the  ground state  and  first  two  excited  states.

From prev task take formula and states:

1. Calculate  the  velocity  and  kinetic  energy  of  an  electron  of  de-Broglie wavelength  1.66 × 10 -10 m

All values in prev task: