WebAssign
CH12-HW01-SP12 (Homework)

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PHYS 172-SPRING 2012, Spring 2012
Instructor: Virendra Saxena

Current Score : – / 18 **Due :** Tuesday, April 10 2012 11:59 PM EDT

The due date for this assignment is past. Your work can be viewed below, but no changes can be made.

Important! Before you view the answer key, decide whether or not you plan to request an extension. Your Instructor may *not* grant you an extension if you have viewed the answer key. Automatic extensions are not granted if you have viewed the answer key.

View Key

1. –/2 points MI3 12.2.X.001

For practice in counting microstates, determine how many ways there are to arrange 2 quanta among 3 one-dimensional oscillators. (3 oscillators correspond to one atom.)
(No Response)

- *Read the eBook*
- Section 12.2

2. –/2 points MI3 12.2.X.004

Use the formula below to calculate the number of ways to arrange 3 quanta among 4 one-dimensional oscillators.
(No Response)

$$\frac{(q + N - 1)!}{q!(N - 1)!}$$

- *Read the eBook*
- Section 12.2

3. –/2 points MI3 12.2.X.004.01

A carbon nanoparticle (very small particle) contains 7000 carbon atoms. According to the Einstein model of a solid, how many oscillators are in this block?

(No Response) oscillators

- *Read the eBook*
- Section 12.2

4. –/2 points MI3 12.2.X.028

In order to calculate the number of ways of arranging a given amount of energy in a tiny block of copper, the block is modeled as containing 9.6×10^5 independent oscillators. How many atoms are in the copper block?

(No Response) atoms

- *Read the eBook*
- Section 12.2

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5. –/4 points MI3 12.2.X.029

In an earlier chapter you calculated the stiffness of the interatomic "spring" (chemical bond) between atoms in a block of aluminum to be 16 N/m. Since in our model each atom is connected to two springs, each half the length of the interatomic bond, the effective "interatomic spring stiffness" for an oscillator is 4*16 N/m = 64 N/m. The mass of one mole of aluminum is 27 grams (0.027 kilograms).

What is the energy, in joules, of one quantum of energy for an atomic oscillator in a block of aluminum?
one quantum = (No Response) joules

- *Read the eBook*
- Section 12.2

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6. –/6 points MI3 12.2.X.030

Consider an object containing 12 one-dimensional oscillators (this object could represent a model of 4 atoms in an Einstein solid). There are 4 quanta of vibrational energy in the object.
(a) How many microstates are there, all with the same energy?
(No Response)
(b) If you examined a collection of 44000 objects of this kind, each containing 4 quanta of energy, about how many of these objects would you expect to find in the microstate 000000000004?
(No Response)

- *Read the eBook*
- Section 12.2