These problems are designed to illustrate the use of exponential numbers, significant figures and unit analysis in chemistry. Don't panic if you are unfamiliar with some of the vocabulary that is used. A knowledge of exponents combined with a little common sense will enable you to work all of the problems. You may even remember a little chemistry in the process.

BE SURE TO SHOW ALL STEPS OF WORK THAT LEAD TO YOUR SOLUTION!

1. Use the following information about heliumation : radius = 0.000000093 cm to calculate: 4,000

a. the mass, in grams, of 1 mole of helium atoms.

b. the average density of a helium atom. (Assume its shape to be spherical.)

- 2. The smallest sample of magnesium that can be weighed on an regular analytical balance how many atoms are in this "smallest" sample? 2 or 3×1018 atoms
- One mole of water molecules weighs 18.0 g. Calculate the mass in grams of one water 3. molecule. 2.99×10-23
- 4. When one gram of carbon burns to form carbon dioxide, 7860 calories of heat is evolved. Calculate the amount of heat evolved when one mole (12.0 g) of carbon burns. This is called the molar heat of combustion. 9.43×10 cal
- **5**. The metal calcium crystallizes into a cubic structure in which the face diagonal of the cube is 0.000000788 cm. Calculate the length of a side of the cube.

5.57×10-8 cm

J/cm 3