PAL Worksheet – Chem 6A

Atomic Structure

I. The particulate nature of matter.

1. Describe in your own words your understanding of the phrase "the particulate nature of matter". Give an example (different from those below) that supports the particulate nature of matter.

2. How do each of the following demonstrate the particulate nature of matter? Explain.

a. Water evaporates slowly from a glass overnight.

b. A child makes rock candy on a stick.

c. It becomes harder to breathe when you are hiking above 7000 feet.

d. The air in your room looks dusty when sunlight comes through the window.

e. A drop of food coloring becomes evenly stirred in water.

II. Atomic particles

1. Describe the Rutherford experiment. What evidence supports a dense, positively charged nucleus?

2. It is not easy for us to envision how small atoms really are but we can try using some calculations. If a carbon atom has a diameter of 0.15 nm, how many carbon atoms would we have to line up to form one inch? Show ALL of your work.

3. Identify the three main types of subatomic particles and their relative charges.

4. The periodic table provides detailed information about atomic structure. How does the periodic table provide information on each of the following? In each case, explain the location of the information and how the periodic table is organized in regard to this information.
   a. Number of protons in an atom

b. Number of neutrons in an atom

c. Number of total electrons in an atom

d. Number of outer shell electrons in an atom.

e. Average atomic mass of a sample of atoms of the same element.

5. Make a sketch of the periodic table showing how its information is displayed and organized. Your sketch should incorporate atomic #, element symbol, and atomic mass for elements **sodium** and **bromine**. You don't need to draw in the other elements or include the lanthanide or actinide elements..

NOTE: Complete this question only if your lecture instructor covers isotopes.

6. Isotopes are atoms of the same element that have different numbers of neutrons. Isotopes are used widely in medicine both for treatment of diseases and in diagnostic testing. Determine how each of the following isotopes are used in medicine and fill in the information in the table.

   a. F-19

   b. I-131

   c. Ra-223

   d. Co-60

Isotope	Protons	Neutrons	Mass number	Mass number of most common isotope in nature (the integer closest to the atomic mass)
F-19				
I-131				
Ra-223				
Co-60				