Show all your work, and PAY ATTENTION TO SIGNIFICANT FIGURES in each of your calculations. If anything is unclear, please ask. CELL PHONES OFF!!!

1. [6 pts] A ring is composed of pure silver, Ag. If the ring has a mass of 32.11 grams, how many silver atoms are in the ring?

\[
32.11 \text{ g} \left( \frac{1 \text{ amu}}{1.6606 \times 10^{-24} \text{ g}} \right) \left( \frac{1 \text{ Ag atom}}{107.9 \text{ amu}} \right) = 1.792 \times 10^{23} \text{ atoms}
\]

2. [8 pts] The density of gasoline is 0.780 g/mL. If the gas tank of a truck holds 35.0 kg of gasoline, what is the volume of this amount, in L?

\[
35.0 \text{ kg} \left( \frac{1000 \text{ g}}{1 \text{ kg}} \right) \left( \frac{1 \text{ mL}}{0.780 \text{ g}} \right) \left( \frac{1 \text{ L}}{1000 \text{ mL}} \right) = 44.9 \text{ L}
\]

3. [6 pts] How many electrons, protons and neutrons are in each of the following:

a. An atom of sulfur with 17 neutrons:
   number of \( p^+ \) = 16
   number of \( n^0 \) = 17
   number of \( e^- \) = 16

b. An atom of carbon-14:
   number of \( p^+ \) = 6
   number of \( n^0 \) = 8
   number of \( e^- \) = 6

c. An atom with an atomic number of 24 and a mass number of 57:
   number of \( p^+ \) = 24
   number of \( n^0 \) = 33
   number of \( e^- \) = 24

d. An atom of magnesium with two more neutrons than protons:
   number of \( p^+ \) = 12
   number of \( n^0 \) = 14
   number of \( e^- \) = 12

4. True/False:

T a) In an ion, the number of protons and the number of electrons are unequal.

F b) The atomic mass of any element is the number of protons plus the number of neutrons.

T c) The majority of an atom’s mass (about 99.9%) is contained in the nucleus.

T d) The fourth shell of an atom (n=4) contains four subshells.
5. [9 pts] Write the electron configuration of each of the following:
   
   a) an atom of As (write the full configuration)
   \[ 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^2 \ 3d^{10} \ 4p^3 \]
   
   b) an atom of Co (use a noble gas core)
   \[ [Ar] \ 4s^2 \ 3d^7 \]
   
   c) an atom of Sr (use a noble gas core)
   \[ [Kr] \ 5s^2 \]

6. [10 pts] How many... (Put your answer to each on the line provided.)

   ...electrons can be held, maximum, in the 3rd shell of an atom? 18
   
   ...valence electrons in an atom of phosphorus, P? 5
   
   ...orbitals are there in a 4d subshell? 5
   
   ...electrons can be held in one orbital of a 4p subshell? 2
   
   ...electrons are there in the 3d shell of an atom of Br? 10

7. [6 pts] Write the full electron configuration for Y\(^{2+}\). Also, identify one atom, one cation, and one anion that are all isoelectronic with Y\(^{2+}\).

   \[ 1s^2 \ 2s^2 \ 2p^6 \ 3s^2 \ 3p^6 \ 4s^2 \ 3d^{10} \ 4p^6 \]

8. [4 pts] What is an electron orbital? Describe it the best you can, in your own words.

   A volume in space surrounding the nucleus of an atom in which an e\(^-\) is probably located. Each orbital can hold 2e\(^-\) maximum.

Given conversion factor:

1 amu = 1.6606x10\(^{-24}\) g