Isotopes and Average Atomic Mass **Name _____ Per _____**

Elements come in a variety of isotopes, meaning they are made up of atoms with the same atomic number but different atomic masses. These atoms differ in the number of neutrons. The average atomic mass is the weighted average of all the isotopes of an element.

Example:

A sample of cesium is 75% ^{133}Cs, 20% ^{132}Cs, and 5% ^{134}Cs. What is the average atomic mass of cesium?

Step 1: Change all the percentages to decimals.
Step 2: Multiple the decimal of the percentage by the mass of that isotope.
Step 3: Add together the products of each decimal percentage to get the average atomic mass.

.75 x 133 = 99.75
.20 x 132 = 26.4
.05 x 134 = 6.7
Total = 132.85 amu = average atomic mass

Since the majority (75%) of all cesium in existence has a mass of 133, it should make sense that that average atomic mass is very close to 133. It was calculated to be 132.85 amu.

Calculate the average atomic mass of the following mixtures of isotopes. *Show all your work for full credit.*

1. Calculate the average atomic mass of iodine given that iodine exists in the following isotopes:
   80% ^{127}I, 17% ^{126}I, and 3% ^{128}I

2. Calculate the average atomic mass of gold given that gold exists in the following isotopes:
   50% ^{197}Au and 50% ^{198}Au

3. Calculate the average atomic mass of iron given that iron exists in the following isotopes:
   15% ^{55}Fe and 85% ^{56}Fe

4. Calculate the average atomic mass of hydrogen given that hydrogen exists in the following isotopes:
99% ^{1}H, 0.8% ^{2}H, and 0.2% ^{3}H

5. Calculate the average atomic mass of nitrogen given that nitrogen exists in the following isotopes:
95% ^{14}N, 3% ^{15}N, and 2% ^{16}N

6. Calculate the average atomic mass of carbon given that carbon exists in the following isotopes:
98% ^{12}C and 2% ^{14}C

7. Magnesium has three naturally occurring isotopes. 78.70% of all magnesium atoms exist as magnesium-24, 10.03% exists as magnesium-25 and 11.17% exist as magnesium-26. What is the average atomic mass of magnesium?

8. In a sample of 200 chlorine atoms, it is found that 151 are ^{35}Cl, and 49 are ^{37}Cl. What is the average atomic mass of Chlorine?

9. Without doing any math, are there more bromine-79 atoms or more bromine-80 atoms on earth? *(Hint: look at the periodic table.)* Explain why you answered the way you did.