Problem Set 4: The Atom

1) How many neutrons, protons, and electrons do the following isotopes have, what element is represented by each chemical symbol?

$a)\ {}^{3}_{2}He$

$b)\ {}^{13}_{6}C$

$c)\ {}^{40}_{19}K$

$d)\ {}^{204}_{80}Hg$

$e)\ {}^{235}_{92}U$

$f)\ {}^{117}_{78}Pt$

a) helium 1 neutron, 2 protons, 2 electrons
b) carbon 7 neutrons, 6 protons, 6 electrons
c) potassium 21 neutrons, 19 protons, 19 electrons
d) mercury 124 neutrons, 80 protons, 80 electrons
e) uranium 143 neutrons, 92 protons, 92 electrons
f) platinum 39 neutrons, 78 protons, 78 electrons

2) A sample of chlorine is 75.77% by mass of the Cl-35 isotope and 24.23% by mass of the Cl-37 isotope what is the relative atomic mass of chlorine?

The average atomic mass of chlorine is 35.45 u.

$$0.7577 \times 34.9689\ u = 26.4959\ u$$
$$\underline{0.2423 \times 36.9659\ u = \ \ 8.9568\ u}$$
$$= 35.45u$$

3) Calculate the number of moles and atoms in the following samples?
   a) 5.0 g of carbon, 0.42 moles, 2.5×10^{23} atoms.
   b) 2.5 g lead, 1.2×10^{-2} moles, 7.3×10^{21} atoms.
   c) 150 g of hydrogen, 1.5×10^{2} mole, 9.0×10^{25} atoms.

4) How many grams are in 0.500 moles of the following elements?
   a) Magnesium , 12.2 g
   b) Phosphorous, 15.5g
   c) Sulfur, 16.0g

5) List the likely ionic charge on the following main group elements.
   aluminum +3, chlorine -1, oxygen -2, potassium +1, lithium +1, calcium +2, bromine -1