Chem I

Name Key

Date ____________ Per _____

Ionic Compounds Review

Note: Starred Problems (*) are for those of you who really get this.

I. Ions: What ion does each of these become? (give the symbol and the charge)

a. sodium : Ex: Na^{+1}

b. oxygen: O^{-2}

c. copper II: Cu^{+2}

d. nitrogen: N^{-3}

e. barium: Ba^{+2}

f. chromium V: Cr^{+5}

g. gallium: Ga^{+3}

h. iodine: I^{-1}

II. Ionic Compounds the First: Give the formula for each of these.

a. Magnesium fluoride MgF_2

b. Potassium nitride K_3N

c. Magnesium nitride Mg_3N_2

d. Gold III iodide AuI_3

e. Vanadium VII phosphide V_3P_7

f. Aluminum sulfide Al_2S_3

III. Ionic Compounds the Second: What is the name of each of these? Use Roman Numerals when necessary.

a. RbBr rubidium bromide

b. AlN aluminum nitride

c. CuF_2 Copper II fluoride

d. Nb_3N_9 niobium IX nitride

e. PbO_2 lead IV oxide

f. $SnCl_4$ tin IV chloride

IV. Grams, Moles, and Molecules

a. How many molecules are in a mole of molecules? 6.02×10^{23} molecules

b. How many atoms are in a mole of atoms? 6.02×10^{23} atoms

c. How many BBs are in a mole of BBs? 6.02×10^{23} BB's *d. One twinkie is 4.00 inches long. The nearest star is Alpha Centari, which is 4.24 light years away from the earth. One light year is 5.88×10^{12} miles. There's 5,280 feet in one mile. Could a mole of twinkies, lined up end to end, make it from here to Alpha Centari?

6.02×10^{23} twinkies $\times \frac{4.00 \text{ inches}}{1 \text{ twinkie}} \times \frac{1 \text{ ft}}{12 \text{ in}} \times \frac{1 \text{ mile}}{5280 \text{ ft}} \times \frac{1 \text{ light year}}{5.88 \times 10^{12} \text{ mi}} = 6.46 \times 10^{6}$ Light years

That's more than enough light years to make it to Alpha Centari, so the answer is (yes).

e. What's the mass of 7.00 moles of calcium chloride?

Ca: 40.08
2 Cl: 70.90
110.98 g/mole

$7.00 \text{ mole} \times \frac{110.98 \text{ g}}{1 \text{ mole}} =$ (777 g $CaCl_2$)
(776.86 g)

f. If you had 4.50×10^{12} molecules of sodium chloride how many moles would it be?

4.50×10^{12} molecules $\times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ molec}} =$ (7.48×10^{-12} moles)
(7.47508 rounds up!)

g. How many molecules would be in 100.0 grams of uranium VI fluoride? = (UF_6)

(U^{+6}, F^{-1})

U = 238.03 g
6 F = 114.00 g
352.03 g/mole

$100.0 \text{ g} \times \frac{1 \text{ mole } UF_6}{352.03 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ molec}}{1 \text{ mole}} =$ (1.71×10^{23} molec)

*i. How many atoms of uranium would there be? (1.71×10^{23} atoms U) (1 atom of U per molecule)

*ii. How many atoms of fluorine would that be? (1.02×10^{24} atoms F) (6 atoms of F per molecule

($6 \times 1.71 \times 10^{23}$ molecules $= 1.02 \times 10^{24}$ atoms)

*iii. Back to the uranium. If one out of 140 of those uranium atoms was U-235 (the stuff that's fissile, or can be used to make a chain reaction (and therefore a bomb), how many atoms of U-235 would that be?

1.71×10^{23} atoms U $\times \frac{1 \text{ atom U-235}}{140 \text{ atoms U}} =$ (1.22×10^{21} atoms U-235)

*iv. Finally, how much would the U-235 atoms weigh?

1.22×10^{21} atoms U-235 $\times \frac{1 \text{ mole}}{6.02 \times 10^{23} \text{ molec}} \times \frac{235 \text{ g}}{1 \text{ mole U-235}} =$ (.476 g)

h. Someone presents you with 25.0 moles of silver I chloride. = AgCl

(Ag^{+}, Cl^{-})

i. How much would it weigh?

Ag = 107.87 g
Cl = 35.45 g
143.32 g

$25.0 \text{ moles AgCl} \times \frac{143.32 \text{ g}}{1 \text{ mole AgCl}} =$ (3580 g AgCl)
(3583 g)

ii. How many molecules would it be?

$25.0 \text{ moles} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mole}} =$ (1.51×10^{25} molecules)

*iii. How many grams of just silver is in there (if you could get it out)?

1.51×10^{25} molecules AgCl $\times \frac{1 \text{ atom Ag}}{1 \text{ molecule AgCl}} \times \frac{1 \text{ mole Ag}}{6.02 \times 10^{23} \text{ atoms}} \times \frac{107.87 \text{ g Ag}}{1 \text{ mole Ag}} =$ (2710 g Ag)