Chemistry 311/312

Name: Answer Key

Ionic Bonding

Practice II

Learning Target
Identify the atoms of elements that tend to lose and tend to gain electrons.
Explain the electrical charge of an ionic compound.
Describe how cations form.
Describe how anions form.
Describe the three properties of ionic compounds.
Determine the molar mass of an element and of a compound (gram formula mass).
Describe how to convert the mass of a substance to the number of moles of a substance,and moles to mass.

First attempt to answer as many of the following questions as you can without the help of your notes. Once you have reached a point where you can no longer answer any more questions, make a note of which questions you could not answer. Now, use your notes to finish answering all of the practice questions.

1. What is an ionic bond?
   - An attraction between cations and anions.
     ↳ an ionic compound is two or more atoms held together by ionic bonds.

2. What types of element(s) make up ionic bonds?

   metals and nonmetals

3. In an ionic bond, which element loses one or more electrons and which element gains one or more electrons?

   metals = lose electrons

   nonmetals = Gain electrons

4. Explain the difference between a monatomic ion and a polyatomic ion.

   monatomic ion = one atom

   polyatomic ion = A charged group of bonded atoms that act as one unit in an ionic bond.

5. What is an ion?

   An atom that has gained or lost one or more electrons.

Name:_____

6. What are the two different types of ion, explain how they are formed.

Anion - loss of electrons

Cation - gain electrons

7. What does a chemical formula show you?

Shows the number of atoms of each element in the smallest unit of a substance.

8. List three properties of ionic compounds.

1) solids at room temperature.

2) High melting points

3) Good conductors of electric current when melted or dissolved in water.

9. Determine if each of the following can form an ionic compound. If they can form an ionic compound list which element will form the anion and which element will form the cation. If the pair cannot form an ionic compound explain why they cannot.

a. H, Cl – ~~yes~~ No, ~~Hydrogen~~ Both nonmetals

b. Mg, O - yes, Mg^{2+} O^{-}

c. K, Ar - No, Ar is a noble gas

d. P, S - No, both nonmetals

e. C, I - No, both nonmetals

f. Sr, O - yes, Sr^{+} O^{-}

g. Cs, F - yes, Cs^{+} F^{-}

h. Br, Na - yes, Br^{-} Na^{+}

i. I, Na - yes, I^{-} Na^{+}

j. H, He - No, He is a noble gas

Chemistry 311/312

Name:_____

10. What do we call the molar mass of an ionic compound?

Gram Formula Mass

11. Determine the GFM for the following ionic compounds (be sure to include units and the compound formula in your answer).

a. NaCl

Na (1)(22.99) = 22.99
Cl (1)(35.45) = 35.45

58.44g NaCl

b. Be_2N_2

Be(2)(9.01) = 18.02
N (2)(14.01) = 28.02

46.04g Be_2N_2

c. Pb_3N_2

Pb (3)(207.20) = 621.60
N (2)(14.01) = 28.02

649.6g Pb_3N_2

12. What is the mass of 5.8 moles of NaCl?

$$5.8 \text{ mol NaCl} \times \frac{58.44 \text{g NaCl}}{1 \text{ mol NaCl}} = 338.952$$

340 g NaCl

13. How many moles are there in 2.54 grams of HCl?

$$2.54 \text{g HCl} \times \frac{1 \text{ mol HCl}}{36.46 \text{g HCl}} = 0.069666538 67$$

0.0697 mol HCl

H(1)(1.01) = 1.01
Cl(1)(35.45) = 35.45
36.46