Study Guide – Chemical Bonding (CH 6)

Name: _____

Vocabulary

1. ***Compound*** is when two or more atoms chemically combine.
2. ***Chemical bond*** is the force that holds atoms together in a compound.
3. ***Ionic bond*** occurs between a metal and non-metal by transferring electrons.
4. ***Ion*** is a charged atom.
5. ***Oxidation state*** is the charge of an ion.
6. ***Cation*** is a positively charged ion.
7. ***Anion*** is a negatively charged ion.
8. Compounds that are formed by ionic bonds are called ***ionic compounds***.
9. ***A polyatomic ion*** is a covalently bonded group of atoms that has a charge and acts as a unit.
10. ***Covalent bond*** is formed between a two nonmetals by sharing electrons.
11. Compounds that are formed by covalent bonds are called ***molecules***.
12. When atoms share electrons equally it is called a ***nonpolar bond***.
13. When atoms share electrons unequally it is called a ***polar bond***.
14. A compound made from only two elements is a ***binary compound***.

Questions

15. Which group contains elements with stable electron configurations? ***Group 18 – noble gases***
16. Typically, atoms gain or lose electrons to achieve stable ***electron configurations***.
17. The elements most likely to form more than one type of ion are the ***transition metals***.
18. Beryllium (Be) and chlorine (Cl) form a binary ionic compound with a one-to-two ratio of beryllium ions to chloride ions. The formula for the compound is ***$BeCl_2$***.
19. Alkali metals, alkaline earth metals, and aluminum all form ions with positive charges equal to the ***group number***.
20. In the compound CO_2 the subscript 2 indicates that ***there are two oxygen atoms for one carbon atom***.
21. Which of the following compounds does NOT contain molecules: H_2, CO_2, ***NaCl***, and H_2O? What do they call this compound? ***Ionic compound***
22. Which of the following formulas represents a compound whose molecules contain a triple bond: ***N ≡ N***, O = O, H – Cl ?

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23. In the name *carbon dioxide,* the prefix of the second word indicates that a molecule of carbon dioxide contains ***two oxygen atoms***.

24. Describe a metallic bond. ***An attraction between a metal cation and a shared pool of electrons, or a sea of electrons***.

Problems

25. Complete the table below. An example has been provided.

Name	Symbol	# of Valence e-	Electron-Dot Diagram (Lewis Structure)	Oxidation State	Ion Notation
Sulfur	**S**	**6 e-**		**2-**	**S^{2-}**
Calcium	**Ca**	**2e-**		**2+**	**Ca^{2+}**
Sodium	**Na**	**1e-**		**1+**	**Na^{+}**
Carbon	**C**	**4e-**		**4+**	**C^{4+}**
Oxygen	**O**	**6e-**		**2-**	**O^{2-}**
Fluoride	**F**	**7e-**		**1-**	**F^{-}**
Aluminum	**Al**	**3e-**		**3+**	**Al^{3+}**

26. Identify the following compounds as having ionic (I) or *covalent (C)* bonds.

a. MgO
b. NH_4Cl
c. KI
d. NO_2
e. $FeCl_3$
f. P_2O_5
g. N_2O_3
h. CO_2

27. Write the chemical formula for each compound formed by combining the elements in each set.

a. aluminum and fluorine ***AlF_3***
b. boron and oxygen ***B_2O_3***
c. magnesium and nitrogen ***Mg_3N_2***
d. potassium and chlorine ***KCl***

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28. Write the chemical formula for each compound formed by combining the elements and polyatomic ion in each set.
    a. sodium and carbonate ***Na_2CO_3***
    b. ammonium and sulfate ***$(NH_4)_2SO_4$***
    c. calcium and nitrite ***$Ca(NO_2)_2$***
    d. beryllium and chlorate ***$Be(ClO_3)_2$***
29. Name the following compounds:
    a. $CaCl_2$ ***calcium chloride***
    b. CO_2 ***carbon dioxide***
    c. H_2O ***dihydrogen monoxide***
    d. $BaSO_4$ ***barium sulfate***
    e. K_2O ***potassium oxide***
    f. NaF ***sodium fluoride***
    g. N_2O_5 ***dinitrogen pentoxide***
    h. LiBr ***lithium bromide***
30. Write the formula for the following compounds:
    a. aluminum oxide ***Al_2O_3***
    b. calcium chloride ***$CaCl_2$***
    c. diphosphorus pentoxide ***P_2O_5***
    d. iron (II) oxide ***FeO***
    e. iron (III) oxide ***Fe_2O_3***
    f. potassium nitrate ***KNO_3***
    g. dihydrogen monoxide ***H_2O***
    h. potassium chloride ***KCl***
    i. beryllium nitride ***Be_3N_2***
    j. sulfur hexachloride ***SCl_6***
31. Name two alloys and list the metals that compose them. ***Bronze – copper, tin; brass – copper, zinc; steel – iron, carbon; stainless steel – iron, carbon, chromium***