Name: _____

Group: _____

Date: _____

Practice Comp #2 - Key

1. A solid substance is exposed to a large amount of heat and instantly vaporizes. The substance has undergone a process of _____.
   A. Melting
   B. Boiling
   C. Deposition
   D. Sublimation

   Solid → gas = sublimation

2. How many electrons are in the following nitride ion, $^{15}_{7}N^{3-}$?
   A. 3
   B. 7
   C. 8
   D. 10

   A neutral atom has the same number of e^- and P^+. Nitride has a -3 charge so there are 3 more electrons than P^+.

3. What is the predicted charge for an alkaline earth metal?
   A. 2+
   B. 1+
   C. 1-
   D. 2-

   Alkaline earth metals are found in group 2A. Elements in this group lose two e^- to acquire a full valence shell leaving them with two more P^+ than e^-.

4. Which of the following periodic families prefers not to have any charge at all? In other words, they don't become ions.
   A. Noble Gases
   B. Halogens
   C. Alkali metals
   D. Alkaline earth metals

   Noble gases have a full valence shells and therefore they do not lose or gain electrons to become ions.

5. Which of the following neutral elements has predicted charge of -1?
   A. Sodium (Na)
   B. Calcium (Ca)
   C. Neon (Ne)
   D. Fluorine (F)

   Elements in group 7A (halogens) gain one e^- to acquire a full valence shell giving them a charge of -1.

6. In which of the following bonds would you expect to see electrons completely transferred from one atom within the compound to the other.

A. O_2
B. CO
C. MgO
D. SiC

Ionic compound contain cations which have completely transferred electrons to another atom which makes it an anion. Opposite charges hold ionic compounds together.

7. Which of the following substances would you expect to be brittle?

A. $C_{25}H_{52}$
B. Copper
C. Potassium bromide
D. Sulfur hexafluoride

Ionic compounds tend to be brittle.

8. What is the chemical formula for nickel (II) carbonate?

A. $NiCO_3$
B. $Ni_3(CO_3)_2$
C. NiCO
D. Ni_2CO_3

Nickel has a 2+ charge in this case and carbonate always has a 2- charge. After the swap and drop these charges need are reduced.

9. What is the chemical name for $Ba(OH)_2$.

A. Barium dihydroxide
B. Barium hydroxide
C. Barium (II) hydroxide
D. Barium oxide

Barium always has a 2+ charge and hydroxide always has a 1- charge. It helps to do a reverse swap and drop here.

10. Which of the following substances has the lowest melting point?

A. MgO
B. Al
C. CO_2
D. $Ca_3(PO_4)_2$

Covalent compounds tend to have a low melting and boiling points.

11. Which of the following is the correct name for SiO_2?

A. Silicon oxide
B. Silicon (II) oxide
C. Silicon dioxide
D. Monosilicon dioxide

Silicon is a metalloid and we usually treat metalloids as nonmetals when we are deciding if a compound is ionic or covalent. Covalent compounds use prefixes.

12. Which of the following substances would be a good conductor of electricity

A. Beryllium (Be)
B. Carbon (C)
C. Water
D. Oxygen molecules (O_2)

Metals are good conductors of heat and electricity.

13. Which of the following substances are NOT ductile. In other words, which cannot be drawn into wires?

A. Sodium (Na)
B. Copper (Cu)
C. Nickel (Ni)
D. Calcium (Ca)

Metals are the only substances which are ductile. Therefore, you should eliminate metals from.

14. What are the coefficients when the following chemical equation is balanced?

$$\_2\_\_\ C_2H_2 + \_\_5\_O_2 \rightarrow \_4\_\ CO_2 + \_\_2\_\ H_2O$$

A. 1, 3, 2, 1
B. 2, 4, 5, 2
C. 2, 5, 4, 2
D. 1, 2, 1, 2

15. According to the following chemical equation, 53.3 g of Cl_2 are bubbled through an aqueous solution containing 133.4 g of $AlBr_3$. After this reaction 119.9 g of bromine gas (Br_2) are captured. How many grams of $AlCl_3$ are also produced?

$$2AlBr_3 + 3Cl_2 \rightarrow 2AlCl_3 + 3Br_2$$

A. 400 g
B. 267 g
C. 66.8 g
D. 186.7 g

133.4 g + 53.3 g = x + 133.4
x = 66.8 g

16. Which of the following balanced chemical reactions is a combustion reaction?

A. $NH_4OH \rightarrow H_2O + NH_3$
B. $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$
C. $S_8 + 24F_2 \rightarrow 8SF_6$
D. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$

Oxygen is necessary for all combustion reactions.

17. What are the coefficients when the following chemical equation is balanced?

$$\_\_2\_Fe_2O_3 + \_3\_\_C \rightarrow \_\_4\_Fe + \_\_3\_CO_2$$

A. 2, 3, 4, 3
B. 1, 2, 3, 2
C. 5, 2, 1, 4
D. 3, 3, 1, 3

18. Three moles of calcium fluoride contains how many F^{1-} ions?

A. 6 F^{1-} ions
B. 1.8 x 10^{24} F^{1-} ions
C. 3.6 x 10^{24} F^{1-} ions
D. 6.02 x 10^{23} F^{1-} ions

$$3 \text{ mol } CaF_2 \times \frac{2 \text{ mol } F^{1-} \text{ ions}}{1 \text{ mol } CaF_2} \times \frac{6 \times 10^{23} F^{1-} \text{ ions}}{1 \text{ mol } F^{1-}} =$$

19. An average can of Coke contains 2.2 g of carbon dioxide. How many moles of carbon dioxide are in an average can of Coke?

A. 5 moles
B. 0.5 moles
C. 5×10^{-2} moles
D. 0.079 moles

$2.2\ g\ CO_2 \times \frac{1\ mol\ CO_2}{44\ g\ CO_2} =$

20. A metal has a mass of 173.5 grams and contains 25 moles of atoms. Assuming that it is a pure substance, what element is this?

A. Magnesium (Mg)
B. Calcium (Ca)
C. Barium (Ba)
D. Lithium (Li)

Molar mass = g/mol = 173.5 g / 25 moles = 6.941 g/mol

21. What is the molar mass of potassium sulfate?

A. 110 g/mol
B. 174 g/mol
C. 135 g/mol
D. 213 g/mol

Potassium sulfate = K_2SO_4 = 174 g/mo

(39.01 x 2) + 32.06 + (16 x 4)

Free Response

$$\_\_\_\_\ N_2 + \underline{\ 3\ }\ H_2 \rightarrow \underline{\ 2\ }\ NH_3$$

22. Balance the chemical equation above.

23. According to the chemical equation above, how many moles of H_2 are required to synthesize 6.2 moles of NH_3?

$$6.2\ mol\ NH_3 \times \frac{3\ mol\ H_2}{2\ mol\ NH_3} = 9.3\ mol\ H_2$$