Name: _____ **Date:** _____ **Period:** _____

Ch 11assessment review

Matching

Match each item with the correct statement below.

a. product
b. reactant
c. chemical equation
d. balanced equation
e. skeleton equation

____ 1. a chemical equation that does not indicate relative amounts of reactants and products
____ 2. a new substance formed in a chemical reaction
____ 3. a starting substance in a chemical reaction
____ 4. a concise representation of a chemical reaction
____ 5. an equation in which each side has the same number of atoms of each element

Match each item with the correct statement below.

a. activity series of metals
b. single-replacement reaction
c. combustion reaction
d. decomposition reaction

____ 6. a reaction in which a single compound is broken down into simpler substances
____ 7. a reaction in which oxygen reacts with another substance, often producing heat or light
____ 8. a reaction in which the atoms of one element replace the atoms of a second element in a compound
____ 9. a list of metals in order of decreasing reactivity

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 10. Chemical reactions ____.
a. occur only in living organisms
b. create and destroy atoms
c. only occur outside living organisms
d. produce new substances

____ 11. Everyday equations describe ____.
a. thermonuclear reactions
b. everyday processes
c. chemical reactions
d. biological chemistry

____ 12. What does the symbol $\triangle$ in a chemical equation mean?
a. Heat is supplied to the reaction.
b. A catalyst is needed.
c. yields
d. precipitate

____ 13. Chemical equations ____.
a. describe chemical reactions
b. show how to write chemical formulas
c. give directions for naming chemical compounds
d. describe only biological changes

____ 14. A skeleton equation does NOT show which of the following?
a. the correct formulas of the reactants and products
b. the reactants on the left, the products on the right
c. an arrow connecting the reactants to the products
d. the relative amounts of reactants and products

____ 15. Symbols used in equations, together with the explanations of the symbols, are shown below. Which set is correct?
a. (*g*), grams
b. (*l*), liters
c. (*aq*), dissolved in water
d. (*s*), solid product

____ 16. In the chemical equation $H_2O_2(aq) \rightarrow H_2O(l) + O_2(g)$, the O_2 is a ____.
a. catalyst
b. solid
c. product
d. reactant

____ 17. This symbol ($\rightleftharpoons$) indicates that ____.
a. heat must be applied
b. a gas is formed by the reaction
c. an incomplete combustion reaction has occurred
d. the reaction is reversible

____ 18. A catalyst is ____.
a. the product of a combustion reaction
b. not used up in a reaction
c. one of the reactants in single-replacement reactions
d. a solid product of a reaction

____ 19. Which of the following is the correct skeleton equation for the reaction that takes place when solid phosphorus combines with oxygen gas to form diphosphorus pentoxide?

a. $P(s) + O_2(g) \rightarrow PO_2(g)$
c. $P(s) + O_2(g) \rightarrow P_2O_5(s)$
b. $P(s) + O(g) \rightarrow P_5O_2(g)$
d. $P_2O_5(s) \rightarrow P_2(s) + O_2(g)$

____ 20. If you rewrite the following word equation as a balanced chemical equation, what will the coefficient and symbol for fluorine be**?** **nitrogen trifluoride → nitrogen + fluorine**

a. $6F_2$
c. 6F
b. F_3
d. $3F_2$

____ 21. What are the coefficients that will balance the skeleton equation ? $\mathbf{AlCl_3 + NaOH \rightarrow Al(OH)_3 + NaCl}$

a. 1, 3, 1, 3
c. 1, 1, 1, 3
b. 3, 1, 3, 1
d. 1, 3, 3, 1

____ 22. What are the coefficients that will balance the skeleton equation? $\mathbf{N_2 + H_2 \rightarrow NH_3}$

a. 1, 1, 2
c. 3, 1, 2
b. 1, 3, 3
d. 1, 3, 2

____ 23. When the equation $Fe + Cl_2 \rightarrow FeCl_3$ is balanced, what is the coefficient for Cl_2?

a. 1
c. 3
b. 2
d. 4

____ 24. When the following equation is balanced, what is the coefficient for HCl? $Mg + HCl \rightarrow MgCl_2 + H_2$

a. 6
c. 1
b. 3
d. 2

____ 25. Which of the following statements is NOT true about what happens in all chemical reactions?

a. The ways in which atoms are joined together are changed.
b. New atoms are formed as products.
c. The starting substances are called reactants.
d. The bonds of the reactants are broken and new bonds of the products are formed.

____ 26. Chemical equations must be balanced to satisfy ____.

a. the law of definite proportions
c. the law of conservation of mass
b. the law of multiple proportions
d. Avogadro's principle

____ 27. When the equation $\mathbf{KClO_3(s) \rightarrow KCl(s) + O_2(g)}$ is balanced, the coefficient of $KClO_3$ is ____.

a. 1
c. 3
b. 2
d. 4

____ 28. In every balanced chemical equation, each side of the equation has the same number of ____.

a. atoms of each element
c. moles
b. molecules
d. coefficients

____ 29. What are the missing coefficients for the skeleton equation below?
$\mathbf{Cr(s) + Fe(NO_3)_2(aq) \rightarrow Fe(s) + Cr(NO_3)_3(aq)}$

a. 4, 6, 6, 2
c. 2, 3, 3, 2
b. 2, 3, 2, 3
d. 1, 3, 3, 1

____ 30. What are the missing coefficients for the skeleton equation below?
$\mathbf{Al_2(SO_4)_3(aq) + KOH(aq) \rightarrow Al(OH)_3(aq) + K_2SO_4(aq)}$

a. 1, 3, 2, 3
c. 4, 6, 2, 3
b. 2, 12, 4, 6
d. 1, 6, 2, 3

____ 31. When potassium hydroxide and barium chloride react, potassium chloride and barium hydroxide are formed. The balanced equation for this reaction is ____.

a. $KH + BaCl \rightarrow KCl + BaH$
c. $2KOH + BaCl_2 \rightarrow 2KCl + Ba(OH)_2$
b. $KOH + BaCl \rightarrow KCl + BaOH$
d. $KOH + BaCl_2 \rightarrow KCl_2 + BaOH$

____ 32. The product of a combination reaction is $Ba(OH)_2$. If one of the reactants is H_2O, what is the other reactant?
a. Ba_2O
b. BaO
c. BaH
d. BaO_2

____ 33. In order to predict whether or not a single-replacement reaction takes place, you need to consult a chart that shows the ____.
a. periodic table
b. activity series of metals
c. common polyatomic ions
d. ionic charges of representative elements.

____ 34. In order for the reaction $2Al + 6HCl \rightarrow 2AlCl_3 + 3H_2$ to occur, which of the following must be true?
a. Al must be above Cl on the activity series.
b. Al must be above H on the activity series.
c. Heat must be supplied for the reaction.
d. A precipitate must be formed.

____ 35. In a combustion reaction, one of the reactants is ____.
a. hydrogen
b. nitrogen
c. oxygen
d. a metal

____ 36. The products of a combustion reaction do NOT include ____.
a. water
b. carbon dioxide
c. carbon monoxide
d. hydrogen

____ 37. The type of reaction that takes place when one element reacts with a compound to form a new compound and a different element is a ____.
a. combination reaction
b. decomposition reaction
c. single-replacement reaction
d. double-replacement reaction

____ 38. In a double-replacement reaction, the ____.
a. products are always molecular
b. reactants are two ionic compounds
c. reactants are two elements
d. products are a new element and a new compound

____ 39. Which of the following statements is NOT correct?
a. The only way to determine the products of a reaction is to carry out the reaction.
b. All chemical reactions can be classified as one of five general types.
c. Complete combustion has occurred when all the carbon in the product is in the form of carbon dioxide.
d. A single reactant is the identifying characteristic of a decomposition reaction.

____ 40. Which of the following is a balanced equation representing the decomposition of lead(IV) oxide?
a. $PbO_2 \rightarrow Pb + 2O$
b. $PbO_2 \rightarrow Pb + O_2$
c. $Pb_2O \rightarrow 2Pb + O$
d. $PbO \rightarrow Pb + O_2$

____ 41. What are the correct formulas and coefficients for the products of the following double-replacement reaction?
$RbOH + H_3PO_4 \rightarrow$
a. $Rb(PO_4)_3 + H_2O$
b. $RbPO_4 + 2H_2O$
c. $Rb_3PO_4 + 3H_2O$
d. $H_3Rb + PO_4OH$

____ 42. When the equation for the complete combustion of one mole of C_3H_7OH is balanced, the coefficient for oxygen is ____. **SHOW YOUR WORK**

____ 43. Which of the following statements is NOT true about the decomposition of a simple binary compound?
a. The products are unpredictable.
b. The products are the constituent elements.
c. The reactant is a single substance.
d. The reactant could be an ionic or a molecular compound.

____ 44. Which of the following statements is true about single-replacement reactions?
a. They are restricted to metals.
b. They involve a single product.
c. Two reactants produce two products.
d. Any metal replaces any other metal.

____ 45. In the activity series of metals, which metal(s) will displace hydrogen from an acid?
a. only metals above hydrogen
b. only metals below hydrogen
c. any metal
d. only metals from Li to Na

____ 46. Use the activity series of metals to complete a balanced chemical equation for the following single replacement reaction.
$Ag(s) + KNO_3(aq) \rightarrow$
a. $AgNO_3 + K$
b. $AgK + NO_3$
c. $AgKNO_3$
d. No reaction takes place because silver is less reactive than potassium.

____ 47. Which of the following statements is NOT true about double-replacement reactions?
a. The product may precipitate from solution.
b. The product may be a gas.
c. The product may be a molecular compound.
d. The reactant may be a solid metal.

____ 48. In a double-replacement reaction, ____.
a. the reactants are usually a metal and a nonmetal
b. one of the reactants is often water
c. the reactants are generally two ionic compounds in aqueous solution
d. energy in the form of heat or light is often produced

____ 49. A double-replacement reaction takes place when aqueous Na_2CO_3 reacts with aqueous $Sn(NO_3)_2$. You would expect one of the products of this reaction to be ____.
a. $NaNO_3$
b. NaSn
c. $Sn(CO_3)_2$
d. CNO_3

____ 50. The complete combustion of which of the following substances produces carbon dioxide and water?
a. C_8H_{18}
b. K_2CO_3
c. $CaHCO_3$
d. NO

____ 51. The reaction $2Fe + 3Cl_2 \rightarrow 2FeCl_3$ is an example of which type of reaction?
a. combustion reaction
b. single-replacement reaction
c. combination reaction
d. decomposition reaction

____ 52. The equation $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$ is an example of which type of reaction?
a. combination reaction
b. single-replacement reaction
c. decomposition reaction
d. double-replacement reaction

____ 53. The equation $H_3PO_4 + 3KOH \rightarrow K_3PO_3 + 3H_2O$ is an example of which type of reaction?
a. double-replacement reaction
b. combination reaction
c. decomposition reaction
d. single-replacement reaction

____ 54. The equation $2C_3H_7OH + 9O_2 \rightarrow 6CO_2 + 8H_2O$ is an example of which type of reaction?
a. combustion reaction
b. single-replacement reaction
c. double-replacement reaction
d. decomposition reaction

____ 55. A double-replacement reaction takes place when aqueous cobalt(III) chloride reacts with aqueous lithium hydroxide. One of the products of this reaction is ____.
a. $Co(OH)_3$
b. $Co(OH)_2$
c. $LiCo_3$
d. $LiCl_3$

____ 56. If a combination reaction takes place between rubidium and bromine, the chemical formula for the product is ____.
a. RuBr
b. Rb_2Br
c. $RbBr_2$
d. RbBr

____ 57. What is the balanced chemical equation for the reaction that takes place between bromine and sodium iodide?

a. $Br_2 + NaI \rightarrow NaBr_2 + I$

b. $Br_2 + 2NaI \rightarrow 2NaBr + I_2$

c. $Br + NaI_2 \rightarrow NaBrI_2$

d. $Br + NaI_2 \rightarrow NaBr + I_2$

Short Answer

58. Complete and balance the following equation.
$Cd(NO_3)_2 + NH_4Cl \rightarrow$

59. Balance the following equation.
$NaClO_3 \rightarrow NaCl + O_2$

60. Balance the following equation.
$Mg + H_3PO_4 \rightarrow Mg_3(PO_4)_2 + H_2$

61. Balance the following equation.
$(NH_4)_2CO_3 + NaOH \rightarrow Na_2CO_3 + NH_3 + H_2O$

62. Balance the following equation.
$C_3H_6 + O_2 \xrightarrow{\Delta} CO_2 + H_2O$

63. Balance the following equation.
$Au_2O_3 \rightarrow Au + O_2$

64. Complete and balance the following equation.
$Al + Cl_2 \rightarrow$

65. Complete and balance the following equation.
$CH_4 + O_2 \xrightarrow{\Delta}$

66. Balance the following equation.
$C_2H_5OH + O_2 \rightarrow CO_2 + H_2O$

67. Complete and balance the following equation:
$K_3PO_4 + BaCl_2 \rightarrow$

68. Write the balanced molecular, ionic, and net ionic equations for the following reaction:
Aqueous barium chlorate reacts with aqueous sodium sulfate to form a barium sulfate precipitate and aqueous sodium chlorate:

a. molecular equation:

b. complete ionic equation:

c. net ionic equation:

69. Write the balanced molecular, ionic, and net ionic equations for the following reaction, you MUST include the state of matter for each compound:
Aqueous phosphoric acid reacts with aqueous calcium hydroxide to form a aqueous calcium posphate and molecular water:

a. Balanced molecular equation:

b. complete ionic equation:

c. net ionic equation:

70. Write the balanced molecular, ionic, and net ionic equations for the following reaction, you MUST include the state of matter for each compound: Predict the precipitate that forms when aqueous solutions of silver nitrate and potassium chloride react to form products in a double-replacement reaction.

a. Balanced Molecular equation

b. complete ionci equation

c. net ionic equation

Solubility Rules for Ionic Compounds

Compound	Solubility
Salts of alkali metals and ammonia	Soluble
Nitrate salts and chlorate salts	Soluble
Sulfate salts, **except compounds** with Pb^{2+}, Ag^{1+}, Hg_2^{2+}, Ba^{2+}, Sr^{2+}, and Ca^{2+}	Soluble Exceptions= insoluble
Chloride salts, except compound with Pb^{2+}, Ag^{1+},and Hg_2^{2+}	Soluble
Carbonates, phosphates, chromates, sulfides, and hydroxides	Most are insoluble