Name: _____ **Class:** _____ **Date:** _____

Chemistry Part 2 *BONUS * Practice Test

Modified True/False
Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

____ 1. For reactions to occur, the reacting particles must collide with enough ***energy.***

____ 2. ***Exothermic*** reactions are those in which there is net release of energy to the surroundings.

____ 3. The terms endothermic and exothermic refer to the changes in ***mass*** during chemical or physical changes.

____ 4. In a ***synthesis*** reaction, two or more elements or compounds combine to form a new compound**.**

____ 5. In a single replacement, reaction a ***metal*** element replaces the metal ion in a compound.

____ 6. The formation of a ***precipitate*** is common in double replacement reactions.

____ 7. Combustion reactions are chemical reactions involving a compound or element that reacts with ***sulfur*** to produce a new compound and heat.

____ 8. One common characteristic of acids is that they taste ***sour***.

____ 9. A base is a substance that forms ***hydrogen*** ions when in aqueous solution.

____ 10. A solution with a pH value less than 7 would be a(n) ***neutral solution***.

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

____ 11. Chemical reactions involve the interaction of matter and energy. When you boil an egg on the stove, which of the following is the source of energy?
a. the cooking pot
b. the stove
c. the water
d. the egg

____ 12. In order to turn on a gas burner on a stove, you turn a dial and there is an electric spark. What is the purpose of the spark?
a. It provides an initial source of energy to start the reaction.
b. It acts as a reactant chemical.
c. It reacts with the chemicals to give products.
d. It mixes the gas with oxygen from the air.

____ 13. Which of the following statements about chemical reactions is true?
a. The maximum amount of energy that is produced during a chemical reaction is the activation energy.
b. The minimum amount of energy required for a chemical reaction to occur is the activation energy.
c. All chemical reactions get warmer as they proceed.

d. All chemical reactions become cooler as they proceed.

____ 14. The law of conservation of energy states that
a. the total energy of the universe is constant.
b. the total energy of a chemical reaction stays constant.
c. the energy of reactants is equal to the energy of products in an open system.
d. the energy of reactants is equal to the energy of products in a closed system.

____ 15. Which of the following statements is true?
a. The system is the materials involved in a chemical reaction and the surroundings is the rest of the universe.
b. The system is the materials involved in a chemical reaction and the surroundings is the universe including the system.
c. The surroundings is the materials involved in a chemical reaction and the system is the rest of the universe.
d. None of these statements is true.

____ 16. You mixed two colourless solutions together in a beaker and the colour changed to a pale yellow. Which of the following items is part of the surroundings for this reaction?
a. you
b. the beaker
c. the classroom
d. All of the above are part of the surroundings.

____ 17. When two chemicals are mixed and the temperature of the solution increases, the reaction is
a. endothermic.
b. exothermic.
c. impossible to classify without more information.
d. initially endothermic and then exothermic.

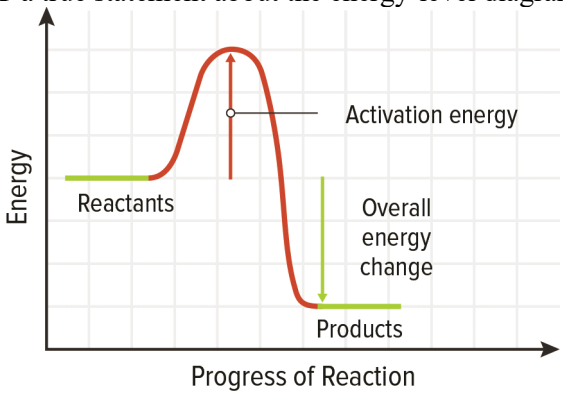
____ 18. The difference between endothermic and exothermic reactions is
a. endothermic reactions involve net absorption of energy while exothermic reactions involve the net release of energy.
b. related to the amount of energy required for bond breaking and the amount of energy released during bond formation.
c. related to the energy of the reactants and the energy of the products.
d. All of the above reflect the difference between exothermic and endothermic reactions.

____ 19. A student performed an experiment that involved initially using a Bunsen burner to gently heat a small strip of shiny metal in a crucible. Once the reaction started, the metal gave off lots of light and heat. At the end of the reaction, the crucible only contained a grey coloured powder. Which of the following statements about this reaction **IS NOT** true?
a. The metal was a reactant and the grey powder was a product.
b. The reaction was an exothermic reaction.
c. The reaction was an endothermic reaction.
d. The flame provided the energy needed to start the reaction.

____ 20. Photosynthesis is the process by which green plants use light energy from the Sun to change carbon dioxide and water into sugar and oxygen. Which of the following statements about photosynthesis is true?
a. Green plants absorb energy and store it in chemical bonds of sugar molecules.
b. Photosynthesis is an endothermic process.
c. Energy stored in sugar molecules is used to fuel our bodies.
d. All of the above are true.

____ 21. Which of the following information is included on an energy-level diagram?
a. the relative energy of the reactants
b. the relative energy of the products
c. a horizontal axis showing the progress of the reaction
d. All of the above are included.

____ 22. Which of the following **IS NOT** a true statement about the energy-level diagram shown below?



a. It shows an exothermic reaction.
b. It shows an endothermic reaction.
c. It shows the amount of energy required for the reaction to occur.
d. It shows that the relative energy of the reactants is greater than that of the products.

____ 23. Which of the following reactions is a synthesis reaction?
a. $2\ H_2O_2(aq) \rightarrow 2\ H_2O(l) + O_2(g)$
b. $4\ Al(s) + 3\ O_2(g) \rightarrow 2\ Al_2O_3(s)$
c. $2\ O_3(g) \rightarrow 3\ O_2(g)$
d. $2\ HI(g) \rightarrow H_2(g) + I_2(g)$

____ 24. Which of the following statements about decomposition reactions is always true?
a. They have a single product.
b. They have a solution and a solid as reactants.
c. They occur in the gas state.
d. They have a single reactant.

____ 25. Which of the following reactions is a decomposition reaction?
a. $2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(l)$
b. $4\ Fe(s) + 3\ O_2(g) \rightarrow 2\ Fe_2O_3(s)$
c. $2\ H_2O_2(aq) \rightarrow 2\ H_2O(l) + O_2(g)$
d. $NaOH(aq) + HCl(aq) \rightarrow NaCl(aq) + H_2O(l)$

____ 26. Which of the following statements about single replacement reactions is true?
a. A metal can replace hydrogen.
b. A metal can replace non-metals.
c. Non-metals can replace metals.
d. The positive ions change places to form new ionic compounds.

____ 27. If the chemical equation for a single replacement reaction is:

$2A + BX \rightarrow A_2X + B$

What type of particle is A?

a. An ionic compound.
b. a covalent molecule.
c. a non-metal element.
d. a metal element.

____ 28. Which of the following is a true statement about double replacement reactions?
a. The positive ions of the reactants change places.
b. The two reactants are both ionic compounds.
c. At least one of the products is commonly a precipitate.
d. All of the above are correct.

____ 29. Which of the following chemicals is always a reactant in a combustion reaction?
a. oxygen
b. carbon dioxide
c. water
d. salt

____ 30. Which of the following statements about hydrocarbon combustion reactions is true?
a. The reactant chemicals are always the same.
b. All the reactants and products contain only hydrogen and carbon.
c. CO_2 and water are always reactants.
d. The product chemicals are always the same.

____ 31. Why should people be concerned about incomplete combustion?
a. If combustion is incomplete too much fuel would be used.
b. The soot produced can damage your pots and pans.
c. Gases produced are potentially dangerous.
d. Carbon monoxide gas is explosive.

____ 32. Which of the following is a binary acid?
a. $H_2SO_3(aq)$
b. $H_2S(aq)$
c. $H_2SO_4(aq)$
d. $H_2SO_2(aq)$

____ 33. Which pieces of information would you need to know to predict the products of a reaction?
a. The physical states of the reactants and products.
b. The temperature before and after the reaction.
c. If the reaction takes place in an open or closed system.
d. The names or formulas of all reactants.

____ 34. Identify the type of reaction that the following reactants will undergo.

$N_2(g) + H_2(g) \rightarrow$

a. synthesis
b. neutralization
c. single replacement
d. decomposition

____ 35. When a piece of copper wire is placed in a solution of silver nitrate a reaction occurs. This is an example of
a. a single replacement reaction and the products are silver metal and copper(II) nitrate.
b. a single replacement reaction and the products are silver nitrate and copper metal.
c. a double replacement reaction and the products are silver nitrate and copper (II) nitrate.

d. It is not possible to identify the type of reaction with the information provided.

Completion

Complete each statement.

36. The temperature of water in a pot on the stove _____ as energy is added.

37. The minimum energy required for a reaction to occur is called the _____ energy.

38. The law of conservation of energy states that the total energy of the _____ is constant.

39. An _____ reaction is one in which there is a net absorption of energy from the surroundings.

40. You can often determine if a reaction is endothermic or exothermic by measuring the change in _____ .

41. The _____ axis of an energy-level diagram can be labeled " Progress of Reaction."

42. In a _____ replacement reaction, an element reacts with a compound

43. Energy is _____ when a combustion reaction takes place.

44. The burning of fossil fuels is a_____ reaction.

45. Incomplete combustion occurs when the supply of _____ is too low.

46. Oxyacids are composed of hydrogen, _____, and another element.

47. A neutral solution has _____ numbers of hydrogen ions and hydroxide ions in solution.

48. The reaction of an acid and a base is called a _____ reaction.

49. The products of an acid and base reaction are a salt and _____.

50. The reverse of a synthesis reaction is a _____ reaction.

Matching

Match the description to one of the following terms. There is one extra term that has no match.

a. activation energy
b. system
c. surroundings
d. endothermic
e. exothermic
f. law of conservation of energy
g. energy-level diagram
h. temperature

____ 51. the total energy of the universe is constant

____ 52. a reaction where there is net release of energy to the surroundings

____ 53. shows the relative energy levels of reactants and products

____ 54. the minimum energy required for a reaction to occur

____ 55. a reaction where there is net absorption of energy by the system

Match the description below to one of the following terms. There is one extra term that has no match.

a. synthesis reaction
b. single replacement reaction
c. combustion reaction
d. base
e. pH scale
f. decomposition reaction
g. double replacement reaction
h. acid
i. acid-base indicator
j. neutralization reaction
k. precipitate

____ 56. changes colour when mixed with an acid or base

____ 57. a reaction where a precipitate is commonly formed

____ 58. a reaction where a metal replaces a metal ion

____ 59. a solid formed during some reactions

____ 60. a reaction between an acid and a base

Short Answer

61. If the temperature of the reactants before a reaction is the same as the temperature of the products after a reaction does that mean there is no change in energy?

62. Is the process of boiling water endothermic or exothermic? Explain your answer in terms of the changes in energy.

63. Fireworks are an exciting addition to the night sky. Describe the changes in energy involved in a fireworks display. Is this an endothermic or exothermic reaction?

64. How does an energy-level diagram for an endothermic reaction look different from the energy-level diagram for an exothermic reaction?

65. Which has more energy in an endothermic reaction, the reactants or the products?

66. In an energy-level diagram, where are the reactants and the products positioned relative to each other on the horizontal scale?

67. List three things you can determine from an energy-level diagram of a chemical reaction.

68. How are synthesis and decomposition reactions related? Explain.

69. If two elements combine to form a compound, what type of reaction has occurred?

70. Is it possible for an element that is a diatomic gas to replace the metal ion in a single replacement reaction? Explain.

71. What are the four products produced during the incomplete combustion of hydrocarbons?

72. What reactant chemical must be added to prevent incomplete combustion of hydrocarbons?

73. What is the difference between a binary acid and an oxyacid?

74. How can you distinguish between an acid and a base if you are given the chemical formula for each compound?

75. Why is litmus used to show if a solution is an acidic or basic solution?

Chemistry Part 2 Practice Test
Answer Section

MODIFIED TRUE/FALSE

1. ANS: T PTS: 1 DIF: Easy
   TOP: 2.3 KEY: chemical bond energy
2. ANS: T PTS: 1 DIF: Easy
   TOP: 2.3 KEY: endothermic reaction |exothermic reaction
3. ANS: F, energy

   PTS: 1 DIF: Easy TOP: 2.3 KEY: endothermic | exothermic
4. ANS: T PTS: 1 DIF: Easy
   TOP: 2.4 KEY: synthesis reaction
5. ANS: T PTS: 1 DIF: Easy
   TOP: 2.4 KEY: single replacement reaction
6. ANS: T PTS: 1 DIF: Easy
   TOP: 2.4 KEY: double replacement reaction
7. ANS: F, oxygen

   PTS: 1 DIF: Easy TOP: 2.4 KEY: combustion reaction
8. ANS: T PTS: 1 DIF: Easy
   TOP: 2.4 KEY: acid | properties
9. ANS: F, hydroxide

   PTS: 1 DIF: Average TOP: 2.4 KEY: base | hydroxide ion
10. ANS: F, acidic

    PTS: 1 DIF: Average TOP: 2.4 KEY: pH scale

MULTIPLE CHOICE

11. ANS: B PTS: 1 DIF: Easy TOP: 2.3
    KEY: matter |energy
12. ANS: A PTS: 1 DIF: Average TOP: 2.3
    KEY: matter |energy| activation energy
13. ANS: B PTS: 1 DIF: Difficult TOP: 2.3
    KEY: matter | energy | activation energy
14. ANS: A PTS: 1 DIF: Average TOP: 2.3
    KEY: law of conservation of energy
15. ANS: A PTS: 1 DIF: Difficult TOP: 2.3
    KEY: law of conservation of energy
16. ANS: D PTS: 1 DIF: Average TOP: 2.3
    KEY: law of conservation of energy | system | surroundings
17. ANS: B PTS: 1 DIF: Average TOP: 2.3
    KEY: endothermic reaction | exothermic reaction
18. ANS: D PTS: 1 DIF: Easy TOP: 2.3

KEY: endothermic reaction | exothermic reaction

19. ANS: C PTS: 1 DIF: Difficult TOP: 2.3
KEY: endothermic reaction | exothermic reaction
20. ANS: D PTS: 1 DIF: Average TOP: 2.3
KEY: endothermic | exothermic
21. ANS: D PTS: 1 DIF: Easy TOP: 2.3
KEY: energy-level diagram | exothermic | endothermic
22. ANS: B PTS: 1 DIF: Average TOP: 2.3
KEY: energy-level diagram| exothermic | endothermic
23. ANS: B PTS: 1 DIF: Difficult TOP: 2.4
KEY: synthesis reaction
24. ANS: D PTS: 1 DIF: Easy TOP: 2.4
KEY: decomposition reaction
25. ANS: C PTS: 1 DIF: Average TOP: 2.4
KEY: decomposition reaction
26. ANS: A PTS: 1 DIF: Average TOP: 2.4
KEY: single replacement reaction
27. ANS: D PTS: 1 DIF: Difficult TOP: 2.4
KEY: single replacement reaction
28. ANS: D PTS: 1 DIF: Difficult TOP: 2.4
KEY: double replacement reaction
29. ANS: A PTS: 1 DIF: Easy TOP: 2.4
KEY: combustion reaction
30. ANS: D PTS: 1 DIF: Difficult TOP: 2.4
KEY: combustion reaction
31. ANS: C PTS: 1 DIF: Average TOP: 2.4
KEY: incomplete combustion
32. ANS: B PTS: 1 DIF: Average TOP: 2.4
KEY: acid
33. ANS: D PTS: 1 DIF: Average TOP: 2.4
KEY: predicting products | chemical reaction
34. ANS: A PTS: 1 DIF: Average TOP: 2.4
KEY: chemical reaction | synthesis reaction
35. ANS: A PTS: 1 DIF: Average TOP: 2.4
KEY: chemical reaction | single replacement

COMPLETION

36. ANS: increases

PTS: 1 DIF: Easy TOP: 2.3 KEY: matter | energy
37. ANS: activation

PTS: 1 DIF: Average TOP: 2.3
KEY: chemical reaction | activation energy
38. ANS: universe

PTS: 1 DIF: Average TOP: 2.3 KEY: law of conservation of energy

39. ANS: endothermic

PTS: 1 DIF: Easy TOP: 2.3
KEY: endothermic reaction | exothermic reaction

40. ANS: temperature

PTS: 1 DIF: Easy TOP: 2.3
KEY: endothermic reaction |exothermic reaction| temperature

41. ANS: horizontal

PTS: 1 DIF: Easy TOP: 2.3 KEY: energy-level diagram

42. ANS: single

PTS: 1 DIF: Average TOP: 2.4 KEY: single replacement reaction

43. ANS:
released
produced

PTS: 1 DIF: Easy TOP: 2.4 KEY: combustion reaction

44. ANS: combustion

PTS: 1 DIF: Easy TOP: 2.4 KEY: combustion reaction

45. ANS: oxygen

PTS: 1 DIF: Average TOP: 2.4 KEY: incomplete combustion

46. ANS: oxygen

PTS: 1 DIF: Easy TOP: 2.4 KEY: acid | oxyacid

47. ANS: equal

PTS: 1 DIF: Easy TOP: 2.4 KEY: pH scale

48. ANS: neutralization

PTS: 1 DIF: Easy TOP: 2.4 KEY: neutralization reaction

49. ANS: water

PTS: 1 DIF: Easy TOP: 2.4 KEY: neutralization reaction

50. ANS: decomposition

PTS: 1 DIF: Easy TOP: 2.4
KEY: synthesis reaction | decomposition reaction

MATCHING

51. ANS: F PTS: 1 DIF: Easy TOP: 2.3
KEY: law of conservation of energy

52. ANS: E PTS: 1 DIF: Easy TOP: 2.3
KEY: endothermic reaction | exothermic reaction

53. ANS: G PTS: 1 DIF: Easy TOP: 2.3

KEY: energy-level diagram

54. ANS: A PTS: 1 DIF: Easy TOP: 2.3
KEY: activation energy

55. ANS: D PTS: 1 DIF: Easy TOP: 2.3
KEY: endothermic reaction |exothermic reaction

56. ANS: I PTS: 1 DIF: Easy TOP: 2.4
KEY: acid | base

57. ANS: G PTS: 1 DIF: Easy TOP: 2.4
KEY: replacement reaction

58. ANS: B PTS: 1 DIF: Easy TOP: 2.4
KEY: single replacement reaction

59. ANS: K PTS: 1 DIF: Easy TOP: 2.4
KEY: double replacement reaction

60. ANS: J PTS: 1 DIF: Easy TOP: 2.4
KEY: neutralization reaction

SHORT ANSWER

61. ANS:
No, the temperature could have changed during the reaction but not been measured. In order to determine the change in energy, you would need to measure the changes in temperature during the reaction. Reactants and products that have the same temperature could just be at the temperature of the room.

PTS: 2 DIF: Difficult TOP: 2.3
KEY: endothermic reaction | exothermic reaction

62. ANS:
The phase change from liquid to gas requires an input of energy, so it is endothermic. The process of boiling water happens from the energy put in from a kettle or stove.

PTS: 2 DIF: Average TOP: 2.3 KEY: endothermic | exothermic

63. ANS:
Fireworks must be ignited, using a flame or an electric spark as an source of energy to overcome the initial energy barrier. Once the firework is lit, it produces and gives off heat and light and sound to the surroundings. Since there is a net release of energy, this is an exothermic reaction.

PTS: 3 DIF: Average TOP: 2.3
KEY: endothermic reaction | exothermic reaction

64. ANS:
In the energy-level diagram for an endothermic reaction the line showing the energy of reactants is positioned lower on the vertical axis than the line showing the energy of the products. In the energy-level diagram for an exothermic reaction, the line showing the energy of the reactants is positioned higher on the vertical axis than the line showing the energy of the products.

PTS: 2 DIF: Difficult TOP: 2.3
KEY: energy-level diagram| processing and

65. ANS:
The products have more energy in an endothermic reaction.

PTS: 2 DIF: Average TOP: 2.3 KEY: energy-level diagram

66. ANS:
The reactants are shown to the left of the products.

PTS: 2 DIF: Average TOP: 2.3 KEY: energy-level diagram

67. ANS:
Answers should include three of the following: The relative energy of the reactants; the relative energy of the products; if there is an overall release or absorption of energy for the process; the relative amount of activation energy required

PTS: 3 DIF: Easy TOP: 2.3
KEY: energy-level diagram | processing and

68. ANS:
Synthesis reactions are the reverse of decomposition reactions. In a synthesis reaction, two or more reactants typically combine to form a single product. In decomposition reactions, a reactant gives two or more products.

PTS: 2 DIF: Average TOP: 2.4 KEY: synthesis reaction

69. ANS:
If two elements form a compound a synthesis reaction has occurred.

PTS: 1 DIF: Easy TOP: 2.4 KEY: synthesis reaction

70. ANS:
Yes, it is possible. Hydrogen is a diatomic gas element that acts like a metal in single replacement reactions.

PTS: 2 DIF: Average TOP: 2.4 KEY: single replacement reaction

71. ANS:
The incomplete combustion of hydrocarbons produces carbon dioxide, water, carbon monoxide, and carbon (soot).

PTS: 2 DIF: Average TOP: 2.4 KEY: incomplete combustion

72. ANS:
Oxygen must be added to prevent incomplete combustion of hydrocarbons.

PTS: 1 DIF: Easy TOP: 2.4 KEY: incomplete combustion

73. ANS:
The difference is the number of elements that make up the acid. Binary acids are composed of two elements—hydrogen and a non-metal. Oxyacids are composed of three elements—hydrogen, oxygen, and another element.

PTS: 2 DIF: Average TOP: 2.4 KEY: acid | base

74. ANS:
Acids release hydrogen ions, H^+, in solution, so they often have a chemical formula that has hydrogen listed first.. Bases release hydroxide ions in solution so many bases contain a hydroxide group, –OH.

PTS: 2 DIF: Average TOP: 2.4 KEY: acid | base

75. ANS:
Litmus is an acid-base indicator. Blue litmus paper changes to red in acidic solution and red litmus paper turns blue in a basic solution. Litmus placed in a neutral solution doesn't change colour.

PTS: 1 DIF: Average TOP: 2.4 KEY: pH scale