Chapter 7 TEST
CHEMICAL REACTIONS
PART 1: MULTIPLE CHOICE.

_____ 1. Which of these is not a sign of a chemical reaction?
   a. A gas is given off.
   b. The material dissolves.
   c. Heat is released.
   d. A color change occurs.

_____ 2. The substance that is formed in a chemical reaction is called the
   a. polymer.
   b. reactant.
   c. radical.
   d. product.

_____ 3. Which of the following stores chemical energy?
   a. the temperature of a substance
   b. the density of a substance
   c. the bonds of a molecule
   d. the nucleus of an atom

_____ 4. A type of reaction that produces an increase in temperature is
   a. endothermic.
   b. exothermic.
   c. covalent.
   d. nonpolar.

_____ 5. An example of an endothermic reaction is
   a. bioluminescence by a firefly.
   b. an exploding firecracker.
   c. burning gasoline.
   d. photosynthesis by a plant.

_____ 6. Which of these represents the release of chemical energy?
   a. pouring gasoline into a tank
   b. burning charcoal in a grill
   c. a toy car running down a ramp
   d. warming food in a microwave

_____ 7. In a balanced chemical equation, the mass of the reactants is equal to the
   a. atoms in a molecule.
   b. atomic mass of the elements.
   c. volume of the reactants.
   d. mass of the products.

_____ 8. What coefficient is missing in \( C_2H_4 + (?)O_2 \rightarrow 2CO_2 + 2H_2O \)?
   a. 2
   b. 3
   c. 4
   d. 5

_____ 9. Which of the following represents the word equation magnesium + oxygen \( \rightarrow \) magnesium oxide?
   a. \( CH_4 + O_2 \rightarrow CH_4O_2 \)
   b. \( MgO + O \rightarrow MgO_2 \)
   c. \( 2Mg + O_2 \rightarrow 2MgO \)
   d. \( 2CH_4 + O_2 \rightarrow 2CH_3OH \)

_____ 10. Which of the following equations is not balanced?
   a. \( Fe + S \rightarrow FeS \)
   b. \( KOH + HCl \rightarrow KCl + H_2O \)
   c. \( 2Mg + O_2 \rightarrow 2MgO \)
   d. \( NaCl + H_2SO_4 \rightarrow Na_2SO_4 + HCl \)

_____ 11. The decomposition of water can be brought about by
   a. combustion.
   b. electrolysis.
   c. synthesis reactions.
   d. oxidation.
12. Which of the following represents a double-displacement reaction between sodium chloride and silver fluoride?
   a. \( \text{NaCl} + \text{AgF} \rightarrow \text{NaAgF} + \text{Cl}_2 \)
   b. \( \text{NaCl} + \text{AgF} \rightarrow \text{NaF} + \text{AgCl} \)
   c. \( \text{NaCl} + \text{AgF} \rightarrow \text{Ag} + \text{NaClF} \)
   d. \( \text{NaCl} + \text{AgF} \rightarrow \text{NaF} + \text{Cl}_2 + \text{Ag} \)

13. A synthesis reaction between magnesium (Mg) and oxygen \((\text{O}_2)\) might produce
   a. \( \text{Mg}_2 \)
   b. \( \text{O}_4 \)
   c. \( \text{MgO} \)
   d. \( \text{MgCO}_2 \)

14. At higher temperatures, food cooks faster because particles of food
   a. take up less space.
   b. increase in number.
   c. collide more often.
   d. come into contact with water.

15. Catalysts that slow reactions are called
   a. inhibitors.
   b. substrates.
   c. balanced.
   d. endothermic.

16. Which is not true of catalysts?
   a. They are used up in a reaction.
   b. They can speed up a reaction.
   c. They can slow down a reaction.
   d. They can be reused.

17. All of these are likely to speed up the rate of a reaction except
   a. decreasing the surface area.
   b. increasing the pressure.
   c. increasing the temperature.
   d. adding a catalyst.

18. \( \text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O} \)
   a. synthesis reaction
   b. decomposition reaction
   c. combustion reaction
   d. single-displacement reaction
   e. double-displacement reaction

19. \( 2\text{NH}_3 \rightarrow \text{N}_2 + 3\text{H}_2 \)

20. \( 2\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{HCl} \)

21. \( \text{Fe} + \text{S} \rightarrow \text{FeS} \)

22. \( 2\text{Li} + 2\text{H}_2\text{O} \rightarrow 2\text{LiOH} + \text{H}_2 \)
PART 2 : MATCHING.

A. Product  
B. Reactant  
C. Exothermic Reaction  
D. Chemical Energy  
E. Chemical Reaction  
F. Endothermic Reaction  
G. Trial and Error  
H. Chemical Equation  

___1. A change in which one or more substances are converted into new substances.
___2. A way to describe a chemical reaction using chemical formulas and other symbols; Has a left side (reactants) and a right side (products) separated by an arrow.
___3. The substances on the left side of the chemical equation.  
What you start with (ingredients for making a cake)
___4. Energy that is stored in the form of chemical bonds
___5. The substances on the right side of the chemical equation. 
What you end with (the cake itself)
___6. A chemical reaction in which energy is released as heat. 
Products have less energy than the reactants. 
Energy of the reactants = ENERGY OF THE PRODUCTS + ENERGY RELEASED
___7. A chemical reaction that requires energy input 
Reactants have more energy than the products. 
ENERGY OF THE REACTANTS + ENERGY ABSORBED = Energy of Products
___8. Technique used to balance equations

PART 3. TRUE OR FALSE. ( .5 points each) 

_____1. When balancing equations you can change the subscripts of the products or reactants.
_____2. A firecracker exploding is an example of an endothermic reaction.
_____3. Freezing water is an example of a chemical reaction.
_____4. Energy is released when bonds are formed.
_____5. Burning a loaf of bread is an example of a chemical reaction.
_____6. Photosynthesis is an example of an endothermic reaction.
_____7. In a chemical reaction, the mass of the reactants is less than the mass of the products.
_____8. A balanced chemical equation has the same number of atoms of each element on both sides of the equation.
_____9. Combustion type reactions are exothermic.
_____10. Energy is absorbed when bonds are broken.
PART 4. MISCELLANEOUS

Label the following chemical equation using the words:

A. PRODUCT   B. REACTANTS   C. SUBSCRIPT
D. COEFFICIENT   E. YIELDS

\[
2 \text{Mg} + \text{O}_2 \rightarrow 2 \text{MgO}
\]

6. According to the law of conservation of mass, if the total mass of the product in this chemical reaction is 19 g, what must the combined masses of the reactants be?

PART 5. Classify each of the following as being combustion (C), synthesis (S), decomposition (D), single replacement (SR), or double replacement (DR)

______1. 

______2. \(2\text{Al}_2\text{O}_3 \rightarrow 4\text{Al} + 3\text{O}_2\)

______3. \(\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}\)

______4. 

______5. \(2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2\)
PART 6. Balance each of the following chemical equations correctly.

SHOW YOUR WORK ON THE ANSWER SHEET.

1. \( \text{Cl}_2 + \text{NaBr} \rightarrow \text{NaCl} + \text{Br}_2 \)
2. \( \text{P}_4 + \text{O}_2 \rightarrow \text{P}_4\text{O}_{10} \)
3. \( \text{Na} + \text{O}_2 \rightarrow \text{Na}_2\text{O} \)
4. \( \text{H}_2\text{O}_2 \rightarrow \text{H}_2\text{O} + \text{O}_2 \)
5. \( \text{P} + \text{O}_2 \rightarrow \text{P}_2\text{O}_5 \)

EXTRA CREDIT

6. \( \text{C}_3\text{H}_8 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} \)
7. \( \text{Fe} + \text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + \text{H}_2 \)
PART 7. LISTS. Match each list with its proper title/description.
A. Metal rusting, stomach growling, candle burning
B. Bonds break, atoms rearrange, new bonds form
C. Formation of a solid, formation of a gas, release of light energy, release of sound energy
D. Carbon dioxide (CO₂) and water (H₂O)
E. Temperature, surface area, concentration, pressure, size of molecules
F. Pyrotechnician, photographer, chef, firefighter
G. Synthesis, decomposition, combustion, single displacement, double replacement

______1. Occupations involving chemical reactions
______2. Clues that may tell you a chemical reaction is happening
______3. Three examples of chemical reactions
______4. Major types of chemical reactions
______5. How new substances form in a chemical reaction
______6. The products of a combustion reaction
______7. Factors affecting reaction rates
PART 1: MULTIPLE CHOICE.

PART 3: TRUE /FALSE
(.5 points each)

PART 5: CLASSIFY

PART 4: MISCELLANEOUS

PART 7: LISTS

PART 8: OGT
PART 6. Balance each of the following chemical equations correctly.
SHOW YOUR WORK BELOW ON #1 ONLY.

1. □ Cl₂ + □ NaBr → □ NaCl + □ Br₂

2. □ P₄ + □ O₂ → □ P₄O₁₀

3. □ Na + □ O₂ → □ Na₂O

4. □ H₂O₂ → □ H₂O + □ O₂

5. □ P + □ O₂ → □ P₂O₅

EXTRA CREDIT (3 points each)

6. □ CH₄ + □ O₂ → □ CO₂ + □ H₂O

7. □ Fe + □ O₂ → □ Fe₂O₃

Part 10. SHORT ANSWER
Answer each of the following below. Use complete sentences when appropriate.

1. Write down in the form of a chemical equation the process of making a roast beef sandwich from two slices of bread, three slices of cheese, and 5 slices of roast beef. (2 points)

2. Compare and contrast endothermic and exothermic reactions. Give an example of each. (THIS MEANS SIMILARITIES AND DIFFERENCES!) (6 points)
PART 8. OGT Questions

1) When methane (CH₄) is burned in the presence of oxygen (O₂), the two chemicals react together in a process called combustion. Which of these compounds could be a possible product of this combustion reaction?

A. NH₃  
B. SO₂  
C. H₂O  
D. CS₂

2) A scientists combined hydrogen chloride (HCl) and sodium hydroxide (NaOH) to produce table salt (NaCl) and water (H₂O). Which equation best represents what took place?

A. 2 NaOH → HCl → 2 H₂O + NaCl  
B. NaOH + HCl → H₂O + 2 NaCl  
C. NaOH + HCl → H₂O + NaCl  
D. 2 NaOH + 2 HCl → H₂O + NaCl

3) Two substances are physically blended together without chemically reacting. They retain their original chemical and physical properties. What is this combination of substances called?

A. an element  
B. a molecule  
C. a compound  
D. a mixture

4) Energy stored in the electrical bonds that hold together the atoms and molecules of all substances is called

A. chemical energy,  
B. mechanical energy.  
C. kinetic energy.  
D. electrical energy

5) Which of the following has the ability to turn light energy into chemical energy?

A. a plant  
B. an automobile  
C. a generator  
D. water
6) **Photosynthesis**: Plants use energy from sunlight to produce sugar and oxygen from carbon dioxide and water.

\[
6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2
\]

**Respiration**: Plants and animals release stored energy in a reaction between sugar molecules and oxygen. This reaction produces carbon dioxide and water.

\[
\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow \text{energy} + 6\text{CO}_2 + 6\text{H}_2\text{O}
\]

To produce 4 molecules of sugar, a plant needs — (PS 10)

A. 6 molecules of hydrogen  
B. 12 molecules of ATP  
C. 18 molecules of water  
D. 24 molecules of carbon dioxide

7) **W** reacts with **X** in the equation below.

\[
\text{W} + \text{X} \rightarrow \text{Y} + \text{Z}
\]

According to the law of conservation of mass, how many grams of **W** must react completely with 225 grams of **X** to result in 375 grams of product?

A. 150 grams  
B. 225 grams  
C. 375 grams  
D. 600 grams

8) Which energy transformation below describes the conversion involved when the carbon compounds in wood are burned?

A. Chemical energy is converted to thermal energy.  
B. Thermal energy is converted to chemical energy.  
C. Potential energy is converted into chemical energy.  
D. Chemical energy is converted into potential energy