

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

# CHEMICAL ENERGY STUDY GUIDE

## Parent Signature (3 % extra credit on test)

I have gone over this study guide with my student for about 30 minutes.

### Chemical Vs. Physical

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1. What is the definition of a chemical property?

*How a substance reacts with other substances. Can only be observed when a new substance is created.*

2. Name 3 chemical properties.

*Flammability, ability to rust, ability to fizz with acid, changes a strange color*

3. What is the definition of a physical property?

*Qualities of a substance that can be directly observed, creating a new substance is not necessary.*

4. Name 3 physical properties.

*Phase, ability to dissolve, mass, density, color, smell, texture*

5. Is the ability to dissolve a chemical or physical property?

*Physical—when something dissolves it does not change the substance, just breaks it into small pieces*

6. What is the difference between a chemical and a physical change?

*A chemical change creates a new substance, it is a chemical reaction. Physical changes don't create a new substance*

7. Give 3 examples of physical changes.

*Breaking something, melting or freezing, dissolving sugar*

8. Give 3 examples of chemical changes.

*Burning, fizzing, rusting, any chemical reaction*

### Chemical Reactions

1. Give 4 signs that can tell whether a chemical reaction has occurred (from your notes).

*Strange color change, strange change of phase, change in energy, change in smell/taste*

2. What is the definition of a reactant? Where do you find reactants in an equation?

*A chemical that makes a reaction happen, reactants are on the left side*

3. What is the definition of a product? Where do you find products in an equation?

*A chemical that is made from the reaction, products are on the right side*

4. Does a chemical reaction change physical properties, chemical properties, or both?

*Chemical reactions change both. They create a new substance with all new properties*

5. What is the Law of Conservation of Mass?

*Chemical reactions do not create or destroy mass, they only rearrange it*

6. Why does the Law of Conservation of Mass make it necessary to balance equations?

*Whatever goes into a chemical reaction on the left side, must come out on the right side—they must be equal*

7. Count the number of atoms for element in the formulas below.

$\text{CH}_4\text{O}_6$   
C-1 H-4 O-6

$3\text{N}_2\text{P}_3\text{O}$   
N-6 P-9 O-3

$2\text{S}_4\text{O}_3\text{H}_6$   
S-8 O-6 H-12

Balance these equations:



8. What should happen to the mass of a material after it has a chemical reaction? (If you measure carefully enough.)

*It should stay exactly the same*

9. What are 4 factors that can affect the rate of chemical reactions?

*Temperature, surface area, concentration, stirring*

10. What is collision theory? How does it relate to the rate of a chemical reaction?

*In order to form products, the reactants must collide. The faster/more they collide, the faster the reaction will happen*

11. **Why** does temperature affect the rate of a chemical reaction?

*The hotter it is, the faster the molecules move and the more they bump into each other*

12. Give an example of how surface area can change the rate of a reaction.

*Crushing up a substance will increase its surface area and make it react faster*

13. What is concentration? Also give an example.

*Basically how "strong" the chemical is. 100% water vs. 50% water. Orange juice freezer section vs. orange juice in the refrigerator section.*

14. Do exothermic reactions release or absorb energy? What happens to the temperature?

*They release energy, making things hotter*

15. Give two examples of exothermic reactions.

*Fire, fireworks, yeast and peroxide*

16. Energy changes from which form of energy to which during an exothermic reaction?

*From chemical to heat*

17. Do endothermic reactions release or absorb energy? What usually happens to the temperature?

*They absorb energy, usually making the things feel colder (unless they happen in a hot place like an oven)*

18. Give two examples of endothermic reactions.

*Cold packs, making pancakes, baking cookies*

19. Energy changes from which form of energy to which during an endothermic reaction?

*From heat to chemical*

20. What is activation energy? Give an example.

*The energy that gets a reaction going, striking a match*

21. Which chemical reactions require activation energy?

*ALL reactions require energy to get started*

## **Phase Changes**

1. Explain what each of the following phase changes are. (solid to liquid, etc)

Boiling: *liquid to gas*

Melting: *solid to liquid*

Freezing: *liquid to solid*

Condensation: *gas to liquid*

Evaporation: *liquid to gas*

Sublimation: *solid to gas*

2. What happens to the particles of a substance as heat energy is added? Taken away?

*Added: spread out and speed up*

*Taken away: come together and slow down*

3. Temperature doesn't change when something is actually melting. Why? What is the heat energy doing?

*All the energy is being used to break up the bonds between molecules and actually get the matter to change phases*

4. Identify what happens to the spacing of the molecules during each of these phase changes. (closer, farther)

Boiling: *spreading out*

Melting: *spreading out*

Freezing: *coming together*

Condensation: *coming together*

5. Identify 3 phase changes that require an increase in energy.

*Melting, boiling, sublimation, evaporation*

6. Identify 2 phase changes that require a decrease in energy.

*Freezing, condensation*

7. Is phase change a chemical or physical change? **Explain.**

*Physical change, it doesn't change the substance. The molecules only change speed and spacing.*

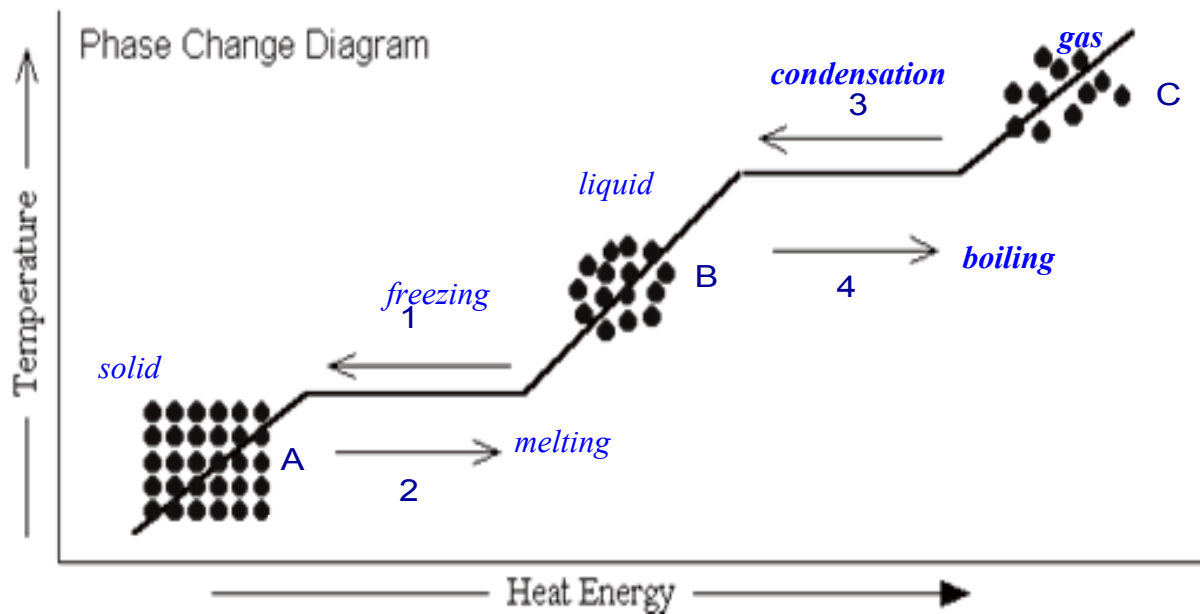
8. What is the melting/freezing temp of water? How about the boiling temp?

*0 degrees C and 100 degrees C*

9. Identify which phase water would be in at the following temperatures.

3° C            *Liquid*      -9° C            *solid*      210° C            *gas*      85° C            *liquid*      99° C            *liquid*

10. Label the phase of matter and the phase changes in the following diagram.



### Reactions with Oxygen

1. Why is rusting called oxidation?

*Rusting is a reaction between iron and OXYGEN, without oxygen it cannot happen*

2. Give another example of oxidation aside from rusting.

*Copper turning green, apples turning brown*

3. Why does rusting usually happen so slowly?

*There's not a ton of oxygen in the atmosphere, water and salt help speed it up*

4. What is fire really made of? Name the two types of energy.

*Fire is heat and electromagnetic energy that came from chemical energy*

5. Name the 2 products that fire always creates (from the article we read).

*Fire always makes carbon dioxide and water*

6. What are the three components of the fire triangle?

*Oxygen, heat and fuel*

7. Why does a candle flame have more than one color?

*Temperature differences in the flame. The bottom of the flame is hotter and has more energy and so it creates blue light with more energy. The top of the flame is colder, with less energy, and so it makes yellow light.*

8. Why are flames shaped the way they are?

*With gravity, things separate according to density. Hot things tend to rise and fire is hot so it rises to a point.*

9. What does a flame look like in zero gravity? WHY?

*Without gravity, density does not cause things to separate. Fire and other hot things won't rise so it forms a perfect sphere.*

10. Is combustion endothermic or exothermic? **Explain.**

*It is exothermic. It is HOT!!!!*