

Name: _____ Period: _____ Date: _____

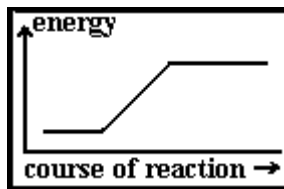
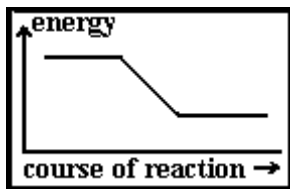
WS HEAT & ENDOTHERMIC / EXOTHERMIC REACTIONS

- Heat is the transfer of _____ energy between objects due to a difference in _____.
- Circle the letter next to each sentence that is true about heat.
 - Adding heat to a substance causes an increase in the temperature of that substance.
 - Heat always flows from a cooler object to a warmer object.
 - Heat will flow between two objects until the temperature of both objects is the same.
 - Heat flows from warmer objects to cooler objects.
- True or False A piece of ice placed in a bowl of warm water will remain at a temperature of 0 °C until all of the water is frozen like ice.

If False, write a true statement of what will happen.

4. What is the law of conservation of energy?

- In an exothermic reaction, the reactants have more / less energy than the products.
 - In an endothermic reaction, the reactants have more / less energy than the products.
- In an exothermic process, the system _____ heat to its surroundings, so the surroundings _____.
- In an endothermic process, the system _____ heat from its surroundings, so the surroundings _____.
- Label the energy level diagrams as endothermic or exothermic.



9. For each phase change indicated below, determine whether energy is absorbed or released and tell if it is an endothermic or exothermic process.

Phase Change	Energy <u>absorbed</u> / <u>released</u>	<u>Endothermic</u> / <u>Exothermic</u>
Solid to liquid (melting)		
Liquid to gas (boiling)		
Liquid to solid (freezing)		
Gas to liquid (condensing)		

10. Classify each of the following changes as either exothermic or endothermic.

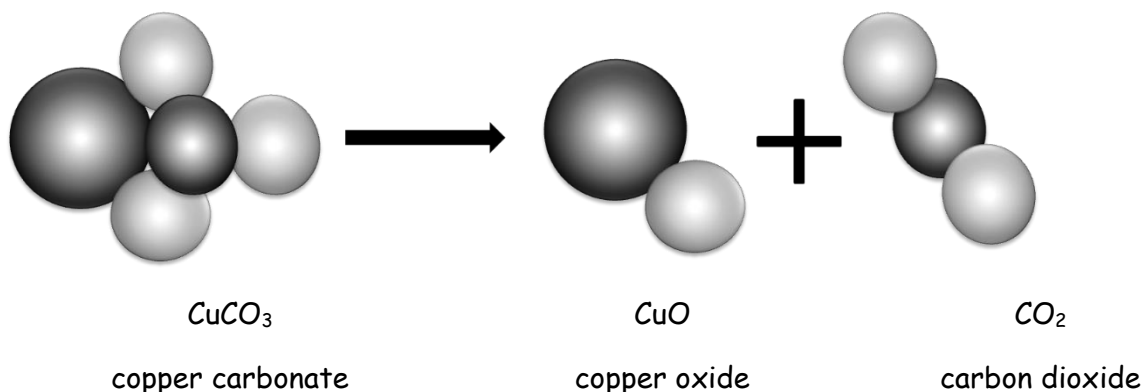
- A. An egg cooking. _____
- B. A match burning. _____
- C. Morning dew forming (condensing) on grass and plants. _____
- D. Dynamite exploding. _____
- E. When two chemicals mix the temperature of the surroundings rises. _____
- F. Plants take in light energy for photosynthesis. _____
- G. Two chemicals will only react if you heat them continually. _____
- H. When two chemicals are mixed the temperature of the surroundings drops. _____

11. During chemical reactions the bonds between atoms break and new bonds form.

Energy must be absorbed to break a bond, so breaking bonds is endothermic.

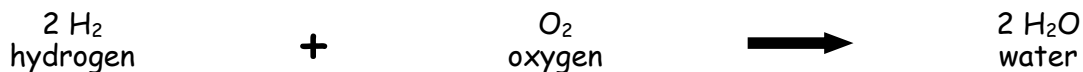
Making new bonds is exothermic because energy is released.

- a) When green copper carbonate decomposes, the equation is:

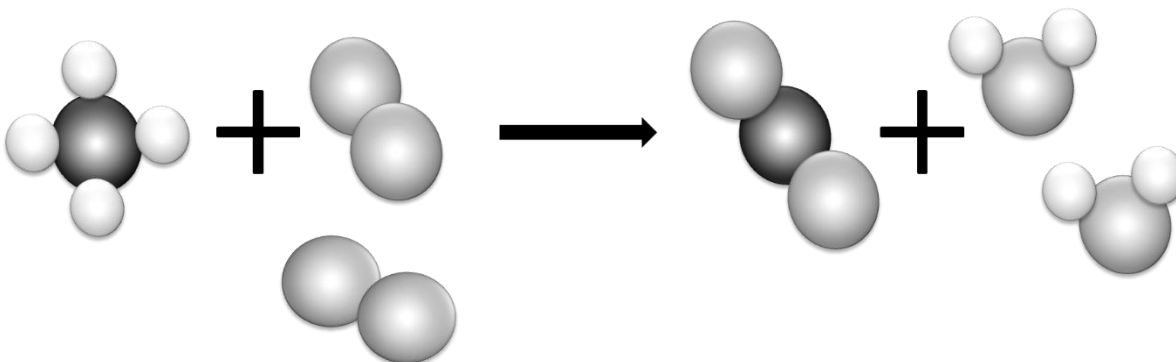


Is the reaction exothermic or endothermic? Use ideas about bonds to explain why.

b) Draw diagrams to show what happens when hydrogen reacts with oxygen. Mark the bonds broken in blue and the new bonds formed in red. The equation is:



12. Most reactions involve bond breaking and bond making. This equation shows what happens when methane (CH_4) burns in oxygen (O_2).



a) Mark the bonds broken in blue and the bonds formed in red.

b) Complete the table to show the number of bonds broken and formed:

Bonds broken	Number	Bonds formed	Number
between carbon and hydrogen		between carbon and oxygen	
between oxygen atoms		between hydrogen and oxygen	

c) Is the reaction exothermic or endothermic overall?

d) The overall energy change is decided by the strength of the bonds that are broken or formed during the reaction. The stronger the bond the larger the energy change.

Which bonds must be stronger in this reaction - the bonds broken or the new bonds formed?

e) An energy level diagram shows the energy taken in and released during the reaction. Add the reactants, products and their separated atoms to the correct places on the diagram.

