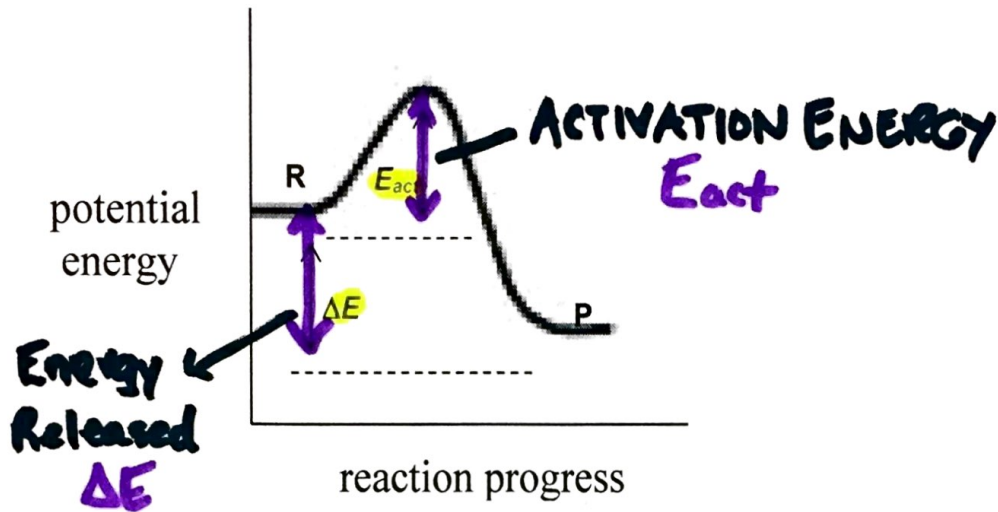


Review Unit ~~10~~: Energy Changes and Reaction Rates

8

1. Heat - the transfer of energy due to a difference in temperature.
2. State the law of conservation of energy.  
The total energy of an isolated system is constant (OR energy cannot be created nor destroyed)
3. If heat energy is absorbed by a chemical system, a greater / equal / lesser amount of energy will be released by the surroundings.
4. Describe the direction of heat flow when a hot rock is placed in cool water.  
Heat flows from the rock to the water making the rock cooler and the water warmer
5. In an endothermic reaction, heat is absorbed by the system.
6. In an exothermic reaction, heat is released by the system.
7. Endothermic      solid ice melting into liquid  
Endothermic      liquid water evaporating into gas  
Exothermic        water vapor condensing into liquid  
Exothermic        liquid water freezing into solid ice  
Endothermic      solid carbon dioxide (dry ice) subliming into carbon dioxide gas
8. If you are holding a beaker in which an exothermic reaction is occurring, the beaker would feel warmer to the touch because the system is releasing energy to the surroundings which is your hand.
9. In an endothermic reaction, the reactants are at lower energy than the products.
10. In an exothermic reaction, the products are at a lower energy than the reactants.
11. When chemical bonds are *formed*, energy is released;  
energy is absorbed in order to break chemical bonds.

12. In an endothermic reaction, which has stronger bonds - **reactants** or products
13. In an exothermic reaction, which has stronger bonds - reactants or **products**
14. The potential energy diagram shown is for an **ENDOTHERMIC** / **EXOTHERMIC** reaction. (circle one)

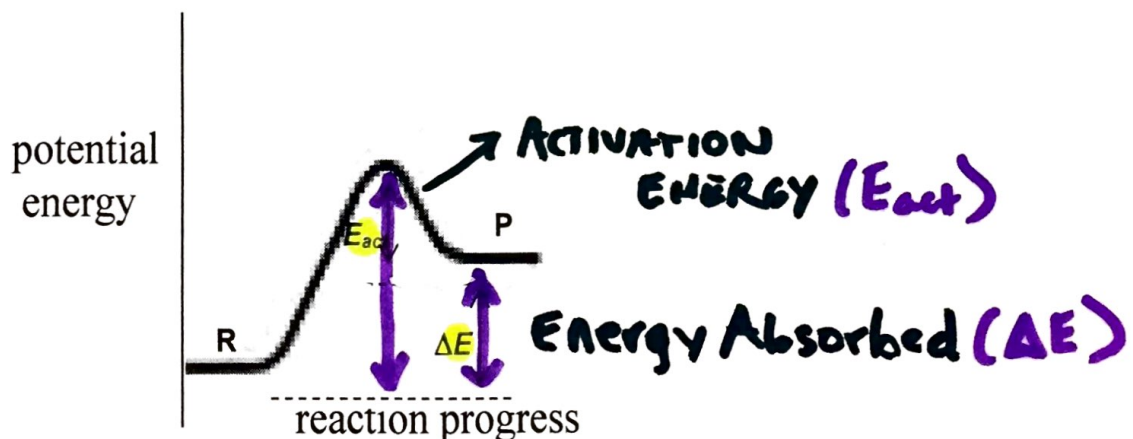


Circle the correct statement.

In an exothermic reaction, heat is **released to** the surroundings, and the surroundings **warm up.**

Touching the beaker with this reaction would feel **warmer** and a thermometer would show the temperature **rising.**

15. The potential energy diagram is for an **ENDOTHERMIC** / **EXOTHERMIC** reaction. (circle one)



Circle the correct statement.

In an endothermic reaction, heat is absorbed from the surroundings,  
and the surroundings cool down.

Touching the beaker with this reaction would feel cooler, and a thermometer would  
show the temperature lowering.

16. Circle EACH of the following that could express a reaction rate in amount per time:

mol/L      g/s      s/mol      mol/min      g/mol

17. Reactant particles must collide in order for a reaction to occur.

18. To be effective, a collision requires the proper orientation of particles and it must occur  
with sufficient energy to react.

19. Define activation energy: the minimum energy required to cause a reaction

20. Identify how increasing each of the following factors affects the a reaction rate:

1) concentration of reactants      effect on rate: increases or decreases

2) temperature      effect on rate: increases or decreases

3) surface area of reactants (smaller particles)      effect on rate: increases or  
decreases

4) stirring      effect on rate: increases or  
decreases

5) catalyst      effect on rate: increases or decreases

21. Explain why increasing the concentration of reactants increases the reaction rate.

Higher concentrations cause more collisions between particles.

22. Explain why a reaction rate increases with an increase in temperature.

Higher temperatures cause more collisions of greater energy.

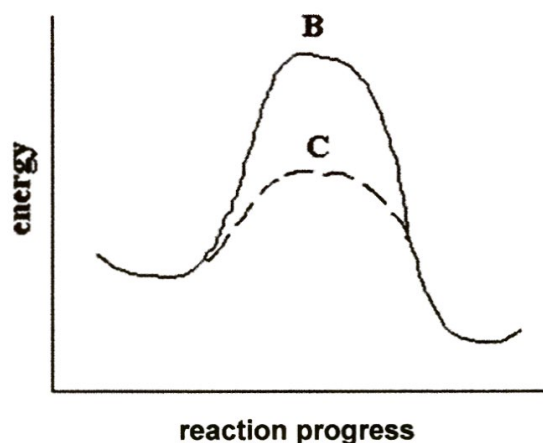
23. Reaction rates increase with \_\_\_\_\_ (smaller / larger) particle sizes which provide  
\_\_\_\_\_ (less / more) surface area of reactant available for collisions.

24. A catalyst is a substance that speeds up the reaction rate.

It works by lowering the activation energy.



Catalysts do not get consumed in the reaction and are left unchanged.

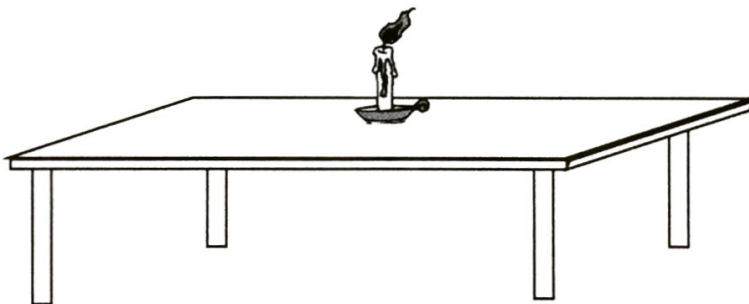


25. Consider reactions B and C above.

The different heights of reactions B and C represent the different activation energies of the reaction.

Reaction C is a catalyzed reaction, while Reaction B is an uncatalyzed reaction.

Reaction B has a higher activation energy and occurs at a slower rate.



26. Consider a candle on a table that burns for 2 hours before going out.

Would you classify this system as OPEN, CLOSED, or ISOLATED? Explain.

OPEN because

both matter and energy can be transferred