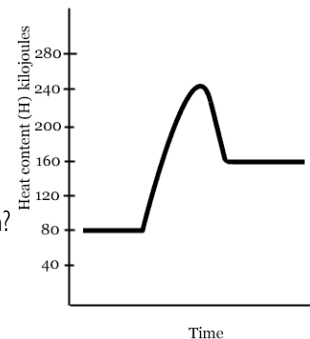


Reaction Rates and Equilibrium Study Guide



1. What does the collision theory state?
2. What two things need to happen for a collision to be EFFECTIVE?
3. What is activation energy and what does it have to do with reactions?
4. Label the reactants, products, activated complex and change in energy on the following:
5. Based on the same graph, what is the activation energy and the change of energy of the reaction?
6. On the same graph, use a dotted line to show how a catalyst will change the curve.
7. Define reaction rate. How is it measured?
8. Reaction rates depend on the amount of _____ happening at a certain time.
9. Fill in the following chart:

If...	the concentration of reactants	the surface area of the reactants	the pressure of gases	the volume of the gases	the temperature increases	the particle size of the reactants
Then...	increases	decreases	increases	decreases		decreases
the reaction rate...						
because...						

10. Explain how a catalyst works (explain using activation energy and reaction rate).
11. When a reaction is at equilibrium, the forward and reverse reaction rates are _____ and the product and reactant concentrations are _____.
12. As a reaction approaches equilibrium, what happens to the following:
 - a. forward reaction rate:
 - b. reverse reaction rate:
 - c. product concentration:
 - d. reactant concentration:
13. For the following reaction, $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + 23 \text{ kJ}$ when the:
 - a. the temp. is increased, the equilibrium shifts to the _____ and the $[H_2]$ _____.
 - b. the press. is decreased, the equilibrium shifts to the _____ and the $[NH_3]$ _____.
 - c. $[H_2]$ is increased, the equilibrium shifts to the _____ and the $[N_2]$ _____.
14. For the following reaction, $N_2O_4(g) + 57.2 \text{ kJ} \rightleftharpoons 2NO_2(g)$ when the:
 - a. the temp. is decreased, the equilibrium shifts to the _____ and the $[NO_2]$ _____.
 - b. the press. is increased, the equilibrium shifts to the _____ and the $[N_2O_4]$ _____.
 - c. $[NO_2]$ is increased, the equilibrium shifts to the _____ and the $[N_2O_4]$ _____.
15. For the following endothermic reaction, $3 \text{ Fe}(s) + 4 \text{ H}_2\text{O}(g) \rightleftharpoons \text{Fe}_3\text{O}_4(s) + 4 \text{ H}_2(g)$ when the:
 - a. the temp. is decreased, the equilibrium shifts to the _____ and the $[H_2]$ _____.
 - b. the press. is increased, the equilibrium shifts to the _____ and the $[Fe_3O_4]$ _____.
 - c. $[Fe]$ is increased, the equilibrium shifts to the _____ and the $[H_2O]$ _____.
16. Which of the following statements is TRUE?
 - a) An endothermic reaction shifts toward reactants when heat is added to the reaction.
 - b) Catalysts are an effective means of changing the position of an equilibrium.
 - c) The concentration of the products equals that of reactants and is constant at equilibrium.
 - d) When two opposing (forward and reverse) processes are proceeding at identical rates, the system is at equilibrium.
17. Draw the potential energy diagrams and answer the questions for the following reactions:
 - a) The activation energy of the forward reaction is 55kJ. The change in potential energy of the exothermic reaction is 25kJ. What is the activation energy of the reverse reaction?
 - b) The activation energy of the forward reaction is 35kJ. The change in potential energy of the endothermic reaction is 25kJ. What is the activation energy of the forward reaction?
18. Use the book questions on p. 883 to serve as your practice for the calculation portion of the test.