

Unit 9 Review - Chemistry

Name

KEY

Period: _____

1. What is a reaction rate and what units are used with reaction rates?

- change in concentration per unit of time
- M/s (molarity per second)

2. What is the collision theory?

states that for a reaction to occur reactants must collide w/ enough energy and in the correct orientation

3. List the factors that affect the rate of a reaction. Explain how each factor affects the rate.

A Nature of the Reactants - some reactants are more/less reactive

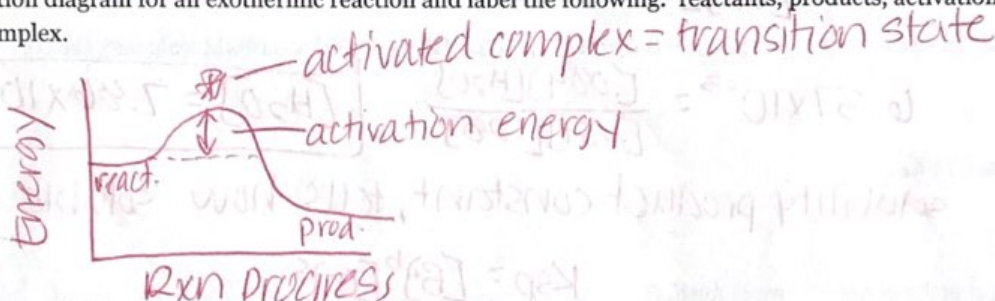
B Concentration - more reactants, more collisions; can speed-up/slow down a rxn

C Temp - ↑temp, ↑KE, more collisions; more energy

D Surface Area - more collision; greater chance of correct orientation

E Catalyst - lowers activation energy

4. Draw a reaction diagram for an exothermic reaction and label the following: reactants, products, activation energy, activated complex.



5. What 2 factors will drive a reaction to completion?

a) formation of a precipitate b) production of a gas

6. Describe a reversible reaction. Give an example.

rxn that can go both forward and reverse

7. Describe dynamic equilibrium. Give an example.

forward & reverse reactions are happening @ the same time

8. At equilibrium how do the forward and reverse reaction rates compare? The forward rate equals the reverse rate.

9. State Le Chatelier's Principle.

a system at equilibrium will respond to a stress by shifting to relieve the stress

10. What are the 3 possible stresses we can apply to a system at equilibrium?

a) concentration b) temperature c) volume

11. Use the reaction ($2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2\text{SO}_3(\text{g}) + \text{heat}$) to determine what will happen (shift left/right, no change) if the following stresses are applied:

a. SO_2 is added shift right b. Volume is increased shift left c. Heat is added shift left

12. What is the general formula for the equilibrium constant, K_{eq} ?

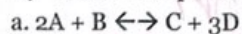
$$K_{\text{eq}} = \frac{\text{products}}{\text{reactants}}$$

13. What does the value of K_{eq} tell a chemist about a reaction:

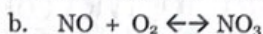
If the value of K_{eq} is greater than 1 products are favored

If the value of K_{eq} is less than 1 reactants are favored

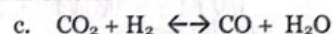
14. Write the equilibrium constants for these reversible reactions – ALL CHEMICALS ARE GASES:



$$K_{eq} = \frac{[C][D]^3}{[A]^2[B]}$$



$$K_{eq} = \frac{[NO_3]}{[NO][O_2]}$$



$$K_{eq} = \frac{[CO][H_2O]}{[CO_2][H_2]}$$

15. Calculate K_{eq} for reaction 14a if the equilibrium concentrations are: $[A]=0.100M$, $[B]=0.230M$, $[C]=1.17M$, & $[D]=2.19M$.

$$K_{eq} = \frac{[1.17][2.19]^3}{[0.100]^2[0.230]} = 5.343$$

16. The equilibrium constant in 14b is .025. If $[NO] = .36M$ and $[O_2] = .21M$, what is the equilibrium concentration of NO_3 ?

$$K_{eq} = \frac{[NO_3]}{[.36][.21]} = .025 \quad [NO_3] = .00189M$$

17. If K_{eq} in 14c is 6.37×10^{-3} , $[CO_2] = 0.037M$, $[H_2] = 0.28M$, and $[CO] = 0.084M$, calculate $[H_2O]$.

$$6.37 \times 10^{-3} = \frac{[.084][H_2O]}{[.037][.28]} \quad [H_2O] = 7.86 \times 10^{-4}M$$

18. Describe K_{sp} .

solubility product constant, tells how soluble a salt is

19. What is the generic formula for K_{sp} ? $K_{sp} = [B]^b [C]^c$

20. Write the expression for K_{sp} for the following sparingly soluble salts:

