Equilibrium Review

Write the dissociation equation and K_{sp} expression.

- $Fe(OH)_3$

May 17-10:03 AM

Equilibrium Review

Write the dissociation equation and K_{sp} expression.

- $Fe(OH)_3$

Fe^{3+} OH^-

$Fe(OH)_3(s) \rightleftharpoons Fe^{3+}_{(aq)} + 3OH^-_{(aq)}$

$K_{sp} = [Fe^{3+}][OH^-]^3$

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Equilibrium Review

- When a reaction reaches equilibrium, the rate of the forward reaction _____ the rate of the reverse reaction.
- When a reaction reaches equilibrium, the amounts of the reactants and products are _____.

May 17-10:08 AM

Equilibrium Review

- When a reaction reaches equilibrium, the rate of the forward reaction equal the rate of the reverse reaction.
- When a reaction reaches equilibrium, the amounts of the reactants and products are constant.

May 17-10:08 AM

Answer the following about reaction rates:

- How is a reaction rate measured?
- What must occur for successful reaction?
- What is the activation energy of a reaction?
- What is an activated complex?

May 17-10:09 AM

Answer the following about reaction rates:

- How is a reaction rate measured?
  $\frac{M}{s} = \frac{\text{concentration}}{\text{time}}$
- What must occur for successful reaction?
  collide, collide w/ enough energy, correct orientation
- What is the activation energy of a reaction?
  energy needed for a reaction to occur
- What is an activated complex?
  - a.k.a. transition state
  - highly unstable — old bonds are breaking, new bonds are forming

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Describe how each of the following would affect the rate of a reaction:

- Heating the reaction.
- Increasing the surface area.
- Adding a catalyst.

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Describe how each of the following would affect the rate of a reaction:

- Heating the reaction.
  ↑, faster particles, more collisions
- Increasing the surface area.
  ↑, more likely to have correct orientation
- Adding a catalyst.
  ↑, lowers activation energy (E_a)

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Write the equilibrium constant expressions (Keq) for the following:

- $4HCl(aq) + O_2(g) \leftrightarrow 2Cl_2(g) + 2H_2O(l)$

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Write the equilibrium constant expressions (Keq) for the following:

- $4HCl(aq) + O_2(g) \leftrightarrow 2Cl_2(g) + 2H_2O(l)$

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

$K_{eq} = \frac{[Cl_2]^2}{[HCl]^4[O_2]}$

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Calculate the equilibrium constant:

$$2NO\ (g) + 2H_2\ (g) \leftrightarrow N_2\ (g) + 2H_2O\ (g)$$

- Calculate K_{eq} if
- [NO]=1.5 M,
- $[H_2]$=2.35 M,
- $[N_2]$=8.24 M,
- $[H_2O]$=6.03 M.

- Are the reactants or products favored at equilibrium? How do you know?

- The magnitude (value) of K_{eq} is dependent only on which variable?

May 17-10:10 AM

Calculate the equilibrium constant:

$$2NO\ (g) + 2H_2\ (g) \leftrightarrow N_2\ (g) + 2H_2O\ (g)$$

$$K_{eq} = \frac{[N_2][H_2O]^2}{[NO]^2[H_2]^2}$$

- Calculate K_{eq} if
- [NO]=1.5 M,
- $[H_2]$=2.35 M,
- $[N_2]$=8.24 M,
- $[H_2O]$=6.03 M.

$$K_{eq} = \frac{[8.24][6.03]^2}{[1.5]^2[2.35]^2} = 24.11$$

- Are the reactants or products favored at equilibrium? How do you know?

1 >

- The magnitude (value) of K_{eq} is dependent only on which variable?

temp.

May 17-10:10 AM

Answer the following with shift left or shift right or no change & explain your answer:

$CH_{4(g)} + 2O_{2(g)} \leftrightarrow CO_{(g)} + 2H_2O_{(g)} + heat$

- Which way will the reaction shift if CH_4 is added?
- Which way if the temperature is raised?
- Which way if water is removed?
- Which way if the volume is increased?

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Answer the following with shift left or shift right or no change & explain your answer:

$CH_{4(g)} + 2O_{2(g)} \leftrightarrow CO_{(g)} + 2H_2O_{(g)} + heat$

3 mol 3 mol

- Which way will the reaction shift if CH_4 is added?
  shift right, products ↑
- Which way if the temperature is raised?
  shift left, reactants ↑
- Which way if water is removed?
  shift right, products ↑
- Which way if the volume is increased?
  no change

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