Name: _____

1) Given the reaction at equilibrium:

$$2CO_3^{2-}(aq) + H_2O(\ell) \rightleftharpoons HCO_3^-(aq) + OH^-(aq)$$

Which statement is always true?

A) The rate of the forward reaction equals the rate of the reverse reaction.
B) $[CO_3^{2-}]$ is less than $[OH^-]$.
C) $[CO_3^{2-}]$ is less than $[HCO_3^-]$.
D) The rate of the forward reaction is less than the rate of the reverse reaction.

2) Given the reaction at equilibrium:

$$2CO(g) + O_2(g) \rightleftharpoons 2CO_2(g)$$

When the reaction is subjected to stress, a change will occur in the concentration of

A) neither reactants nor products
B) both reactants and products
C) reactants, only
D) products, only

3) Given the reaction at equilibrium:

$$A(g) + B(g) \rightleftharpoons AB(g) + \text{heat}$$

The concentration of $A(g)$ can be increased by

A) adding a catalyst
B) lowering the temperature
C) increasing the concentration of $AB(g)$
D) increasing the concentration of $B(g)$

4) Given the reaction:

$$N_2(g) + O_2(g) + 182.6\ \text{kJ} \rightleftharpoons 2NO(g)$$

Which change would cause an immediate increase in the rate of the forward reaction?

A) increasing the concentration of $NO(g)$
B) decreasing the reaction pressure
C) decreasing the reaction temperature
D) increasing the concentration of $N_2(g)$

5) Given the reaction at equilibrium:

$$N_2(g) + O_2(g) + \text{energy} \rightleftharpoons 2NO(g)$$

Which change will result in a decrease in the amount of $NO(g)$ formed?

A) decreasing the concentration of $N_2(g)$
B) increasing the concentration of $O_2(g)$
C) increasing the temperature
D) decreasing the pressure

6) Given the reaction at equilibrium:

$$2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g) + \text{heat}$$

Which change will shift the equilibrium to the right?

A) decreasing the pressure
B) adding a catalyst
C) adding more $O_2(g)$
D) increasing the temperature

7) Given the reaction at equilibrium:

$$A_2(g) + B_2(g) \rightleftharpoons 2AB(g) + \text{heat}$$

Which stress on the system at equilibrium will increase the concentration of $AB(g)$?

A) increasing the concentration of $B_2(g)$
B) decreasing the pressure
C) decreasing the concentration of $A_2(g)$
D) increasing the temperature

8) Given the reaction at equilibrium:

$$2SO_2(g) + O_2(g) \longrightarrow 2SO_3(g) + \text{heat}$$

Which change will shift the equilibrium to the right?

A) decreasing $[SO_2]$
B) decreasing the pressure
C) increasing the temperature
D) increasing $[O_2]$

9) Given the reaction at equilibrium:

$$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$$

As the concentration of $N_2(g)$ increases, the concentration of $O_2(g)$ will

A) remain the same
B) increase
C) decrease

10) Given the reaction at STP and at equilibrium:

$$H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$$

Which change will result in an increase in the concentration of $Cl_2(g)$?

A) decreasing the concentration of $HCl(g)$
B) increasing the concentration of $H_2(g)$
C) increasing the concentration of $HCl(g)$
D) decreasing the pressure of the system