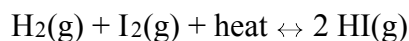


- _____ 1) Given the equilibrium reaction in a closed system: $\text{H}_2(\text{g}) + \text{I}_2(\text{g}) + \text{heat} \leftrightarrow 2 \text{HI}(\text{g})$
What will be the result of an increase in temperature?
- 1) The equilibrium will shift to the left and $[\text{H}_2]$ will increase.
 - 2) The equilibrium will shift to the left and $[\text{H}_2]$ will decrease.
 - 3) The equilibrium will shift to the right and $[\text{HI}]$ will increase.
 - 4) The equilibrium will shift to the right and $[\text{HI}]$ will decrease.
- _____ 2) Given the equation representing a reaction at equilibrium:
 $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \leftrightarrow 2 \text{HN}_3(\text{g}) + \text{energy}$
Which change causes the equilibrium to shift to the right?
- 1) decreasing the concentration of $\text{H}_2(\text{g})$
 - 2) decreasing the pressure
 - 3) increasing the concentration of $\text{N}_2(\text{g})$
 - 4) increasing the temperature
- _____ 3) Given the system at equilibrium:
 $2 \text{POCl}_3(\text{g}) + \text{energy} \rightleftharpoons 2 \text{PCl}_3(\text{g}) + \text{O}_2(\text{g})$
Which changes occur when $\text{O}_2(\text{g})$ is added to this system?
- 1) The equilibrium shifts to the right and the concentration of $\text{PCl}_3(\text{g})$ increases.
 - 2) The equilibrium shifts to the right and the concentration of $\text{PCl}_3(\text{g})$ decreases.
 - 3) The equilibrium shifts to the left and the concentration of $\text{PCl}_3(\text{g})$ increases.
 - 4) The equilibrium shifts to the left and the concentration of $\text{PCl}_3(\text{g})$ decreases.
- _____ 4) Given the reaction at equilibrium:
 $4 \text{HCl}(\text{g}) + \text{O}_2(\text{g}) \leftrightarrow 2 \text{Cl}_2(\text{g}) + 2 \text{H}_2\text{O}(\text{g})$
If the pressure on the system is increased, the concentration of $\text{Cl}_2(\text{g})$ will
- 1) decrease
 - 2) increase
 - 3) remain the same
- _____ 5) Ammonia is produced commercially by the Haber reaction:
 $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \leftrightarrow 2 \text{NH}_3(\text{g}) + \text{heat}$
The formation of ammonia is favored by
- 1) an increase in pressure
 - 2) a decrease in pressure
 - 3) removal of $\text{N}_2(\text{g})$
 - 4) removal of $\text{H}_2(\text{g})$
- _____ 6) The addition of a catalyst to a system at equilibrium will increase the rate of
- 1) the forward reaction, only
 - 2) the reverse reaction, only
 - 3) both the forward and reverse reactions
 - 4) neither the forward nor reverse reaction
- _____ 7) Given the Haber reaction at equilibrium:
 $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \leftrightarrow 2 \text{NH}_3(\text{g}) + \text{heat}$
- Which stress on the system will shift the reaction towards the reactants?
- 1) increasing the concentration of $\text{N}_2(\text{g})$
 - 2) increasing the pressure on the system
 - 3) decreasing the concentration of $\text{H}_2(\text{g})$
 - 4) decreasing the temperature on the system
- _____ 8) Given the equation representing a system at equilibrium:
 $\text{N}_2(\text{g}) + 3 \text{H}_2(\text{g}) \leftrightarrow 2 \text{NH}_3(\text{g}) + \text{energy}$
- Which changes occur when the temperature of this system is *decreased*?
- 1) The concentration of $\text{H}_2(\text{g})$ increases and the concentration of $\text{N}_2(\text{g})$ increases.
 - 2) The concentration of $\text{H}_2(\text{g})$ decreases and the concentration of $\text{N}_2(\text{g})$ increases.
 - 3) The concentration of $\text{H}_2(\text{g})$ decreases and the concentration of $\text{NH}_3(\text{g})$ decreases.
 - 4) The concentration of $\text{H}_2(\text{g})$ decreases and the concentration of $\text{NH}_3(\text{g})$ increases.

9) Given the equilibrium reaction in a closed system:



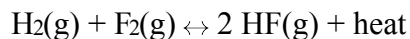
What will be the result of an increase in temperature?

- 1) The equilibrium will shift to the left and $[\text{H}_2]$ will increase.
- 2) The equilibrium will shift to the left and $[\text{H}_2]$ will decrease.
- 3) The equilibrium will shift to the right and $[\text{HI}]$ will increase.
- 4) The equilibrium will shift to the right and $[\text{HI}]$ will decrease.

10) For a reaction system at equilibrium, LeChatelier's principle can be used to predict the

- 1) activation energy for the system
- 2) type of bonds in the reactants
- 3) effect of a stress on the system
- 4) polarity of the product molecules

11) Given the system at equilibrium:



Which change will *not* shift the point of equilibrium?

- 1) changing the pressure
- 2) changing the temperature
- 3) changing the concentration of $\text{H}_2(\text{g})$
- 4) changing the concentration of $\text{HF}(\text{g})$

12) Given the closed system at equilibrium:



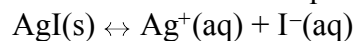
As the pressure on the system increases, the solubility of the $\text{CO}_2(\text{g})$

- 1) decreases
- 2) increases
- 3) remains the same

13) Which system at equilibrium will be *least* affected by a change in pressure?

- 1) $3 \text{H}_2(\text{g}) + \text{N}_2(\text{g}) \leftrightarrow 2 \text{NH}_3(\text{g})$
- 2) $2 \text{S}(\text{s}) + 3 \text{O}_2(\text{g}) \leftrightarrow 2 \text{SO}_3(\text{g})$
- 3) $\text{AgCl}(\text{s}) \leftrightarrow \text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq})$
- 4) $2 \text{HgO}(\text{s}) \leftrightarrow 2 \text{Hg}(\ell) + \text{O}_2(\text{g})$

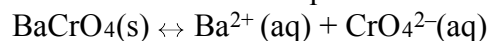
14) Given the reaction at equilibrium:



What happens as $\text{KI}(\text{s})$ is added to the solution?

- 1) The reaction shifts forwards and the concentration of $\text{AgI}(\text{aq})$ decreases .
- 2) The reaction shifts reverse and the concentration of $\text{AgI}(\text{aq})$ increases
- 3) The reaction shifts forwards and the concentration of $\text{Ag}^+(\text{aq})$ increases
- 4) The reaction shifts reverse and the concentration of $\text{Ag}^+(\text{aq})$ increases

15) Given the reaction at equilibrium:



Which substance, when added to the mixture will cause an increase in the amount of $\text{BaCrO}_4(\text{s})$?

- | | |
|----------------------------|--------------------|
| 1) K_2CO_3 | 3) BaCl_2 |
| 2) CaCO_3 | 4) CaCl_2 |