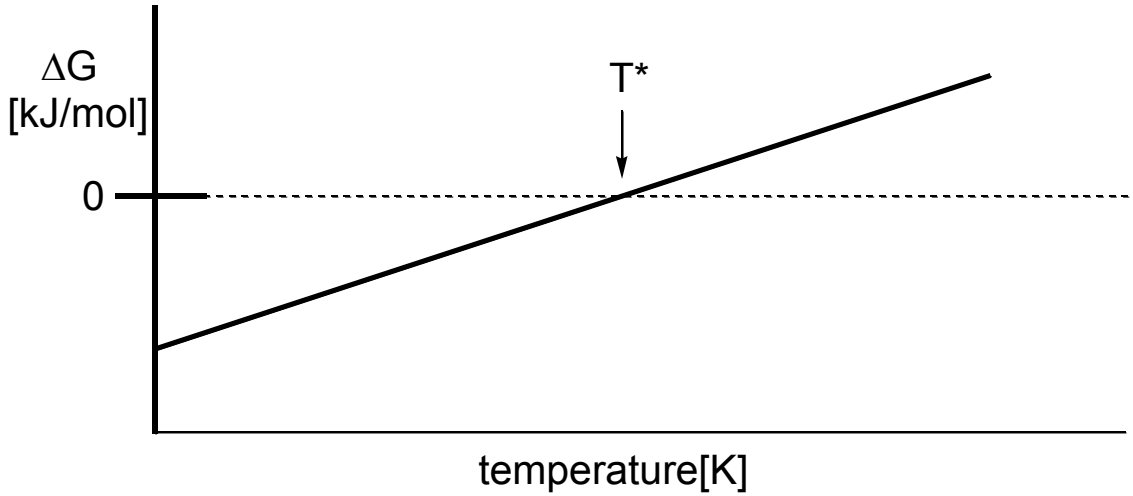
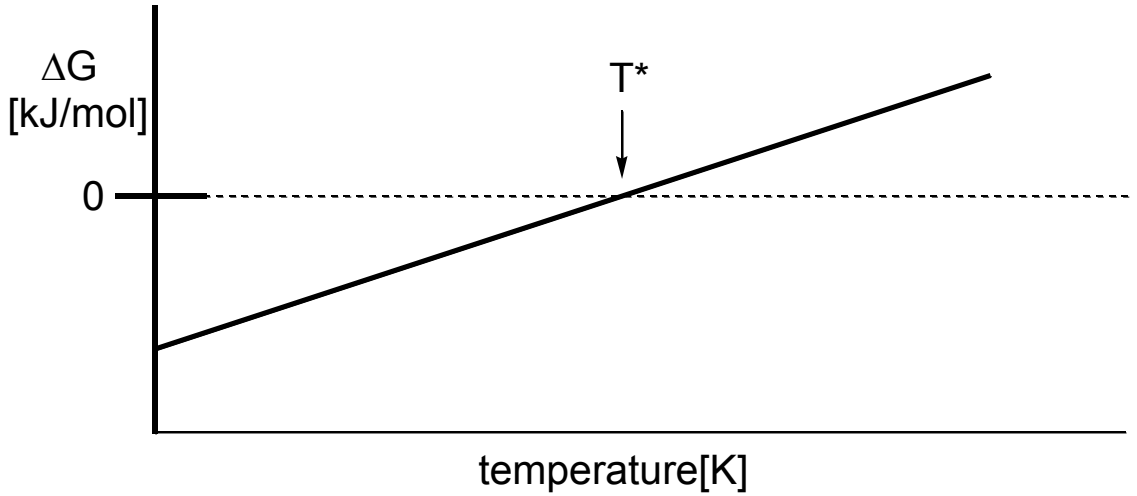
The following graph of $\Delta G° = \Delta H° - T\Delta S°$ describes a reaction in which:



1. $\Delta H° > 0$ and $\Delta S° > 0$
2. $\Delta H° < 0$ and $\Delta S° < 0$
3. $\Delta H° < 0$ and $\Delta S° > 0$
4. $\Delta H° > 0$ and $\Delta S° < 0$

The following graph of $\Delta G° = \Delta H° - T\Delta S°$ describes a reaction in which:



8% 1. $\Delta H° > 0$ and $\Delta S° > 0$

73% ✓ 2. $\Delta H° < 0$ and $\Delta S° < 0$

11% 3. $\Delta H° < 0$ and $\Delta S° > 0$

8% 4. $\Delta H° > 0$ and $\Delta S° < 0$

$$\mathbf{N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)}$$

$K = 1.9 \times 10^{-4}$ at 400°C

$PN_2 = 5.5$ bar, $PH_2 = 2.2$ bar, $PNH_3 = 1.1$ bar at 400°C

Which direction will the reaction go?

1. toward products, since $Q < K$
2. toward products, since $Q > K$
3. toward reactants, since $Q > K$
4. toward reactants, since $Q < K$

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

$K = 1.9 \times 10^{-4}$ at 400°C

$PN_2 = 5.5$ bar, $PH_2 = 2.2$ bar, $PNH_3 = 1.1$ bar at 400°C

Which direction will the reaction go?

7% 1. toward products, since Q < K

12% 2. toward products, since Q > K

79% 3. toward reactants, since Q > K

3% 4. toward reactants, since Q < K

Which is the correct expression for K for the following reaction:

$2NO_2\ (g) \rightarrow N_2O_4(g)$

1. $(PNO_2)/(PN_2O_4)$
2. $(PNO_2)^2/(PN_2O_4)$
3. $(PN_2O_4)/(PNO_2)$
4. $(PN_2O_4)/(PNO_2)^2$

Which is the correct expression for K for the following reaction:

$2NO_2\ (g) \rightarrow N_2O_4(g)$

2% 1. $(PNO_2)/(PN_2O_4)$

8% 2. $(PNO_2)^2/(PN_2O_4)$

3% 3. $(PN_2O_4)/(PNO_2)$

88% ✓ 4. $(PN_2O_4)/(PNO_2)^2$

$$\Delta G^\circ = -RT \ln K \quad \text{or} \quad K = \exp[-\Delta G^\circ / RT]$$

K is large if ΔG° is…

1. negative and small
2. negative and large
3. positive and small
4. positive and large

$$\Delta G^\circ = -RT \ln K \quad \text{or} \quad K = \exp[-\Delta G^\circ / RT]$$

K is large if ΔG° is…

10% 1. negative and small

82% ✓ 2. negative and large

5% 3. positive and small

3% 4. positive and large

Removing Product

If you remove product, what happens?

1. Q<K. The reaction shifts to the right toward product.
2. Q>K. The reaction shifts to the right toward product.
3. Q<K. The reaction shifts to the left toward reactants.
4. Q>K. The reaction shifts to the left toward reactants.

Removing Product

If you remove product, what happens?

70% ✓ 1. Q<K. The reaction shifts to the right toward product.

16% 2. Q>K. The reaction shifts to the right toward product.

6% 3. Q<K. The reaction shifts to the left toward reactants.

7% 4. Q>K. The reaction shifts to the left toward reactants.

5.111 Principles of Chemical Science
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