Chapter 15

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) The value of K_{eq} for the equilibrium 1) ________

$$H_2\ (g) + I_2\ (g) \rightleftharpoons 2\ HI\ (g)$$

is 794 at 25 °C. What is the value of K_{eq} for the equilibrium below?

$$1/2\ H_2\ (g) + 1/2\ I_2\ (g) \rightleftharpoons HI\ (g)$$

A) 1588 B) 0.035 C) 28 D) 397 E) 0.0013

2) The value of K_{eq} for the equilibrium 2) ________

$$H_2\ (g) + I_2\ (g) \rightleftharpoons 2\ HI\ (g)$$

is 794 at 25 °C. At this temperature, what is the value of K_{eq} for the equilibrium below?

$$HI\ (g) \rightleftharpoons 1/2\ H_2\ (g) + 1/2\ I_2\ (g)$$

A) 0.0013 B) 28 C) 0.035 D) 397 E) 1588

3) The value of K_{eq} for the equilibrium 3) ________

$$H_2\ (g) + I_2\ (g) \rightleftharpoons 2\ HI\ (g)$$

is 54.0 at 427 °C. What is the value of K_{eq} for the equilibrium below?

$$HI\ (g) \rightleftharpoons 1/2\ H_2\ (g) + 1/2\ I_2\ (g)$$

A) 27

B) 0.136

C) 2.92×10^3

D) 7.35

E) 3.43×10^{-4}

4) Consider the following chemical reaction: 4) ________

$$H_2\ (g) + I_2\ (g) \rightleftharpoons 2HI\ (g)$$

At equilibrium in a particular experiment, the concentrations of H_2, I_2, and HI were 0.15 M, 0.033 M, and 0.55 M, respectively. The value of K_{eq} for this reaction is __________.

A) 61 B) 9.0×10^{-3} C) 23 D) 111 E) 6.1

5) A reaction vessel is charged with hydrogen iodide, which partially decomposes to molecular hydrogen and iodine: 5) ________

$$2HI\ (g) \rightleftharpoons H_2(g) + I_2(g)$$

When the system comes to equilibrium at 425 °C, P_{HI} = 0.708 atm, and $P_{H_2} = P_{I_2}$ = 0.0960 atm. The value of K_p at this temperature is __________.

A) 6.80×10^{-2}

B) 1.84×10^{-2}

C) K_p cannot be calculated for this gas reaction when the volume of the reaction vessel is not given.

D) 1.30×10^{-2}

E) 54.3

6) Acetic acid is a weak acid that dissociates into the acetate ion and a proton in aqueous solution: 6) ________

$$HC_2H_3O_2\ (aq) \rightleftharpoons C_2H_3O_2^-\ (aq) + H^+\ (aq)$$

At equilibrium at 25 °C a 0.100 M solution of acetic acid has the following concentrations: $[HC_2H_3O_2]$ = 0.0990 M, $[C_2H_3O_2^-]$ = 1.33×10^{-3} M, and $[H^+]$ = 1.33×10^{-3} M. The equilibrium constant, K_{eq}, for the ionization of acetic acid at 25 °C is __________.

A) 5.71×10^{4}

B) 1.79×10^{-5}

C) 1.75×10^{-7}

D) 0.100

E) 5.71×10^{6}

7) At elevated temperatures, molecular hydrogen and molecular bromine react to partially form hydrogen bromide: 7) ________

$$H_2\,(g) + Br_2\,(g) \rightleftharpoons 2HBr\,(g)$$

A mixture of 0.682 mol of H_2 and 0.440 mol of Br_2 is combined in a reaction vessel with a volume of 2.00 L. At equilibrium at 700 K, there are 0.566 mol of H_2 present. At equilibrium, there are __________ mol of Br_2 present in the reaction vessel.

A) 0.440 B) 0.324 C) 0.000 D) 0.566 E) 0.232

8) Dinitrogentetraoxide partially decomposes according to the following equilibrium: 8) ________

$$N_2O_4\,(g) \rightleftharpoons 2NO_2\,(g)$$

A 1.00-L flask is charged with 0.400 mol of N_2O_4. At equilibrium at 373 K, 0.0055 mol of N_2O_4 remains. K_{eq} for this reaction is __________.

A) 2.2×10^{-4} B) 13 C) 0.22 D) 0.87 E) 0.022

9) At 200 °C, the equilibrium constant (K_p) for the reaction below is 2.40×10^3. 9) ________

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

A closed vessel is charged with 36.1 atm of NO. At equilibrium, the partial pressure of O_2 is __________ atm.

A) 18.1

B) 1.50×10^{-2}

C) 294

D) 6.00

E) 35.7

10) At 22 °C, $K_p = 0.070$ for the equilibrium: 10) ________

$$NH_4HS\,(s) \rightleftharpoons NH_3\,(g) + H_2S\,(g)$$

A sample of solid NH_4HS is placed in a closed vessel and allowed to equilibrate. Calculate the equilibrium partial pressure (atm) of ammonia, assuming that some solid NH_4HS remains.

A) 0.52 B) 0.26 C) 3.8 D) 0.070 E) 4.9×10^{-3}

11) In the coal–gasification process, carbon monoxide is converted to carbon dioxide via the following reaction: 11) _______

$$CO\,(g) + H_2O\,(g) \rightleftharpoons CO_2\,(g) + H_2\,(g)$$

In an experiment, 0.35 mol of CO and 0.40 mol of H_2O were placed in a 1.00–L reaction vessel. At equilibrium, there were 0.19 mol of CO remaining. K_{eq} at the temperature of the experiment is __________.

A) 5.47 B) 1.0 C) 1.78 D) 0.75 E) 0.56

12) A sealed 1.0 L flask is charged with 0.500 mol of I_2 and 0.500 mol of Br_2. An equilibrium reaction ensues: 12) _______

$$I_2\,(g) + Br_2\,(g) \rightleftharpoons 2IBr\,(g)$$

When the container contents achieve equilibrium, the flask contains 0.84 mol of IBr. The value of K_{eq} is __________.

A) 4.0 B) 110 C) 11 D) 2.8 E) 6.1

13) The equilibrium constant (K_p) for the interconversion of PCl_5 and PCl_3 is 0.0121: 13) _______

$$PCl_5\,(g) \rightleftharpoons PCl_3\,(g) + Cl_2\,(g)$$

A vessel is charged with PCl_5, giving an initial pressure of 0.123 atm. At equilibrium, the partial pressure of PCl_3 is __________ atm.

A) 0.123 B) 0.045 C) 0.090 D) 0.078 E) 0.033

14) K_p = 0.0198 at 721 K for the reaction 14) _______

$$2HI\,(g) \rightleftharpoons H_2\,(g) + I_2\,(g)$$

In a particular experiment, the partial pressures of H_2 and I_2 at equilibrium are 0.710 and 0.888 atm, respectively. The partial pressure of HI is __________ atm.

A) 0.125 B) 7.87 C) 5.64 D) 1.98 E) 0.389

15) At equilibrium, __________. 15) _______

A) all chemical reactions have ceased

B) the rate constants of the forward and reverse reactions are equal

C) the rates of the forward and reverse reactions are equal

D) the value of the equilibrium constant is 1

E) the limiting reagent has been consumed

16) What role did Karl Bosch play in development of the Haber–Bosch process? 16) ________

A) Haber was working in his lab with his instructor at the time he worked out the process.

B) He originally isolated ammonia from camel dung and found a method for purifying it.

C) He developed the equipment necessary for industrial production of ammonia.

D) He was the German industrialist who financed the research done by Haber.

E) He discovered the reaction conditions necessary for formation of ammonia.

17) In what year was Fritz Haber awarded the Nobel Prize in chemistry for his development of a process for synthesizing ammonia directly from nitrogen and hydrogen? 17) ________

A) 1954 B) 1912 C) 1933 D) 1900 E) 1918

18) Which one of the following is true concerning the Haber process? 18) ________

A) It is another way of stating LeChatelier's principle.

B) It is an industrial synthesis of sodium chloride that was discovered by Karl Haber.

C) It is a process for the synthesis of elemental chlorine.

D) It is a process used for the synthesis of ammonia.

E) It is a process used for shifting equilibrium positions to the right for more economical chemical synthesis of a variety of substances.

19) Which one of the following will change the value of an equilibrium constant? 19) ________

A) adding other substances that do not react with any of the species involved in the equilibrium

B) varying the initial concentrations of products

C) changing temperature

D) varying the initial concentrations of reactants

E) changing the volume of the reaction vessel

20) The equilibrium–constant expression depends on the __________ of the reaction. 20) ________

A) the quantities of reactants and products initially present

B) stoichiometry and mechanism

C) mechanism

D) stoichiometry

E) temperature

21) The relationship between the rate constants for the forward and reverse reactions and the equilibrium constant for the process is K_{eq} = __________. 21) ________

A) k_f/k_r B) $k_f k_r$ C) $k_f - k_r$ D) $k_f + k_r$ E) k_r/k_f

22) The equilibrium constant for the gas phase reaction 22) ________

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

is $K_{eq} = 4.34 \times 10^{-3}$ at 300 °C. At equilibrium, __________.

A) roughly equal amounts of products and reactants are present

B) products predominate

C) reactants predominate

D) only reactants are present

E) only products are present

23) The equilibrium constant for the gas phase reaction 23) ________

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

is $K_{eq} = 230$ at 300 °C. At equilibrium, __________.

A) reactants predominate

B) products predominate

C) only products are present

D) roughly equal amounts of products and reactants are present

E) only reactants are present

24) The equilibrium constant for reaction 1 is K. The equilibrium constant for reaction 2 is __________. 24) ________

(1) $SO_2 (g) + (1/2) O_2 (g) \rightleftharpoons SO_3 (g)$

(2) $2SO_3 (g) \rightleftharpoons 2SO_2 (g) + O_2 (g)$

A) 2K B) $1/K^2$ C) K^2 D) $-K^2$ E) 1/2K

25) The value of K_{eq} for the following reaction is 0.25: 25) ________

$$SO_2 (g) + NO_2 (g) \rightleftharpoons SO_3 (g) + NO (g)$$

The value of K_{eq} at the same temperature for the reaction below is __________.

$$2SO_2 (g) + 2NO_2 (g) \rightleftharpoons 2SO_3 (g) + 2NO (g)$$

A) 0.12 B) 0.25 C) 0.062 D) 0.50 E) 16

26) Which of the following expressions is the correct equilibrium–constant expression for the equilibrium between dinitrogen tetroxide and nitrogen dioxide? 26) _______

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

A) $[NO_2][N_2O_4]$

B) $\dfrac{[NO_2]}{[N_2O_4]}$

C) $[NO_2]^2[N_2O_4]$

D) $\dfrac{[NO_2]^2}{[N_2O_4]}$

E) $\dfrac{[NO_2]}{[N_2O_4]^2}$

27) The equilibrium expression for K_p for the reaction below is __________. 27) _______

$$2O_3\ (g) \rightleftharpoons 3O_2\ (g)$$

A) $\dfrac{2P_{O_3}}{3P_{O_2}}$ B) $\dfrac{P_{O_2}{}^3}{P_{O_3}{}^2}$ C) $\dfrac{P_{O_3}{}^2}{P_{O_2}{}^2}$ D) $\dfrac{3P_{O_3}}{2P_{O_2}}$ E) $\dfrac{3P_{O_2}}{2P_{O_3}}$

28) The K_{eq} for the equilibrium below is 7.52×10^{-2} at 480 °C. 28) _______

$$2Cl_2\ (g) + 2H2O\ (g) \rightleftharpoons 4HCl\ (g) + O_2\ (g)$$

What is the value of K_{eq} at this temperature for the following reaction?

$$Cl_2\ (g) + H_2O\ (g) \rightleftharpoons 2HCl\ (g) + \frac{1}{2}O_2\ (g)$$

A) 5.66×10^{-3}

B) 0.274

C) 0.0752

D) 0.0376

E) 0.150

29) The K_{eq} for the equilibrium below is 7.52×10^{-2} at 480 °C. 29) ________

$$2Cl_2\,(g) + 2H_2O\,(g) \rightleftharpoons 4HCl\,(g) + O_2\,(g)$$

What is the value of K_{eq} at this temperature for the following reaction?

$$4HCl\,(g) + O_2\,(g) \rightleftharpoons 2Cl_2\,(g) + 2H_2O\,(g)$$

A) 5.66×10^{-3}

B) 0.0752

C) -0.0752

D) 13.3

E) 0.150

30) The K_{eq} for the equilibrium below is 7.52×10^{-2} at 480 °C. 30) ________

$$2Cl_2\,(g) + 2H_2O\,(g) \rightleftharpoons 4HCl\,(g) + O_2\,(g)$$

What is the value of K_{eq} at this temperature for the following reaction?

$$2HCl\,(g) + \frac{1}{2}O_2\,(g) \rightleftharpoons Cl_2\,(g) + H_2O\,(g)$$

A) 0.274

B) 3.65

C) -0.0376

D) 5.66×10^{-3}

E) 13.3

31) The K_{eq} for the equilibrium below is 0.112 at 700 °C. 31) ________

$$SO_2\,(g) + \frac{1}{2}O_2\,(g) \rightleftharpoons SO_3\,(g)$$

What is the value of K_{eq} at this temperature for the following reaction?

$$2SO_2\,(g) + O_2\,(g) \rightleftharpoons 2SO_3\,(g)$$

A) 0.112 B) 0.0125 C) 0.0560 D) 0.335 E) 0.224

32) The K_{eq} for the equilibrium below is 0.112 at 700 °C. 32) ________

$$SO_2\ (g) + \frac{1}{2}O_2\ (g) \rightleftharpoons SO_3\ (g)$$

What is the value of K_{eq} at this temperature for the following reaction?

$$SO_3\ (g) \rightleftharpoons SO_2\ (g) + \frac{1}{2}O_2\ (g)$$

A) 0.112 B) –0.112 C) 0.0125 D) 0.224 E) 8.93

33) The K_{eq} for the equilibrium below is 0.112 at 700 °C. 33) ________

$$SO_2\ (g) + \frac{1}{2}O_2\ (g) \rightleftharpoons SO_3\ (g)$$

What is the value of K_{eq} at this temperature for the following reaction?

$$2SO_3\ (g) \rightleftharpoons 2SO_2\ (g) + O2\ (g)$$

A) 4.46 B) 8.93 C) 79.7 D) 2.99 E) 17.86

34) At 1000 K, the equilibrium constant for the reaction 34) ________

$$2NO\ (g) + Br_2\ (g) \rightleftharpoons 2NOBr\ (g)$$

is $K_p = 0.013$. Calculate K_p for the reverse reaction,

$$2NOBr\ (g) \rightleftharpoons 2NO\ (g) + Br_2\ (g).$$

A) 0.013 B) 0.99 C) 77 D) 1.1 E) 1.6×10^{-4}

35) Consider the following equilibrium. 35) ________

$$2\ SO_2\ (g) + O_2\ (g) \rightleftharpoons 2\ SO_3\ (g)$$

The equilibrium cannot be established when __________ is/are placed in a 1.0–L container.

A) 0.75 mol SO_2 (g)

B) 0.25 mol of SO_2 (g) and 0.25 mol of SO_3 (g)

C) 1.0 mol SO_3 (g)

D) 0.50 mol O_2 (g) and 0.50 mol SO_3 (g)

E) 0.25 mol SO_2 (g) and 0.25 mol O_2 (g)

36) The expression for K_p for the reaction below is __________. 36) ________

$$4CuO\,(s) + CH_4\,(g) \rightleftharpoons CO_2\,(g) + 4Cu\,(s) + 2H_2O\,(g)$$

A) $\dfrac{P_{CO_2}\,P_{H_2O}{}^2}{P_{CH_4}}$

B) $\dfrac{P_{CO_2}\,P_{H_2O}{}^2}{P_{CuO}}$

C) $\dfrac{[Cu]\,P_{CO_2}\,P_{H_2O}{}^2}{[CuO]^4\,P_{CH_4}}$

D) $\dfrac{P_{CH_4}}{P_{CO_2}\,P_{H_2}{}^2}$

E) $\dfrac{P_{CH_4}}{P_{H_2O}{}^2\,P_{CO_2}}$

37) The equilibrium-constant expression for the reaction 37) ________

$$Ti\,(s) + 2Cl_2\,(g) \rightleftharpoons TiCl_4\,(l)$$

is given by

A) $\dfrac{[Ti\,(s)]\,[Cl_2(\,g)]^2}{[TiCl4(l)]}$

B) $\dfrac{[TiCl_4\,(l)]}{[Ti\,(s)]\,[Cl_2(\,g)]^2}$

C) $\dfrac{[TiCl_4\,(l)]}{[Ti\,(s)]\,[Cl_2\,(g)]}$

D) $\dfrac{[TiCl_4\,(l)]}{[Cl_2\,(g)]^2}$

E) $[Cl_2\,(g)]^{-2}$

38) At 400 K, the equilibrium constant for the reaction 38) ________

$$Br_2\,(g) + Cl_2\,(g) \rightleftharpoons 2BrCl\,(g)$$

is $K_p = 7.0$. A closed vessel at 400 K is charged with 1.00 atm of Br_2 (g), 1.00 atm of Cl_2 (g), and 2.00 atm of BrCl (g). Use Q to determine which of the statements below is true.

A) The equilibrium partial pressure of Br_2 will be greater than 1.00 atm.

B) At equilibrium, the total pressure in the vessel will be less than the initial total pressure.

C) The reaction will go to completion since there are equal amounts of Br_2 and Cl_2.

D) The equilibrium partial pressure of BrCl (g) will be greater than 2.00 atm.

E) The equilibrium partial pressures of Br_2, Cl_2, and BrCl will be the same as the initial values.

39) How does the reaction quotient of a reaction (Q) differ from the equilibrium constant (K_{eq}) of the same reaction? 39) ________

A) Q does not change with temperature.

B) Q does not depend on the concentrations or partial pressures of reaction components.

C) K does not depend on the concentrations or partial pressures of reaction components.

D) K_{eq} does not change with temperature, whereas Q is temperature dependent.

E) Q is the same as K_{eq} when a reaction is at equilibrium.

40) How is the reaction quotient used to determine whether a system is at equilibrium? 40) ________

A) At equilibrium, the reaction quotient is undefined.

B) The reaction is at equilibrium when $Q = K_{eq}$.

C) The reaction is at equilibrium when $Q > K_{eq}$.

D) The reaction is at equilibrium when $Q < K_{eq}$.

E) The reaction quotient must be satisfied for equilibrium to be achieved.

41) Nitrosyl bromide decomposes according to the following equation. 41) ________

$$2NOBr\,(g) \rightleftharpoons 2NO\,(g) + Br_2\,(g)$$

A sample of NOBr (0.64 mol) was placed in a 1.00-L flask containing no NO or Br_2. At equilibrium the flask contained 0.46 mol of NOBr. How many moles of NO and Br_2, respectively, are in the flask at equilibrium?

A) 0.18, 0.18 B) 0.18, 0.090 C) 0.46, 0.46 D) 0.46, 0.23 E) 0.18, 0.360

42) Of the following equilibria, only __________ will shift to the left in response to a decrease in volume. 42) _______

A) $4\ Fe\ (s) + 3\ O_2\ (g) \rightleftharpoons 2\ Fe_2O_3\ (s)$

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

C) $2HI\ (g) \rightleftharpoons H_2\ (g) + I_2\ (g)$

D) $2\ SO_3\ (g) \rightleftharpoons 2\ SO_2\ (g) + O_2\ (g)$

E) $N_2\ (g) + 3\ H_2\ (g) \rightleftharpoons 2\ NH_3\ (g)$

43) Of the following equilibria, only __________ will shift to the left in response to a decrease in volume. 43) _______

A) $4\ Fe\ (s) + 3\ O_2\ (g) \rightleftharpoons 2\ Fe_2O_3\ (s)$

B) $2HI\ (g) \rightleftharpoons H_2\ (g) + I_2\ (g)$

C) $2\ SO_3\ (g) \rightleftharpoons 2\ SO_2\ (g) + O_2\ (g)$

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

E) $N_2\ (g) + 3\ H_2\ (g) \rightleftharpoons 2\ NH_3\ (g)$

44) The reaction below is exothermic: 44) _______

$$2SO_2\ (g) + O_2\ (g) \rightleftharpoons 2SO_3\ (g)$$

Le Châtelier's Principle predicts that __________ will result in an increase in the number of moles of SO_3 (g) in the reaction container.

A) increasing the pressure

B) increasing the volume of the container

C) removing some oxygen

D) decreasing the pressure

E) increasing the temperature

45) For the endothermic reaction 45) ________

$$CaCO_3\ (s) \rightleftharpoons CaO\ (s) + CO_2\ (g)$$

Le Châtelier's principle predicts that __________ will result in an increase in the number of moles of CO_2.

A) decreasing the temperature

B) removing some of the $CaCO_3$ (s)

C) increasing the pressure

D) increasing the temperature

E) adding more $CaCO_3$ (s)

46) In which of the following reactions would increasing pressure at constant temperature not change the concentrations of reactants and products, based on Le Châtelier's principle? 46) ________

A) $2N_2\ (g) + O_2\ (g) \rightleftharpoons 2N_2O\ (g)$

B) $N_2\ (g) + 3H_2\ (g) \rightleftharpoons 2NH_3\ (g)$

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

D) $N_2O_4\ (g) \rightleftharpoons 2NO_2\ (g)$

E) $N_2\ (g) + 2O_2\ (g) \rightleftharpoons 2NO_2\ (g)$

47) Consider the following reaction at equilibrium: 47) ________

$$2NH_3\ (g) \rightleftharpoons N_2\ (g) + 3H_2\ (g) \qquad \Delta H° = +92.4\ kJ$$

Le Châtelier's principle predicts that adding N_2 (g) to the system at equilibrium will result in __________.

A) a decrease in the concentration of H_2 (g)

B) a lower partial pressure of N_2

C) a decrease in the concentration of NH_3 (g)

D) removal of all of the H_2 (g)

E) an increase in the value of the equilibrium constant

48) Consider the following reaction at equilibrium: 48) _______

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

Le Châtelier's principle predicts that the moles of H_2 in the reaction container will increase with __________

A) some removal of NH_3 from the reaction vessel (V and T constant)

B) an increase in total pressure by the addition of helium gas (V and T constant)

C) addition of some N_2 to the reaction vessel (V and T constant)

D) a decrease in the total volume of the reaction vessel (T constant)

E) a decrease in the total pressure (T constant)

49) Consider the following reaction at equilibrium: 49) _______

$$2CO_2\ (g) \rightleftharpoons 2CO\ (g) + O_2\ (g) \qquad \Delta H° = -514\ kJ$$

Le Châtelier's principle predicts that adding O_2 (g) to the reaction container will __________.

A) decrease the partial pressure of CO_2 (g) at equilibrium

B) increase the value of the equilibrium constant

C) increase the partial pressure of CO_2 (g) at equilibrium

D) increase the partial pressure of CO (g) at equilibrium

E) decrease the value of the equilibrium constant

50) Consider the following reaction at equilibrium: 50) _______

$$2CO_2\ (g) \rightleftharpoons 2CO\ (g) + O_2\ (g) \qquad \Delta H° = -514\ kJ$$

Le Châtelier's principle predicts that an increase in temperature will __________.

A) increase the partial pressure of CO

B) decrease the value of the equilibrium constant

C) decrease the partial pressure of CO_2 (g)

D) increase the value of the equilibrium constant

E) increase the partial pressure of O_2 (g)

51) Consider the following reaction at equilibrium. 51) _______

$$2CO_2\,(g) \rightleftharpoons 2CO\,(g) + O_2\,(g) \qquad \Delta H° = -514\ kJ$$

Le Châtelier's principle predicts that the equilibrium partial pressure of CO (g) can be maximized by carrying out the reaction __________.

A) at high temperature and high pressure

B) at high temperature and low pressure

C) at low temperature and low pressure

D) at low temperature and high pressure

E) in the presence of solid carbon

52) Consider the following reaction at equilibrium: 52) _______

$$2SO_2\,(g) + O_2\,(g) \rightleftharpoons 2SO_3\,(g) \qquad \Delta H° = -99\ kJ$$

Le Châtelier's principle predicts that an increase in temperature will result in __________.

A) a decrease in the partial pressure of SO_2

B) a decrease in the partial pressure of SO_3

C) an increase in K_{eq}

D) the partial pressure of O_2 will decrease

E) no changes in equilibrium partial pressures

53) The effect of a catalyst on an equilibrium is to __________. 53) _______

A) slow the reverse reaction only

B) shift the equilibrium to the right

C) increase the equilibrium constant so that products are favored

D) increase the rate of the forward reaction only

E) increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture

1) C
2) C
3) B
4) A
5) B
6) B
7) B
8) D
9) A
10) B
11) E
12) B
13) E
14) C
15) C
16) C
17) E
18) D
19) C
20) D
21) A
22) C
23) B
24) B
25) C
26) D
27) B
28) B
29) D
30) B
31) B
32) E
33) C
34) C
35) A
36) A
37) E
38) D
39) E
40) B
41) B
42) D
43) C
44) A
45) D
46) C
47) A
48) E
49) C
50) B

51) C
52) B
53) E