Quiz: Equilibrium 1

Q1: For the reaction \mathrm{N2(g) + 3H2(g) <=> 2NH3(g)}, the equilibrium constant K_p is related to K_c by:

A) K_p = K_c(RT)2
B) K_p = K_c(RT)-2
C) K_p = K_c(RT)-4
D) K_p = K_c(RT)4

Q2: For a reversible reaction at equilibrium, which of the following is always true?

A) Rate of forward reaction is zero
B) Rate of backward reaction is zero
C) Rate of forward reaction equals rate of backward reaction
D) Concentrations of reactants and products are equal

Q3: For the reaction \mathrm{2SO2(g) + O2(g) <=> 2SO3(g)}, decreasing the volume at constant temperature will:

A) Shift equilibrium to the left
B) Shift equilibrium to the right
C) Have no effect
D) Decrease K_c

Q4: If K_c = 10-5 for a reaction, the reaction mixture at equilibrium contains:

A) Mostly products
B) Mostly reactants
C) Equal reactants and products
D) Only products

Q5: For the reaction \mathrm{A <=> B}, if K = 1, then:

A) Reaction is complete
B) Only reactants are present
C) DeltaG deg = 0
D) DeltaG < 0

Q6: The equilibrium constant for a reaction depends on:

A) Initial concentrations
B) Catalyst
C) Temperature
D) Pressure

Q7: Which of the following will not change the equilibrium position?

A) Adding a catalyst
B) Changing concentration
C) Changing pressure
D) Changing temperature

Q8: For an endothermic reaction, increase in temperature will:

A) Decrease K
B) Increase K
C) Not affect K
D) Make K=1

Q9: The value of equilibrium constant for a reaction is 1000. Which statement is correct?

A) Reaction is slow
B) Reaction is fast
C) Products are favored
D) Reactants are favored

Q10: If the reaction quotient Q < K, then the reaction will proceed:

A) In forward direction
B) In backward direction
C) Is already at equilibrium
D) Stops completely

Q11: For the reaction \mathrm{2A <=> B}, if the concentration of A is doubled, equilibrium will shift:

A) To the left
B) To the right
C) No change
D) Reaction stops

Q12: Which of the following expressions is correct for K_c of \mathrm{2NO2(g) <=> N2O4(g)}?

A) [NO2]2/[N2O4]
B) [N2O4]/[NO2]2
C) [NO2]/[N2O4]
D) [NO2]2[N2O4]

Q13: For a reaction with DeltaH < 0, decrease in temperature will:

A) Shift equilibrium to reactants
B) Shift equilibrium to products
C) Have no effect
D) Decrease K

Q14: The equilibrium constant of a reaction is unaffected by:

A) Change in temperature
B) Change in pressure
C) Change in volume
D) Change in catalyst

Q15: If K_p = K_c(RT)Deltan, what is Deltan for \mathrm{PCl5(g) <=> PCl3(g) + Cl2(g)}?

A) +1
B) -1
C) 0
D) +2

Q16: For which reaction does pressure have no effect on equilibrium?

A) \mathrm{N2 + 3H2 <=> 2NH3}
B) \mathrm{H2 + I2 <=> 2HI}
C) \mathrm{2SO2 + O2 <=> 2SO3}
D) \mathrm{N2O4 <=> 2NO2}

Q17: Which factor changes both equilibrium position and equilibrium constant?

A) Catalyst
B) Pressure
C) Concentration
D) Temperature

Q18: If the equilibrium constant of a reaction is very large, the reaction is:

A) Irreversible
B) Nearly complete
C) Very slow
D) Impossible

Q19: For the reaction \mathrm{CO(g) + H2O(g) <=> CO2(g) + H2(g)}, Deltan is:

A) +1
B) -1
C) 0
D) +2

Q20: If K_c for a reaction is known, the unit of K_c depends on:

A) Temperature
B) Stoichiometry of reaction
C) Initial concentration
D) Catalyst

Q21: Which of the following statements is correct for equilibrium?

A) Macroscopic properties remain constant
B) Reaction stops
C) All reactants convert to products
D) Forward reaction stops

Q22: For a reversible reaction, equilibrium is established when:

A) Products are maximum
B) Reactants are minimum
C) Rate of forward reaction equals backward reaction
D) Concentration becomes zero

Q23: Which of the following will increase the yield of ammonia in Haber process?

A) High temperature
B) Low pressure
C) High pressure
D) Removing catalyst

Q24: If equilibrium constant K = 10-3, the standard Gibbs energy change DeltaG deg is:

A) Negative
B) Positive
C) Zero
D) Cannot be determined

Q25: In Le Chatelier's principle, system counteracts the applied change to:

A) Increase entropy
B) Minimize effect of change
C) Maximize reaction rate
D) Stop reaction

Q26: For which reaction will increase in pressure favor products?

A) \mathrm{N2 + O2 <=> 2NO}
B) \mathrm{2NO2 <=> N2O4}
C) \mathrm{H2 + I2 <=> 2HI}
D) \mathrm{CO + H2 <=> CH3OH}

Q27: Which condition favors dissociation of \mathrm{N2O4} into \mathrm{NO2}?

A) High pressure
B) Low temperature
C) Low pressure
D) Adding inert gas at constant volume

Q28: The equilibrium constant for reverse reaction is:

A) Same as forward
B) Square of forward
C) Reciprocal of forward
D) Negative of forward

Q29: If the coefficients of a balanced equation are doubled, the new equilibrium constant becomes:

A) K2
B) \sqrt{K}
C) 1/K
D) Unchanged

Q30: Which of the following best describes chemical equilibrium?

A) Static
B) Dynamic
C) Irreversible
D) One-way

Q31: Adding inert gas at constant volume to an equilibrium system will:

A) Shift equilibrium
B) Change K
C) Not affect equilibrium
D) Stop reaction

Q32: Which of the following quantities remains constant at equilibrium?

A) Reaction rate
B) Concentration
C) Forward reaction rate
D) Ratio of rates

Q33: For a reaction with DeltaH > 0, which condition favors product formation?

A) Low temperature
B) High temperature
C) High pressure
D) Low pressure

Q34: Which statement is true about K_p and K_c?

A) They are always equal
B) K_p > K_c always
C) K_p may be greater or smaller than K_c
D) They are unrelated

Q35: For which reaction is K_p = K_c?

A) \mathrm{N2 + 3H2 <=> 2NH3}
B) \mathrm{H2 + I2 <=> 2HI}
C) \mathrm{2SO2 + O2 <=> 2SO3}
D) \mathrm{N2O4 <=> 2NO2}

Q36: Which of the following is not included in equilibrium constant expression?

A) Pure solids
B) Pure liquids
C) Gases
D) Aqueous ions

Q37: For reaction \mathrm{A + B <=> C}, if K_c = 4, which statement is correct?

A) Reaction is incomplete
B) Products favored
C) Reactants favored
D) Equilibrium impossible

Q38: When equilibrium is disturbed by adding more reactant, the system responds by:

A) Stopping reaction
B) Increasing backward reaction
C) Increasing forward reaction
D) Changing K

Q39: Which graph best represents equilibrium?

A) Rate vs time intersecting and becoming equal
B) Concentration vs time dropping to zero
C) Rate vs time diverging
D) Constant concentration from start

Q40: For equilibrium \mathrm{CaCO3(s) <=> CaO(s) + CO2(g)}, K_p depends on:

A) Amount of CaCO3
B) Amount of CaO
C) Partial pressure of CO2
D) Total pressure

Q41: For the reaction \mathrm{H2(g) + I2(g) <=> 2HI(g)}, initially 1 mol each of H2 and I2 are taken in a 1 L vessel. If at equilibrium 0.2 mol of H2 remains, the equilibrium constant K_c is:

A) 16
B) 25
C) 64
D) 4

Q42: For a reaction \mathrm{A <=> B}, DeltaG deg = +5.7\,\text{kJ mol}-1 at 300 K. The value of equilibrium constant is approximately:

A) 0.1
B) 1
C) 10
D) 100

Q43: For the reaction \mathrm{2NO2(g) <=> N2O4(g)}, if degree of dissociation of N2O4 is alpha, the equilibrium constant K_p is:

A) \dfrac{1-alpha}{4alpha2}P
B) \dfrac{alpha2}{(1-alpha)P}
C) \dfrac{4alpha2}{(1-alpha)P}
D) \dfrac{(1-alpha)P}{alpha2}

Q44: For a gaseous reaction with Deltan = -1, if temperature is doubled, the ratio K_p/K_c becomes:

A) 2R
B) 1/(2R)
C) R
D) 1/R

Q45: For the reaction \mathrm{N2 + 3H2 <=> 2NH3}, which change will increase equilibrium yield of ammonia?

A) Increase temperature
B) Decrease pressure
C) Add catalyst
D) Remove ammonia continuously

Q46: If K_c=4 for \mathrm{A+B <=> C} and initial concentrations of A and B are 1 M each, the equilibrium concentration of C is:

A) 0.5 M
B) 0.67 M
C) 0.8 M
D) 0.25 M

Q47: For an exothermic reaction, the van’t Hoff equation predicts that with increase in temperature:

A) K increases
B) K decreases
C) K remains constant
D) DeltaH becomes zero

Q48: Which condition favors maximum dissociation of \mathrm{PCl5(g)} into \mathrm{PCl3(g)} and \mathrm{Cl2(g)}?

A) High pressure, low temperature
B) Low pressure, high temperature
C) High pressure, high temperature
D) Low pressure, low temperature

Q49: If Q>K for a reaction mixture, the reaction will proceed:

A) Forward
B) Backward
C) To completion
D) Randomly

Q50: For reaction \mathrm{2A <=> B}, if K_c=1/4, the reaction is:

A) Product favored
B) Reactant favored
C) At equilibrium always
D) Irreversible

Q51: For which of the following reactions will K_p decrease with increase in temperature?

A) Endothermic reaction
B) Exothermic reaction
C) Deltan=0 reaction
D) Irreversible reaction

Q52: For the equilibrium \mathrm{CO + 3H2 <=> CH4 + H2O}, increasing pressure will:

A) Shift left
B) Shift right
C) Have no effect
D) Decrease K_p

Q53: If equilibrium constant of a reaction is 1 at all temperatures, then:

A) DeltaH deg=0
B) DeltaS deg=0
C) DeltaG deg=0 only at one temperature
D) Reaction is slow

Q54: For a reaction mixture at equilibrium, which quantity must be zero?

A) DeltaH
B) DeltaS
C) DeltaG
D) Reaction rate

Q55: If equilibrium constant K_c=105, the value of DeltaG deg at 298 K is approximately:

A) -28.5 kJ mol-1
B) +28.5 kJ mol-1
C) 0
D) -5.7 kJ mol-1

Q56: Which of the following does not change the value of reaction quotient Q?

A) Adding reactant
B) Removing product
C) Adding catalyst
D) Changing concentration

Q57: For equilibrium \mathrm{Fe3+ + SCN^- <=> FeSCN2+}, addition of Fe3+ will:

A) Shift left
B) Shift right
C) Not affect equilibrium
D) Change K

Q58: If K_p=K_c, the reaction must have:

A) Equal moles of reactants and products
B) Deltan=0
C) Same phases
D) Only solids

Q59: For a gaseous equilibrium, addition of inert gas at constant pressure will:

A) Shift towards fewer moles
B) Shift towards more moles
C) Not affect equilibrium
D) Change K

Q60: Which factor increases both forward and backward reaction rates equally?

A) Temperature
B) Catalyst
C) Pressure
D) Concentration

Q61: If equilibrium constant is extremely large, which is correct?

A) Reaction is slow
B) Reaction is reversible
C) Reaction goes almost to completion
D) Reactants dominate

Q62: For which equilibrium does temperature change have maximum effect?

A) DeltaH=0
B) Highly exothermic
C) Deltan=0
D) Isothermal

Q63: If equilibrium constant is expressed in terms of mole fraction, it is denoted as:

A) K_p
B) K_c
C) K_x
D) K_m

Q64: Which of the following statements is incorrect?

A) Equilibrium is dynamic
B) K depends on temperature
C) Catalyst changes K
D) Forward and backward rates are equal

Q65: For the reaction \mathrm{2SO2 + O2 <=> 2SO3}, decrease in temperature will:

A) Decrease yield of SO3
B) Increase yield of SO3
C) No change
D) Decrease K

Q66: If DeltaG deg<0 and DeltaH deg>0, reaction will be spontaneous:

A) At all temperatures
B) At high temperatures
C) At low temperatures
D) Never

Q67: Which equilibrium constant has no unit?

A) K_c
B) K_p
C) K_x
D) Depends on reaction

Q68: For equilibrium \mathrm{NH4Cl(s) <=> NH3(g)+HCl(g)}, increasing pressure will:

A) Shift right
B) Shift left
C) No effect
D) Increase K_p

Q69: If reaction quotient Q=K, then the system is:

A) At equilibrium
B) Moving forward
C) Moving backward
D) Unstable

Q70: Which of the following always increases entropy of reaction?

A) Decrease in moles of gas
B) Increase in moles of gas
C) Formation of solid
D) Condensation

Q71: For a reaction, if DeltaS>0 and DeltaH<0, then:

A) Never spontaneous
B) Spontaneous at all temperatures
C) Spontaneous at high T
D) Spontaneous at low T

Q72: For equilibrium involving only solids and liquids, the equilibrium constant is:

A) Zero
B) Infinity
C) One
D) Undefined

Q73: If coefficients of a balanced equation are halved, new equilibrium constant becomes:

A) K2
B) \sqrt{K}
C) 1/K
D) Same

Q74: Which statement is correct regarding equilibrium constant?

A) Depends on catalyst
B) Depends on initial concentrations
C) Depends on temperature
D) Depends on volume

Q75: For reaction \mathrm{A <=> B}, if K=10, then:

A) DeltaG deg>0
B) DeltaG deg<0
C) DeltaG deg=0
D) Reaction is slow

Q76: Which of the following is a homogeneous equilibrium?

A) \mathrm{CaCO3(s) <=> CaO(s)+CO2(g)}
B) \mathrm{H2(g)+I2(g) <=> 2HI(g)}
C) \mathrm{AgCl(s) <=> Ag^+(aq)+Cl^-(aq)}
D) \mathrm{NH4Cl(s) <=> NH3(g)+HCl(g)}

Q77: If equilibrium constant is small, the equilibrium lies:

A) Towards products
B) Towards reactants
C) At middle
D) Outside reaction

Q78: Which term decides direction of spontaneity?

A) DeltaH
B) DeltaS
C) DeltaG
D) K

Q79: For equilibrium \mathrm{2HI <=> H2 + I2}, if K_c=0.25, the forward reaction is:

A) Favored
B) Not favored
C) Complete
D) Irreversible

Q80: Which change will shift equilibrium but not change K?

A) Temperature
B) Pressure
C) Catalyst
D) Nature of reactants

Q81: For the equilibrium \mathrm{2SO2(g) + O2(g) <=> 2SO3(g)}, initially 2 mol SO2 and 1 mol O2 are taken in a 1 L vessel. If at equilibrium 1 mol SO3 is formed, the value of K_c is:

A) 1
B) 2
C) 4
D) 8

Q82: For reaction \mathrm{N2O4(g) <=> 2NO2(g)}, if total pressure is P and degree of dissociation is alpha, the partial pressure of NO2 is:

A) \dfrac{alphaP}{1+alpha}
B) \dfrac{2alphaP}{1+alpha}
C) \dfrac{(1-alpha)P}{1+alpha}
D) \dfrac{2(1-alpha)P}{1+alpha}

Q83: For a reaction \mathrm{A <=> B}, K=0.01 at 298 K. The value of DeltaG deg (in kJ mol-1) is approximately:

A) +11.4
B) -11.4
C) +5.7
D) -5.7

Q84: For equilibrium \mathrm{CO(g)+H2O(g) <=> CO2(g)+H2(g)}, if K_c=1, then:

A) DeltaG deg>0
B) DeltaG deg<0
C) DeltaG deg=0
D) Reaction is irreversible

Q85: For the reaction \mathrm{PCl5(g) <=> PCl3(g)+Cl2(g)}, if K_p=1 and total pressure is 1 atm, the degree of dissociation is:

A) 0.2
B) 0.33
C) 0.5
D) 0.67

Q86: Which of the following changes will increase both Q and K for an equilibrium system?

A) Increase in temperature for exothermic reaction
B) Decrease in temperature for endothermic reaction
C) Increase in temperature for endothermic reaction
D) Adding catalyst

Q87: For a reaction, DeltaH deg=-40 kJ mol-1 and DeltaS deg=-100 J mol-1 K-1. The reaction will be spontaneous:

A) At all temperatures
B) At high temperatures
C) At low temperatures
D) Never

Q88: For equilibrium \mathrm{2HI(g) <=> H2(g)+I2(g)}, increasing pressure will:

A) Shift right
B) Shift left
C) No effect
D) Change K_p

Q89: If equilibrium constant is written in terms of partial pressures, it is dimensionless because:

A) Pressure has no unit
B) Standard state is used
C) Gas constant cancels units
D) Moles are equal

Q90: For the reaction \mathrm{A+B <=> C+D}, DeltaH deg=0. If temperature is increased, equilibrium constant:

A) Increases
B) Decreases
C) Remains unchanged
D) Becomes zero

Q91: For equilibrium \mathrm{N2(g)+3H2(g) <=> 2NH3(g)}, addition of inert gas at constant pressure will:

A) Shift right
B) Shift left
C) No effect
D) Increase K_p

Q92: For which equilibrium does addition of inert gas at constant volume have no effect?

A) Gaseous equilibrium
B) Heterogeneous equilibrium
C) Homogeneous gaseous equilibrium
D) All equilibria

Q93: If equilibrium constant K_c has unit \mathrm{mol-1L}, the reaction is:

A) \mathrm{A <=> B}
B) \mathrm{2A <=> B}
C) \mathrm{A+B <=> C}

D) \mathrm{A <=> 2B}

Q94: For a reaction, K_p=K_c(RT)Deltan. If Deltan=+2, then K_p/K_c is proportional to:

A) T2
B) 1/T2
C) T
D) 1/T

Q95: For equilibrium \mathrm{AgCl(s) <=> Ag^+(aq)+Cl^-(aq)}, the equilibrium constant expression is:

A) [Ag^+,Cl^-]
B) [AgCl]
C) [Ag^+]/[Cl^-]
D) 1/[Ag^+,Cl^-]

Q96: For which reaction is entropy change maximum?

A) Decrease in gaseous moles
B) Increase in gaseous moles
C) Solid to liquid
D) Liquid to solid

Q97: For a reaction with DeltaG deg=+10 kJ mol-1 at 298 K, the equilibrium constant is:

A) Greater than 1
B) Equal to 1
C) Less than 1
D) Zero

Q98: For equilibrium \mathrm{2A(g) <=> B(g)}, doubling the volume will:

A) Shift right
B) Shift left
C) No effect
D) Change K_c

Q99: Which condition favors product formation for an exothermic reaction with decrease in gaseous moles?

A) High T, low P
B) High T, high P
C) Low T, high P
D) Low T, low P

Q100: For equilibrium \mathrm{H2(g)+Cl2(g) <=> 2HCl(g)}, Deltan is:

A) +1
B) -1
C) 0
D) +2

Q101: For which reaction will K_c have unit \mathrm{mol-2L2}?

A) \mathrm{A <=> B}
B) \mathrm{2A <=> B}
C) \mathrm{A+B <=> C}
D) \mathrm{A <=> 2B}

Q102: If K_c for a reaction is very large, then equilibrium concentration of reactants is:

A) High
B) Low
C) Equal to products
D) Zero always

Q103: For a reaction at equilibrium, which of the following ratios is constant?

A) [Products]/[Reactants]
B) Rate forward/rate backward
C) Reaction quotient Q
D) All of these

Q104: For equilibrium \mathrm{2NO(g)+O2(g) <=> 2NO2(g)}, increasing concentration of NO2 will:

A) Shift right
B) Shift left
C) No effect
D) Increase K

Q105: If K_x is equilibrium constant in terms of mole fraction, then:

A) It has units
B) It is dimensionless
C) It equals K_c
D) It equals K_p always

Q106: For a reaction, if DeltaS deg<0 and DeltaH deg>0, the reaction will be:

A) Spontaneous at all T
B) Spontaneous at high T
C) Spontaneous at low T
D) Never spontaneous

Q107: For equilibrium \mathrm{A(g)+B(g) <=> C(g)}, decreasing temperature will favor products if:

A) Reaction is endothermic
B) Reaction is exothermic
C) Deltan=0
D) Catalyst is added

Q108: If equilibrium constant is expressed using concentrations in mol L-1, it is denoted by:

A) K_p
B) K_x
C) K_c
D) K_m

Q109: For reaction \mathrm{A <=> 2B}, if K_c=4, starting with 1 M A only, the equilibrium concentration of B is approximately:

A) 0.8 M
B) 1.0 M
C) 1.2 M
D) 1.6 M

Q110: For equilibrium involving gases, which factor changes equilibrium constant?

A) Pressure
B) Volume
C) Temperature
D) Concentration

Q111: Which of the following is a correct statement?

A) Large K means fast reaction
B) Small K means irreversible reaction
C) K indicates extent of reaction
D) K depends on catalyst

Q112: For equilibrium \mathrm{NH3(g)+HCl(g) <=> NH4Cl(s)}, increasing pressure will:

A) Shift right
B) Shift left
C) No effect
D) Decrease K

Q113: For a reaction, if DeltaG deg=0 at a certain temperature, then:

A) K=0
B) K=1
C) K>1
D) K<1

Q114: For equilibrium \mathrm{2A(g)+B(g) <=> 2C(g)}, Deltan is:

A) +1
B) -1
C) 0
D) -2

Q115: If K_p is very small, then:

A) Products dominate
B) Reactants dominate
C) Reaction is fast
D) Reaction is irreversible

Q116: For equilibrium \mathrm{CaCO3(s) <=> CaO(s)+CO2(g)}, adding more CaCO3 will:

A) Increase CO2 pressure
B) Decrease CO2 pressure
C) Have no effect
D) Change K_p

Q117: Which quantity decides the extent of reaction at equilibrium?

A) DeltaH
B) DeltaS
C) DeltaG deg
D) K

Q118: For reaction \mathrm{A+B <=> C}, if initial concentrations are equal and K_c=1, then at equilibrium:

A) All A and B react
B) More products than reactants
C) Equal extent of reactants and products
D) Reaction stops immediately

Q119: Which of the following shifts equilibrium without changing K?

A) Temperature change
B) Pressure change
C) Nature of reaction
D) Standard state

Q120: For equilibrium \mathrm{2NO2(g) <=> N2O4(g)}, lowering temperature will:

A) Increase dissociation
B) Decrease dissociation
C) No effect
D) Change K_c randomly

Q121: For the equilibrium \mathrm{2A(g) <=> B(g)}, initially 1 mol of A is taken in a 1 L vessel. At equilibrium, total pressure is 2 atm and degree of dissociation of A is alpha. The equilibrium constant K_p is:

A) \dfrac{alpha2}{(1-alpha)}P
B) \dfrac{(1-alpha)P}{alpha2}
C) \dfrac{alpha2P}{2(1-alpha)}
D) \dfrac{alpha2}{2(1-alpha)P}

Q122: For a reaction at equilibrium, DeltaG=0. If DeltaG deg=-20\,\text{kJ mol}-1 at 298 K, the value of Q is approximately:

A) 10-4
B) 10-2
C) 102
D) 104

Q123: For equilibrium \mathrm{N2O4(g) <=> 2NO2(g)}, at a fixed temperature, the degree of dissociation will be maximum at:

A) High pressure
B) Low pressure
C) High volume
D) Low volume

Q124: For reaction \mathrm{A+B <=> C}, if K_c=10 and initial concentrations are [A]=[B]=1 M, the equilibrium concentration of C is closest to:

A) 0.5 M
B) 0.73 M
C) 0.82 M
D) 0.91 M

Q125: For the reaction \mathrm{CO(g)+2H2(g) <=> CH3OH(g)}, Deltan is:

A) +1
B) 0
C) -1
D) -2

Q126: If K_p=16 for \mathrm{2A(g) <=> B(g)} at a certain temperature, then K_c at the same temperature is:

A) 16RT
B) 16/(RT)
C) 16(RT)
D) 16/(RT)2

Q127: For a reaction, DeltaH deg>0 and DeltaS deg>0. The equilibrium constant will:

A) Decrease with increase in temperature
B) Increase with increase in temperature
C) Be independent of temperature
D) Become zero at high temperature

Q128: For equilibrium \mathrm{2NO(g)+O2(g) <=> 2NO2(g)}, if volume is suddenly decreased at constant temperature, immediately after change:

A) Q=K
B) Q<K
C) Q>K
D) Reaction stops

Q129: For which of the following reactions does equilibrium constant decrease with increase in temperature?

A) \mathrm{N2+O2 <=> 2NO}
B) \mathrm{H2+I2 <=> 2HI}
C) \mathrm{2SO2+O2 <=> 2SO3}
D) \mathrm{CaCO3 <=> CaO+CO2}

Q130: For the equilibrium \mathrm{A(g) <=> 2B(g)}, if K_p is small, which condition will increase the extent of reaction?

A) High pressure
B) Low pressure
C) Low temperature
D) Adding inert gas at constant volume

Q131: For a reaction at equilibrium, which of the following changes will not disturb equilibrium?

A) Increase in temperature
B) Addition of catalyst
C) Increase in pressure
D) Addition of reactant

Q132: For reaction \mathrm{A+B <=> C+D}, K_c=1. Initially [A]=[B]=[C]=[D]=1 M. The reaction quotient Q is:

A) 0.25
B) 0.5
C) 1
D) 4

Q133: For equilibrium \mathrm{NH3(g)+H2O(l) <=> NH4^+(aq)+OH^-(aq)}, which species is not included in equilibrium expression?

A) NH3
B) NH4^+
C) OH^-
D) H2O

Q134: If equilibrium constant of a reaction is independent of pressure, then the reaction must have:

A) Deltan=0
B) DeltaH=0
C) Equal concentrations
D) Equal rates always

Q135: For reaction \mathrm{2A(g) <=> B(g)}, if initially only A is present, then at equilibrium:

A) [A]=[B]
B) [A]>[B]
C) [A]<[B]
D) Only B is present

Q136: For equilibrium \mathrm{CaCO3(s) <=> CaO(s)+CO2(g)}, if temperature is increased:

A) K_p decreases
B) K_p increases
C) K_p unchanged
D) Reaction stops

Q137: For a reaction with DeltaG deg<0 but K is small at room temperature, which statement is correct?

A) Reaction is impossible
B) Reaction is spontaneous but equilibrium favors reactants
C) Reaction is non-spontaneous
D) Reaction is irreversible

Q138: For equilibrium \mathrm{A(g)+B(g) <=> C(g)}, increasing pressure will shift equilibrium to the right only if:

A) Reaction is endothermic
B) Deltan<0
C) DeltaH<0
D) K>1

Q139: For a reaction, if K_p is very large, then:

A) DeltaG deg is large and positive
B) DeltaG deg is zero
C) DeltaG deg is large and negative
D) Reaction is slow

Q140: For equilibrium \mathrm{2SO2(g)+O2(g) <=> 2SO3(g)}, addition of inert gas at constant pressure will:

A) Shift right
B) Shift left
C) No effect
D) Change K

Q141: For a reaction, if K=1 at all temperatures, which statement is correct?

A) DeltaH deg=0
B) DeltaS deg=0
C) DeltaG deg=0 at all temperatures
D) Reaction is slow

Q142: For equilibrium \mathrm{2HI(g) <=> H2(g)+I2(g)}, which change increases dissociation of HI?

A) Increase pressure
B) Decrease temperature
C) Decrease pressure
D) Add catalyst

Q143: For a reaction mixture at equilibrium, which of the following is minimum?

A) DeltaH
B) DeltaS
C) DeltaG
D) Reaction rate

Q144: For equilibrium \mathrm{A(g) <=> B(g)}, doubling pressure will:

A) Shift right
B) Shift left
C) Have no effect
D) Change K

Q145: For reaction \mathrm{A+B <=> C}, if K_c=0.01, which is correct?

A) Products dominate
B) Reactants dominate
C) Reaction is complete

D) Reaction is irreversible

Q146: For equilibrium \mathrm{2NO2(g) <=> N2O4(g)}, increasing temperature will:

A) Increase N2O4
B) Increase NO2
C) No change
D) Make K=1

Q147: If reaction quotient Q<K, then:

A) Reaction shifts backward
B) Reaction shifts forward
C) System is at equilibrium
D) Reaction stops

Q148: For a reaction, if DeltaH deg=0 but DeltaS deg>0, then:

A) K decreases with temperature
B) K increases with temperature
C) K independent of temperature
D) K=1 always

Q149: For equilibrium \mathrm{NH3(g)+HCl(g) <=> NH4Cl(s)}, the equilibrium constant expression is:

A) [NH3,HCl]
B) 1/[NH3,HCl]
C) [NH4Cl]/[NH3,HCl]
D) [NH3]/[HCl]

Q150: Which of the following indicates maximum tendency of reaction to proceed forward?

A) Large positive DeltaG deg
B) Large negative DeltaG deg
C) Small K
D) K<1

Q151: For equilibrium \mathrm{A(g)+2B(g) <=> C(g)}, decreasing pressure will:

A) Shift right
B) Shift left
C) No effect
D) Change K

Q152: For a reaction at equilibrium, which of the following is true?

A) Concentrations are equal
B) Rates are zero
C) Rates of forward and backward reactions are equal
D) Reaction stops

Q153: For equilibrium \mathrm{2A(g) <=> B(g)}, if K_c is very large, then at equilibrium:

A) Mostly A present
B) Mostly B present
C) Equal A and B

D) Only A present

Q154: For a reaction, which change alters both equilibrium position and equilibrium constant?

A) Pressure change
B) Concentration change
C) Catalyst addition
D) Temperature change

Q155: For equilibrium \mathrm{A(g) <=> B(g)}, if K_p=4 at 300 K, then DeltaG deg is:

A) Positive
B) Negative
C) Zero
D) Cannot be predicted

Q156: For reaction \mathrm{A+B <=> C+D}, if Deltan=0, which is correct?

A) K_p=K_c
B) K_p>K_c
C) K_p<K_c
D) K_p undefined

Q157: For equilibrium \mathrm{2NO2(g) <=> N2O4(g)}, if pressure is doubled at constant temperature, the equilibrium constant:

A) Doubles
B) Halves
C) Remains unchanged
D) Becomes zero

Q158: Which of the following best indicates direction of reaction at any instant?

A) K
B) DeltaG deg
C) Q
D) DeltaH

Q159: For a reaction, if Q>K, then DeltaG is:

A) Negative
B) Positive
C) Zero
D) Minimum

Q160: For equilibrium \mathrm{CO(g)+H2O(g) <=> CO2(g)+H2(g)}, which statement is correct?

A) Pressure affects equilibrium position
B) Temperature affects equilibrium constant
C) Catalyst changes equilibrium composition
D) Initial concentrations fix equilibrium