OBAFEMI AWOLOWO UNIVERSITY, ILE-IFE, NIGERIA
DEPARTMENT OF CHEMISTRY
B.Sc. Degree (Chemistry) Examination, Part II
CHM 203: Basic Physical Chemistry
Harmattan Semester Examination 2021/2022 Session

Time Allowed: $2\frac{1}{2}$ Hours

Instructions
Attempt all questions.
Constants: $R = 8.314\ J\ mol^{-1}\ K^{-1}$; $k_B = 1.385 \times 10^{-23}\ J\ K^{-1}$; Avogadro number $= 6.022 \times 10^{23}$

molecules; $\pi = 3.142$; $O_2 = 32\ g.mol^{-1}$, $CH_4 = 16\ g.mol^{-1}$; 1 atm $= 101325\ N\ m^{-2}$;

Date: 12th January, 2023

1. At what temperature is the root mean square velocity of a hydrogen molecule equal to that of an oxygen molecule at 47°C?
   A. 80 K   B. –23 K   C. 3 K   D. 20 K

2. On which factor does the average kinetic energy of gas molecules depend?
   A. Nature of the gas   B. Temperature
   C. Volume   D. Mass

3. The molar volume of ethane (C_2H_6) at 350 K is 0.1379 L mol⁻¹. Calculate the pressure of the gas using the van der Waals equation. Given that $a = 5.47$ $L^2\ atm\ mol^{-2}$, $b = 0.0651\ L\ mol^{-1}$; $R = 0.0821\ L\ atm$ $mol^{-1}K^{-1}$.
   A. 106.9 atm   B. 208.3 atm
   C. 82.8 atm   D. 98.7 atm

4. If the pressure in a closed vessel is reduced by drawing out some gas, the mean free path of the molecules
   A. increases
   B. Decreases
   C. remains the same
   D. keeps changing depending on the molar mass

5. Maxwell's speed distribution graph is drawn as shown below. The most probable speed of the gas molecules is:

A. 2 km s⁻¹
B. between 6 km s⁻¹ and 10 km s⁻¹
C. between 2 km s⁻¹ and 6 km s⁻¹
D. 4 km s⁻¹

6. The root-mean-square velocity (v_{rms}) of oxygen gas at 298 K and 1.00 atm is 482 m s⁻¹ and the mean free path (λ) is 7.10×10^{-8} m. Calculate the average time (Δt) between collisions.
   A. 1.47×10^{-10} s   B. 1.60×10^{-10} s
   C. 1.80×10^{-10} s   D. 1.59×10^{-10} s

7. Arrange the following gases: NH_3, CH_4, Ar, HBr and HCl in the order of increasing rate of effusion. Assume that all the gases are at the same temperature.
   A. $HBr > Ar > HCl > NH_3 > CH_4$
   B. $CH_4 > NH_3 > HCl > HBr > Ar$
   C. $Ar < HBr < HCl < NH_3 < CH_4$
   D. $CH_4 < NH_3 < HCl < Ar < HBr$

8. The collision diameter (d) of methane is 4.09×10^{-10} m, and the number density (ρ) is 2.43×10^{25} m⁻³ at 1.00 bar and 298 K. What is the mean free path (λ) in meters at 1.00 bar?
   A. 2.26×10^{-17} m   B. 5.54×10^{-8} m
   C. 1.74×10^{-7} m   D. 3.34×10^{-8} m

9. The density of intergalactic space is estimated to be as low as one hydrogen atom per cubic meter at 2.7 K (T). What is the mean speed (v_m) of the hydrogen atom? $R = 8.314\ J\ mol^{-1}\ K^{-1}$.
   A. 260 m s⁻¹   B. 212 m s⁻¹
   C. 239 m s⁻¹   D. 200 m s⁻¹

10. Consider the following gases: NH_3, CH_4, Cl_2, O_2. Which of the gases has the highest root-mean-square speed at any given temperature?

1

A. O_2 B. Cl_2 C. NH_3 D. CH_4

11. 1 mole of NH_3 gas at $27°C$ is expanded in reversible adiabatic condition to make volume 8 times (R = $8.314 \, J \, mol^{-1} \, K^{-1}$; $\gamma = 1.33$). Final temperature and work done by the gas respectively are to the nearest 10 unit:
    A. 150 K, 3750 J   B. 150 K, 4140 J
    C. 150 K, 4140 J   D. 200 K, 4140 J

12. The enthalpy of vaporization of a substance is 8400 J mol^{-1} and its boiling point is $-173°C$. The entropy change for vaporization is:
    A. $84 \, J \, mol^{-1} \, K^{-1}$ B. $21 \, J \, mol^{-1} \, K^{-1}$
    C. $49 \, J \, mol^{-1} \, K^{-1}$ D. $12 \, J \, mol^{-1} \, K^{-1}$

13. $(\Delta U - \Delta H)$ for the formation of NH_3 from N_2 and H_2 is:
    A. $-2RT$ B. $2RT$ C. RT D. $\frac{1}{2}RT$

14. The work done during the expansion of a gas from a volume of $4 dm^3$ to $6 dm^3$ against a constant external pressure of 3 atm is
    A. $-6 J$ B. $-608 J$ C. $+304 J$ D. $-304 J$

15. Consider the following reaction occurring in an automobile
    $2 C_8H_{18}(g) + 25 O_2(g) \rightarrow 16 CO_2 + 18 H_2O(g)$ the sign of ΔH, ΔS and ΔG would be
    A. $+, -, +$ B. $-, +, -$ C. $-, +, +$ D. $+, +, -$

16. Consider the reaction at 300 K $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$; $\Delta H° = -185 \, kJ$ If 2 mole of H_2 completely react with 2 mole of Cl_2 to form HCl. What is $\Delta U°$ for this reaction?
    A. 0   B. $-185 \, kJ$ C. $370 \, kJ$ D. $-370 \, kJ$

17. The enthalpies of formation of N_2O and NO at 298 K are 82 and 90 kJ mol^{-1}. The enthalpy of the reaction:
    $N_2O(g) + \frac{1}{2}O_2(g) \rightarrow 2NO(g)$
    A. $-8 \, kJ$ B. $-98 \, kJ$ C. $8 \, kJ$ D. $98 \, kJ$

18. One mole of an ideal gas is allowed to expand freely and adiabatically into vacuum until its volume has doubled. The expression which is not true concerning statement is
    A. $H = 0$ B. $S = 0$ C. $E = 0$ D. $W = 0$

19. What will be the heat of formation of methane, if the heat of combustion of carbon is '$-x$' kJ, heat of formation of water is '$-y$' kJ and heat of combustion of methane is '$-z$' kJ?
    A. $(-x-y+z) \, kJ$ B. $(-z-x+y) \, kJ$
    C. $(-x-2y-z) \, kJ$ D. $(-x-2y+z) \, kJ$

20. During isothermal expansion of an ideal gas, its A. internal energy increases
    B. enthalpy decreases
    C. enthalpy remains unaffected
    D. enthalpy reduces to zero.

21. Two electromagnetic radiations have wave numbers in the ratio 2:3. Their energies per quanta will be in the ratio
    A. 3:2
    B. 9:4
    C. 4:9
    D. 2:3

22. Bond dissociation on energy of Br_2 is 200 kJ/mole. The longest wavelength of photon that can break this bond would be ($N_A \times hc = 0.12 \, J$)
    A. $6.0 \times 10^{-5} \, m$
    B. $1.2 \times 10^{-5} \, m$
    C. $6.0 \times 10^{-7} \, m$
    D. $1.2 \times 10^{-12} \, m$

23. Radiations of frequency, (v) are incident on a photosensitive metal. The maximum kinetic energy of photoelectrons is E. When the frequency of the incident radiations is doubled, then what is the maximum kinetic energy of the photoelectrons?
    A. $2E$
    B. $E/2$
    C. $E + hv$
    D. $E - hv$

24. In order to increase the kinetic energy of ejected photoelectrons, there should be an increase in
    A. intensity of radiation.
    B. wavelength of radiation.
    C. frequency of radiation.
    D. both wavelength and intensity of radiation.

25. The amount of energy released when an electron jumps from the seventh excited state to the first excited state in H atom is ($R_H hc = 2.179 \times 10^{-18} \, J$, 1 eV = $1.6 \times 10^{-19} \, J$)
    A. 3.33 eV
    B. 3.19 eV

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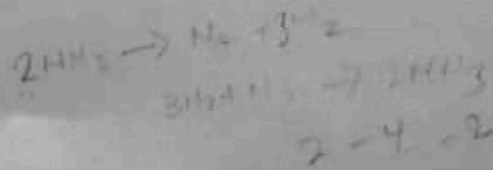
C. 13.32 eV
D. 6.52 eV

26. The wavelength of a spectral line obtained by an electronic transition is inversely proportional to
   A. the number of transit electrons
   B. the nuclear charge of the atom.
   C. the energy difference of the related energy levels.
   D. Speed of the transit electron.

27. If wavelength for which the maximum energy emitted by black body is 6590Å, the temperature of black body is (Given that the Wien's constant σ = 0.0029 m.K)
   A. 4400 K
   B. 440 K
   C. 44 K
   D. 4.40 K

28. A radio station is emitting the radiations of frequency 2×10^4 Hz. If its frequency is doubled,
   A. wavelength will be doubled.
   B. energy per quanta will be doubled.
   C.
   D. energy per quanta will be quadrupled.

29. The wavelength of Brackett line during transition from 6th higher orbit is (R_H = 1.097 × 10⁷ m)
   A. 16250 Å
   B. 26250 Å
   C. 36250 Å
   D. 46250 Å

30. The threshold wavelength of a metal is 124 Å, find the work-function of that metal (hc = 1.9865 × 10⁻²⁵ J.m)
   A. 200 J
   B. 100 J
   C. 50 J
   D. 25 J

31. For the hypothetical reaction A + 3B → 2C, the rate should be expressed as
   A. $rate = \Delta \frac{[A]}{\Delta t}$
   B. $rate = -\Delta \frac{[C]}{\Delta t}$
   C. $rate = -3\left(\Delta \frac{[B]}{\Delta t}\right)$

D. $rate = \left(\frac{1}{2}\right)\left(\Delta \frac{[C]}{\Delta t}\right)$

32. A certain first-order reaction A → B is 25% complete in 42 min at 25 °C. What is the half-life of the reaction?
   A. 21 min
   B. 42 min
   C. 84 min
   D. 101 min

33. At a certain temperature, the reaction between NO and O_2 to form NO_2 is fast, while that between CO and O_2 is slow. It may be concluded that
   A. NO is more reactive than CO.
   B. CO is smaller in size than NO
   C. activation energy for the reaction 2NO + O_2 → $2NO_2$ is less.
   D. activation energy for the reaction 2NO + O_2 → $2NO_2$ is high.

34. Which statement best describes the variation of the rate constant of a reaction with temperature?
   A. The rate constant does not change with temperature because it is
   B. increasing temperature because fewer molecules are able to adopt the required orientation at higher temperature.
   C. The rate constant typically increases with increasing temperature because increasing the temperature increases the fraction of collision that results in reaction.
   D. The rate constant typically increases with increasing temperature because most reactions become more favourable as the temperature increases.

35. The activation energy for the thermal decomposition of acetaldehyde is 71 kJ/mol. How many times greater is rate constant for this reaction at 170 °C than at 150 °C?
   A. 1.1
   B. 2.5
   C. 4.0
   D. 5.0

36. The isomerization of cyclopropane follows first order kinetics. The rate constant at 700 K is 6.20 × 10⁻⁴ min⁻

3

1', and the half-life at 760 K is 29.0 min. Calculate the activation energy for this reaction.

A. 5 kJ/mol
B. 27 kJ/mol
C. 160 kJ/mol
D. 270 kJ/mol

37. The activation energy for the reaction $O + O_3 \rightarrow 2O_2$ is 25 kJ/mol, and the enthalpy change is $\Delta H = -388$ kJ/mol. What is the activation energy for the decomposition of O_2 by the reverse reaction?

A. 413 kJ
B. 388 kJ
C. 363 kJ
D. 50 kJ

38. The activation energy of a certain uncatalyzed reaction is 64 kJ/mol. In the presence of a catalyst, the E_a is 55 kJ/mol. How many times faster is the catalysed than the uncatalyzed reaction at 400°C? Assume that the frequency factor remains the same.

A. 5
B. 1.16
C. 15
D. 2

39. The following reaction in aqueous solution was found to be first order in [OH⁻], first order in [C_2H_5Br], and inverse first order in Br⁻

$C_2H_5Br + OH^- \rightarrow C_2H_5OH + Br^-$

Which one of the following mechanisms is consistent with the observed reaction order?

A. $C_2H_5Br \rightleftharpoons C_2H_5^+ + Br^-$ fast
   $C_2H_5^+ + OH^- \rightarrow C_2H_5OH$ slow

B. $C_2H_5Br + H_2O \rightarrow C_2H_5OH + H^+ + Br^-$ slow
   $H^+ + OH^- \rightarrow H_2O$ fast

C. $C_2H_5Br \rightleftharpoons C_2H_5^+ + Br^-$ slow
   $C_2H_5^+ + OH^- \rightarrow C_2H_5OH$ fast

D. $C_2H_5Br \rightleftharpoons C_2H_5^+ + Br^-$ slow
   $OH^- + Br^- \rightarrow HOBr$ fast
   $HOBr + C_2H_5^+ \rightarrow C_2H_5OH + Br^-$ fast

40. The rate law for the reaction $H_2O_2 + 2H^+ + 2I^- \rightarrow I_2 + 2H_2O$ is rate = $k[H_2O_2][I^-]$. The following mechanism has been suggested.

$H_2O_2 + I^- \rightarrow HOI + OH^-$ slow
$OH^- + H^+ \rightarrow H_2O$ fast
$HOI + H^+ + I^- \rightarrow I_2 + H_2O$ fast
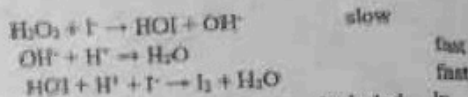
Identify all intermediates included in this mechanism.

A. H^+ and I^-
B. H^+ and HOI
C. HOI and OH^-
D. H_2O and OH^-

41. Butyric acid is a weak electrolyte and can be denoted by HA. Calculate the limiting ionic conductivity, $\lambda_0(A^-)$ of butyrate ion, if the limiting ionic conductivity at very large dilution for H^+, $\lambda_0(H^+)$ is 34.98 mS.m³.mol⁻¹ and the limiting molar conductivity, Λ_0 of the electrolyte is 38.24 mS.m².mol⁻¹ at 25°C.

A. 73.22 mS.m².mol⁻¹
B. 3.26 mS.m².mol⁻¹
C. 36.61 mS.m².mol⁻¹
D. 1.63 mS.m².mol⁻¹

42. Calculate the molar conductivity of a weak electrolyte if its specific conductivity is 4.436 mS.m⁻¹ at 0.001 mol dm⁻³.

A. 4.436 mS.m².mol⁻¹
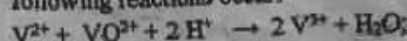B. 4436 mS.m².mol⁻¹
C. 44.36 mS.m².mol⁻¹
D. 443.6 mS.m³.mol⁻¹

43. Calculate the dissociation constant (K_A) at 25°C for a weak electrolyte (HA), if its specific conductivity is 14.31 mS.m⁻¹ at 0.01 mol dm⁻³ and its molar conductivity at infinite dilution is 38.24 mS.m².mol⁻¹ at 25°C.

A. 1.45×10^{-2}
B. 1.45×10^{-4}
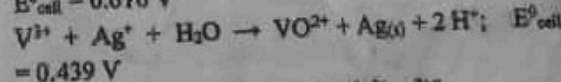C. 1.45×10^{-3}
D. 1.45×10^{-5}

44. For a electrochemical cell $Zn | Zn^{2+} (C_1 M) || Cu^{2+} (C_2 M) | Cu$, the decrease in free energy at a given temperature is a function of

A. $\ln C_1$
B. $\ln C_2$
C. $\ln C_2.C_1$
D. $\ln C_1/C_2$

45. Two electrochemical cells are assembled in which the following reactions occur:

$V^{2+} + VO^{2+} + 2H^+ \rightarrow 2V^{3+} + H_2O$; $E^0_{cell} = 0.616$ V
$V^{3+} + Ag^+ + H_2O \rightarrow VO^{2+} + Ag_{(s)} + 2H^+$; $E^0_{cell} = 0.439$ V

If $E^0_{Ag^+|Ag} = 0.799$ V, what is $E^0_{V^{3+}|V^{2+}}$?

A. −0.256 V
B. +0.256 V
C. +1.854 V
D. −1.854 V

4

46. The theoretical efficiency of a hypothetical cell is about 84% which involves the following reaction:
$$A_{(s)} + B^{2+}_{(aq)} \rightarrow A^{2+}_{(aq)} + B_{(s)}; \Delta H = -285\ kJ,$$
then, the standard EMF of the cell is
A. 1.10 V   B. 1.24 V   C. 2.48 V   D. 2.20 V

47. An electrochemical cell reaction is said to be spontaneous when
A. Temperature is constant
B. EMF of the cell is positive
C. EMF of the cell is negative
D. No current flows through the cell

48. Which of the following information is correct about the cell constant, K
A. It is only dependent on electrode area and separation distance
B. It is dependent on electrode area, separation distance and angle
C. It is dependent on electrode area, separation distance and electric field
D. It is independent of electrode area

49. According to Kohlrausch, the plot of molar conductivity versus
A. concentration must give a straight line for all electrolytes
B. limiting ionic conductivity must give a straight line for strong electrolytes
C. square root of concentration must give a straight line for weak electrolytes
D. square root of concentration must give a straight line for strong electrolytes

50. Derive the expression for the molar conductivity at infinite dilution for the weak electrolyte (HA) given the following information:
$\Lambda_o(KCl) = a\ Sm^2mol^{-1}$;
$\Lambda_o(HCl) = 3a\ Sm^2mol^{-1}$;
$\Lambda_o(AK) = 53a^2\ Sm^2mol^{-1}$
A. $a(53a+2)$ mS.cm².mol⁻¹
B. $10^7 a(53a+2)$ mS.cm².mol⁻¹
C. $(53a+2)$ mS.cm².mol⁻¹
D. $10^3 a(53a+2)$ mS.cm².mol⁻¹

51. The equivalent conductance of 0.1 M acetic acid solution is 10 S.cm².eq⁻¹ and its corresponding value at infinite dilution is 200 S.cm².eq⁻¹. Calculate the pH of the solution.

A. 3.2   B. 3.5   C. 2.3   D. 1.3

52. At 25°C, the molar conductance at infinite dilution for HCl solution is 4.25 x 10⁻² Ω⁻¹m²mol⁻¹, while its specific conductance is 382.5 Ω⁻¹m⁻¹. If the degree of dissociation is 90%, the molarity of the solution is
A. 10.0 M   B. 0.1 M   C. 9.0 M   D. 0.9 M

53. Resistance of 0.2 M solution of an electrolyte is 50 Ω. The specific conductance of the solution is 1.4 S.m⁻¹. The resistance of 0.5 M solution of the same electrolyte is 280 Ω. The molar conductance of the 0.5 M solution of the electrolyte (S.m².mol⁻¹) is
A. 5 x 10⁻⁵   B. 5 x 10³   C. 5 x 10⁻⁴   D. 5 x 10⁻²

54. Calculate the speed of Na⁺ ion when a potential of 19.3 V is applied at the cell electrodes distance of 5 cm. The limiting molar ionic conductivity is 50.0 Ω⁻¹cm²mol⁻¹.
A. 2 x 10⁻² cm/s   B. 2 x 10⁻⁵ cm/s
C. 2 x 10⁻⁴ cm/s   D. 2 x 10⁻³ cm/s

55. Which of the following statement(s) about voltaic cell is/are correct?
I. electric current is generated by spontaneous cell reaction
II. It is an assemblage of electrodes and electrolyte
III. It does not permit charge transfer
IV. It has a positive cathode and a negative anode
A. I, II and IV only   B. I and IV only
C. II and IV only   D. I, II and III only

56. For the reversible reaction: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ at 500°C, the value of K_P is 1.44 x 10⁻⁵ when partial pressure is measured in atmospheres. The Corresponding value of K_C for the reaction (with concentrations in mol.L⁻¹) is
A. $\frac{1.44\times10^{-5}}{(0.082\times500)^{-2}}$
B. $\frac{1.44\times10^{-5}}{(0.082\times773)^{-2}}$
C. $\frac{1.44\times10^{-5}}{(8.314\times500)^{-2}}$
D. $\frac{1.44\times10^{-5}}{(0.082\times500)^2}$

57. Given that:
$XeF_6 + H_2O \rightleftharpoons XeOF_4 + 2HF;\ K=\alpha$
$XeO_4 + XeF_6 \rightleftharpoons XeOF_4 + XeO_3F_2;\ K=\beta$
What will be the equilibrium constant for the reaction:
$XeO_4 + 2HF \rightleftharpoons XeO_3F_2 + H_2O$
A. $\frac{\beta}{\alpha}$ B. $\beta-\alpha$ C. $\frac{\alpha}{\beta}$ D. $\alpha-\beta$

58. For the reversible reaction $P + Q \rightleftharpoons R$, if the concentrations of the reactants are doubled at

5

definite temperature, then, the value of the equilibrium constant would

A. be halved   B. be one-fourth

C. remain the same   D. be doubled

59. The approximate value of $\frac{K_p}{K_c}$ for the reaction: $NO + \frac{1}{2}O_2 \rightleftharpoons NO_2$ is

A. $\sqrt{RT}$ B. RT C. $\frac{1}{RT}$ D. $\frac{1}{\sqrt{RT}}$

60. For a reversible reaction, the rate constant for the forward reaction is one-tenth that of the backward reaction. The equilibrium constant for the reaction will be

A. 0.1   B. 10   C. 100   D. 0.01

61. NO_2 is involved in the formation of smog and acid rain. It is formed mainly as:
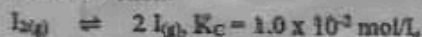
$NO_{(g)} + O_{3(g)} \rightleftharpoons NO_{2(g)} + O_{2(g)}$

$K_c = 6.0 \times 10^{34}$

The air over a metropolitan city contained 1.0×10^{-5} M (NO), 1.0×10^{-6} M (O_3), 2.5×10^{-4} (NO_2) and 8.2×10^{-3} (O_2). The concentrations of the species suggest that

A. more NO and O_3 tend to be formed

B. more NO_2 and O_2 tend to be formed

C. more NO_2 and O_2 tend to be formed

D. No tendency to change as the reaction is already at equilibrium
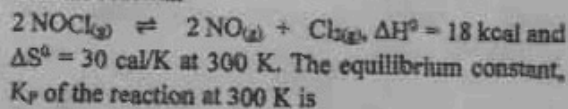
62. For the reaction:

$I_{2(g)} \rightleftharpoons 2 I_{(g)}$, $K_c = 1.0 \times 10^{-2}$ mol/L.

What volume of the vessel should be taken so that at equilibrium α mole of I_2 and β mole of I are present?

A. αβ Litre   B. $100\alpha\beta^2$ cm³

C. $\frac{10\beta^2}{\alpha}$ dm³   D. $\frac{100\beta^2}{\alpha}$ dm³

63. The equilibrium constant for the reaction: $3 C_2H_2 \rightleftharpoons C_6H_6$ is 4.0 at a specific temperature. If the equilibrium concentration of C_2H_2 is 2ξ mol/dm³, then the concentration of C_6H_6 (in dm³) at equilibrium is:

A. $16\xi^3$ B. $32\xi^3$ C. $4\xi^3$ D. $8\xi^3$

64. For the reaction

$2 NOCl_{(g)} \rightleftharpoons 2 NO_{(g)} + Cl_{2(g)}$, $\Delta H^0 = 18$ kcal and $\Delta S^0 = 30$ cal/K at 300 K. The equilibrium constant, K_p of the reaction at 300 K is

A. e^{15} B. e^{-15} C. e^{-18} D. e^{-12}

65. The equilibrium constants for the reaction: $A_2 \rightleftharpoons 2 A$ at 500 K and 1000 K are 1×10^{-10} and 1×10^{-5}, respectively. Which of the following is correct about the reaction?

A. Forward reaction is exothermic & $\Delta H = 5R\ln 10$

B. Forward reaction is endothermic & $\Delta H = 10R\ln 10$

C. Forward reaction is exothermic & $\Delta H = 10R\ln 10$

D. Forward reaction is endothermic & $\Delta H = 5R\ln 10$

66. ΔG^0 for the reaction $X + Y \rightleftharpoons Z$ is -9.212 kcal at 1000 K. The equilibrium constant for the reverse mode of the reaction is

A. 0.01   B. 0.1   C. 10   D. 100

67. At 717 K, HI is 50% dissociated. If initially 5 moles of HI are taken, the number of moles of HI at equilibrium is

A. 0.5 moles   B. 3.5 moles

C. 2.5 moles   D. 5 moles

68. For the reaction $PCl5(g) \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$, if initial mole of PCl_5 is ξ, the degree of dissociation of PCl_5 is α and the total pressure at equilibrium is P, then the product of equilibrium partial pressure of PCl_5 and inverse of equilibrium total pressure is

A. $\frac{1-\alpha}{1+\alpha}$ B. $\frac{1+\alpha}{1-\alpha}$ C. $\frac{\alpha}{1+\alpha}$ D. $\frac{1}{1+\alpha}$

69. Which of the following hypothetical reactions will be favoured (in the forward direction) by increase in temperature as well as pressure?

A. $A_{(l)} + 2 B_{(g)} \rightleftharpoons C_{(g)} + D_{(g)}$; $\Delta H = +ve$

B. $A_{(l)} + 2 B_{(g)} \rightleftharpoons 2 C_{(g)} + D(g)$; $\Delta H = +ve$

C. $2 A_{(g)} + B_{(l)} \rightleftharpoons 2 C_{(g)} + D_{(l)}$; $\Delta H = +ve$

D. $2 A_{(l)} + 2 B_{(g)} \rightleftharpoons 2 C(g) + 2 D(g)$; $\Delta H = -ve$

70. Consider the reaction: $H_2O_{(l)} \rightleftharpoons H_2O_{(g)}$

Which of the following correctly expresses the effect on the system when pressure is increased at equilibrium?

A. the boiling point of $H_2O_{(l)}$ will increase

B. the boiling point of $H_2O_{(l)}$ will decrease

C. the boiling point of $H_2O_{(l)}$ will not be affected

D. all $H_2O_{(l)}$ will vaporize

6