CHEMISTRY

BOOKS - PATHFINDER CHEMISTRY (BENGALI ENGLISH)

EQUILIBRIUM

QUESTION BANK

1. For the reaction $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$ which one is correct.

A. $K_p = Pcaco_3$

B. $K = Pco_2$

C. $K_p = \frac{1}{Pcaco_3}$

D. $K_p = \frac{1}{Pco_2}$

Answer: B

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2. For which of the following a reaction would proceed to completion.

A. $K = 10^2$

B. $K = 10^{-2}$

C. K=10

D. K=1

Answer: A

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3. Addition of inert gas at constant volume to the equilibrium $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ results.

A. Increase in NH_3 production

B. Less production of NH_3

C. No effect on the reaction

D. Increase in magnitude of K_p

Answer: C

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4. Production of SO_3 will be maximum for the exothermic reaction $2SO_2 + O_2 \Leftrightarrow 2SO_3$ when.

A. temperature is increased at constant pressure

B. pressure is increased and temperature is decreased

C. both temperature and pressure are increased

D. both temperature and pressure are decreased

Answer: B

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5. $H_2 + l_2 \Leftrightarrow 2HL$, unit of equilibrium constant of the reversible reaction.

A. $Mo \leq^{-1} litre$

B. $Mo \leq^{-2} litre$

C. $Mo \leq litre^{-1}$

D. None of these

Answer: D

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6. Which equilibrium will shift to the right by temperature increase.

A. $CO(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g)$

B. $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

C. $H_2O(g) \Leftrightarrow H_2(g) + \frac{1}{2}O_2(g)$

D. $4HCl + O_2(g) \Leftrightarrow 2H_2O(g) + Cl_2(g)$

Answer: C

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7. $3A + 2B \to 2C$, K_c for this reaction is

A. $\frac{[3A][2B]}{C}$

B. $\frac{[A]^3[B]}{C}$

C. $\frac{[C]^2}{[A]^3[B]^2}$

D. $\frac{[C]}{[3A][2B]}$

Answer: C

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8. If $K_p = K_c \times (RT)^{\times}$ for the reaction $SO_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow SO_3(g)$.

Then x will be

A. -1

B. $-\frac{1}{2}$

C. $\frac{1}{2}$

D. 1

Answer: B

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9. Application of pressure in solid of liquid equilibrium would cause

A. decrease in amount of solid

B. decrease in amount of liquid

C. temperature will increase

D. temperature will decrease

Answer: A

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10. For $Hl(g) = \frac{1}{2}H_2(g) + \frac{1}{2}l_2(g)$ magnitude of K=8, then magnitude of equilibrium constant for $H_2(g) + l_2(g) = 2Hl(g)$ is

A. 16

B. $\frac{1}{8}$

C. $\frac{1}{16}$

D. $\frac{1}{64}$

Answer: D

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11. Indicator used in the titration of Na_2CO_3 and HCl is

A. Methyl Orange

B. Methylene Blue

C. Phenolphthalein

D. Litmus

Answer: A

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12. Addition of sodium Acetate to 0.1(M) acetic will cause

A. increase in pH

B. decrease in pH

C. unchanged pH

D. pH can not be ascertained

Answer: A

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13. An acidic buffer solution can be prepared by mixing the solution of

A. $CH_3COONa + CH_3COOH$

B. $NH_4Cl + NH_4OH$

C. $H_2SO_4 + Na_2SO_4$

D. $NaCl + NaOH$

Answer: A

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14. Which of the following salt solution in water is basic?

A. NaCl

B. NaOCl

C. $NaHSO_4$

D. NH_4NO_3

Answer: B

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15. At $90^{\circ} C$, pure water has $\left[H_3O^+\right] = 10^{-6}$ mol/L. What is the value of K_w at $90^{\circ} C$

A. 10^{-6}

B. 10

C. 10^{-12}

D. 10^{-14}

Answer: C

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16. pH of 0.05(M) calcium acetate solution $(pK_a = 4.74)$ is -

A. 8.72

B. 7

C. 8.87

D. 1.3

Answer: C

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17. Equal volume of two solutions of pH 3 and 4 are mixed. The pH of the final solution will be

A. 7

B. 3.3

C. 2.98

D. 3.26

Answer: D

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18. In the titration of weak acid against strong base, at the half equivalence point (half-neutralization) :

A. $pH = \frac{1}{2} pK_a$

B. pH=pKa

C. pH=2pKa

D. None of these

Answer: B

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19. The solubility of A_2X_3 is 'y' mol dm^{-3} its solubility product is -

A. $6y^4$

B. $64y^4$

C. $36y^5$

D. $108y^5$

Answer: D

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20. The solubility of $PbCl_2$ is

A. $\sqrt{K}_{sp}$

B. $(K_{sp})^{\frac{1}{3}}$

C. $\left(\frac{K_{sp}}{4}\right)^{\frac{1}{3}}$

D. $(8K_sp)^{\frac{1}{2}}$

Answer: C

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21. Conjugate base of HPO_4^{-2} is :

A. PO_4^{-3}

B. $H_2PO_4^-$

C. H_3PO_4

D. H_3PO_3

Answer: A

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22. Ostwald's dilution law is applicable to :

A. strong electrolytes only

B. weak electrolytes only

C. non electrolytes only

D. strong and weak electrolytes both

Answer: B

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23. Dissociation constant of a weak acid is K_a and its concentration is C, the concentration of hydrogen ion is

A. $\sqrt{\frac{K_a}{C}}$

B. $\frac{C}{K_a}$

C. $K_a. C$

D. $\sqrt{K}a. c$

Answer: D

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24. Which statement is correct :

A. pK_w increases with increase in temp.

B. pK_w decreases with increase in temp.

C. pK_w is 14 in all temp.

D. at all temp. $pK_w = pH$.

Answer: B

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25. At $50^{\circ} C$ pK_w of water is 13.26 value of its pH

A. 6

B. 7

C. 6.63

D. 13.26

Answer: C

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26. Solubility of $Ca(OH)_2$ is $\sqrt{3}$, value of its solubility product is

A. 3

B. 27

C. $\sqrt{3}$

D. $12\sqrt{3}$

Answer: D

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27. In which of the reaction $K_p = K_c$

A. $2NOCl(g) \Leftrightarrow 2NO(g) + Cl_2(g)$

B. $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

C. $H_2(g) + Cl_2(g) \Leftrightarrow 2HCl(g)$

D. $COCl_2(g) \Leftrightarrow CO(g) + Cl_2(g)$

Answer: C

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28. Equilibrium constant of which reaction is $\frac{[MX_3]^2}{[MX_2]^2[X_2]}$

A. $MX_3 \Leftrightarrow MX_2 + \frac{1}{2}X_2$

B. $2MX_3 \Leftrightarrow 2MX_2 + X_2$

C. $2MX_2 + X_2 \Leftrightarrow 2MX_3$

D. $MX_2 + \frac{1}{2}X2 \Leftrightarrow MX_3$

Answer: C

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29. Which of the following mixtures form a buffer solution?

A. $NaOH + CH_3COOH(1:1mo \leq)$

B. $NH_4OH + HCl(1:1mo \leq)$

C. $CH_3COOH + NaOH(2:1mo \leq)$

D. $CH_3COOH + NaOH(1:2mo \leq)$

Answer: C

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30. pH of 10^{-8} molar solution of Hcl in water is

A. 8

B. 6

C. between 6 and 7

D. between 7 and 8

Answer: C

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31. If the solubility of $Ca_3(PO_4)_2$ in water be y mol L^{-1}, the solubility product of the salt will be -

A. $6y^4$

B. $36y^4$

C. $64y^5$

D. $108y^5$

Answer: D

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32. Which one among the following ions is the strongest base

A. CH_3COO^-

B. `CO_3^(2-)

C. `SO_4(2-)

D. NO_3^-

Answer: B

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33. If a standard solution of $NaOH$ is kept in open air for some hours -

A. A precipitate forms

B. Strength of the solution decreases

C. Strength of the solution increases

D. Strength remains unchanged

Answer: B

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34. For which of following gaseous reactions Kp less than Kc

A. $N_2O_4 \Leftrightarrow 2NO_2$

B. $2Hl \quad \text{if} \quad H_2 + l_2$

C. $2SO_2 + O_2 \Leftrightarrow 2SO_3$

D. $N_2 + O_2 \Leftrightarrow 2NO$

Answer: C

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35. The unit of K_c for the reaction $2SO_2 + O_2 \Leftrightarrow 2SO_3$ is `

A. $molL^{-1}$

B. (mol $L^{-1})^2$

C. L mol^{-1}

D. (L $mol^{-1})^2$

Answer: C

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36. The chemical reaction $A \Leftrightarrow B$ remains in equilibrium when

A. A is completely converted to B

B. 50% of A is $converted \rightarrow B$

C. $Only 10\% of A is converted \rightarrow B$

D. The rate of conversion of A to B is same as the rate of conversion of B to A

Answer: D

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37. For the reaction $\underset{(g)}{CO} + \underset{(g)}{Cl_2} \Leftrightarrow \underset{(g)}{COCl_2}$, the value of $\frac{K_p}{K_c}$ is

A. 1/RT

B. 1

C. $\sqrt{RT}$

D. RT

Answer: A

38. The equilibrium constant for the reactions -

(i) $N_2 + 3H_2 \Leftrightarrow 2NH_3$

(ii) $N_2 + O_2 \Leftrightarrow 2NO$ and

(iii) $H_2 + \frac{1}{2}O_2 \Leftrightarrow H_2O$ are K_1, K_2 and K_3 respectively.

The equilibrium constant of the reaction $2NH_3 + \frac{5}{2}O_2 \Leftrightarrow 2NO + 3H_2O$ in terms of K_1, K_2 and K_3 is

A. $K_1\frac{K_2}{K_3}$

B. $\frac{K_1K_3^2}{K_2}$

C. $\frac{K_2K_3^3}{K_1}$

D. $K_1K_2K_3$

Answer: C

39. At $25^{\circ}C$ the value of K_c, for the reaction $\frac{1}{2}N_2 + O_2 \Leftrightarrow NO_2$ is $2 \times 10(-4)$, what will be the value of K_c for $2NO_2 \Leftrightarrow N_2 + 2O_2$

A. 2×10^2

B. $\frac{1}{4} \times 10^8$

C. 2×10^4

D. 10^4

Answer: B

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40. 1:1 mole of A are mixed with 2.2 mole of B and the mixture is kept in one litre flask till the equilibrium is reached $A + 2B \Leftrightarrow 2C + D$.

At equilibrium 0.2 mole of C is formed. The equilibrium constant in presence of catalyst at 2000K is

A. 0.001

B. 0.002

C. 0.003

D. 0.004

Answer: A

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41. The solubility product of Hg_2l_2 is equal to -

A. $[Hg^+][l^-]$

B. $[Hg^{+2}][l^-]$

C. $[Hg_2^{2+}][l^-]^2$

D. $[Hg^+]^{-2}[l^-]^{-2}$

Answer: C

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42. Which buffer solution comprising of the following has its pH value greater than 7 -

A. $CH_3COOH + CH_3COONa$

B. $HCOOH + HCOOK$

C. CH_3COONH_4

D. $NH_4OH + NH_4Cl$

Answer: D

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43. The correct order of increasing basicily of the given conjugate bases (R=CH_3) is -

A. $RCOO^{-} < HC \equiv C^{-} < NH_2^{\prec} R^{-}$

B. $RCOO^{-} < HC \equiv C^{-} < R^{-} < NH_2^{-}$

C. $R^{-} < HC \equiv C^{-} < RCOO(-) < NH_2^{-}$

D. $RCOO^- < NH_2^- < HC \equiv C^- < R^-$

Answer: A

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44. The weight of oxalic acid that will be required to prepare a 1000 ml (N/20) solution is -

A. $\frac{126}{100}g$

B. $\frac{63}{40}g$

C. $\frac{63}{20}g$

D. $\frac{126}{20}g$

Answer: C

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45. Total volumes of molar hydrochloric acid and sulphuric acid are neutralized by dilute NaOH solution and $\times$ kcal and y kcal of heat are liberated respectively. Which of the following is true -

A. $\times\ = y$

B. $\times\ = \frac{y}{2}$

C. $\times\ = 2y$

D. None of these

Answer: B

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46. Which indicator is suitable for the titration of a weak acid with strong base -

A. Methyl orange

B. Methyl red

C. Phenolphthalein

D. Bromothymol blue

Answer: C

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47. Aqueous solution of which of the following ions is alkaline?

A. NH_4^+

B. Na^+

C. CO_3^{2-}

D. NO_3^-

Answer: C

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48. Aqeous solution of aluminium chloride is acidic, because of

A. Cationic hydrolysis

B. Anionic hydrolysis

C. Both cationic and anionic hydrolysis

D. Dissociation

Answer: A

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49. The increasing order of pH of 0.1M solution of NaCl, NH_4Cl, NaCN and HCl is

A. $NaCl < NH_4Cl < NaCN < HCl$

B. $HCl, NH_4Cl < NaCl < NaCN$

C. $NaCN < NH_4Cl < NaCl < HCl$

D. $HCl < NaCl < NaCN < NH_4Cl$

Answer: B

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50. AgCN is sparingly soluble salt. Its solubility increases when KCN is added in its aqueous solution. Because -

A. Solubility of a sparingly soluble salt increases due to common ion effect

B. AgCN undergoes hydrolysis in presence of KCN

C. Complex salt is produced due to the reaction between AgCN and KCN

D. A double salt is produced due to the reaction between AgCN and KCN

Answer: C

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51. In which of the following pair of compounds common ion effect is observed -

A. $BaCl_2 + Ba(NO_3)2$

B. $NH_4OH + NH_4Cl$

C. $NaCl + HCl$

D. $AgCN + KCN$

Answer: D

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52. 10ml 0.05 N H_2SO_4 solution is mixed with 10 ml 0.1 N $NaOH$ solution. The pH of the final mixture is

A. 10.5

B. 12.4

C. 6.4

D. 7.8

Answer: B

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53. The pH of an acid solution is 6. If the solution is diluted 100 times, the approximate pH becomes -

A. 6

B. 8

C. 9

D. 6.96

Answer: D

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54. H_3PO_4 (Phosphoric acid) is a tribasic acid. In aqueous solution it ionises in the following three steps

$H_3PO_4 \overset{k_1}{\Longleftrightarrow} H^+ + H_2PO_4^-$, $H_2PO_4^- \overset{k_2}{\Longleftrightarrow} H^+ + HPO_4^{2-}$, $HPO_4^{2-} \overset{k_3}{\Longleftrightarrow} H^+ + PO_4^{3-}$. Here K_1, K_2, K_3 are the dissociation constants of the respective three steps. The correct order of the values of three constants is

A. $K_1 < K_2 < K_3$

B. $K_1 < K_2 < K_3$

C. $K_1 < K_2 < K_3$

D. $K_1 < K_2 < K_3$

Answer: B

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55. Which one of the following is not a protonic acid -

A. $SO_2(OH)_2$

B. $B(OH)_3$

C. $PO(OH)_3$

D. $SO(OH)_2$

Answer: B

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56. In a reversible chemical reaction at equilibrium, if the concentration of any one of the reactants is doubled then the equilibrium constant will -

A. Also be doubled

B. be halved

C. remain the same

D. become one fourth

Answer: C

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57. The equilibrium constant of a reaction may be written as :

A. $K = e^{\frac{-\Delta G}{RT}}$

B. $K = e^{\frac{-\Delta G^{\circ}}{RT}}$

C. $K = e^{\frac{-\Delta H}{RT}}$

D. $K = e^{\frac{-\Delta H^{\circ}}{RT}}$

Answer: B

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58. In a buffer solution containing equal concentration of B^{-} and HB, the K_b for B^{-} is 10^{-10}. The pH of buffer solution is

A. 4

B. 10

C. 7

D. 6

Answer: A

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59. Which of these is least likely to act as Lewis base -

A. CO

B. F^{-}

C. BF_3

D. PF_3

Answer: C

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60. Which of the following affects the value of equilibrium constant -

A. Presence of catalyst

B. Increase in temperature

C. Increase in pressure

D. Elimination of a product

Answer: B

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61. If K_1 and K_2 are the respective equilibrium constants for the two reactions

(i) $XeF_6(g) + H_2O(g) \Leftrightarrow XeOF_4(g) + 2HF(g)$

(ii) $XeO_4(g) + XeF_6(g) \Leftrightarrow XeOF_4(g) + XeO_3F_2(g)$

The equilibrium constant for the reaction $XeO_4(g) + 2HF(g) \Leftrightarrow XeO_3F_2(g) + H_2O(g)$ will be

A. $\frac{K_1}{K_2}$

B. $\frac{K_1}{(K_2)^2}$

C. $K_1 K_2$

D. $\frac{K_2}{K_1}$

Answer: D

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62. Consider the following equilibrium in a closed container

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

At a fixed temperature, the volume of the container is halved. For the change, which of the following statements holds true regarding the equilibrium constant (K_p) and degree of dissociation (α) :

A. Neither K_p nor α changes

B. both K_p and α change

C. K_p changes but α does not change

D. K_p does not change but α changes

Answer: D

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63. A 500 ml vessel contains 1.5 M each of A, B, C and D at equilibrium if 0.5 M each of C and D are taken out the value of K_c for $A + B \Leftrightarrow C + D$ will be

A. 1.0

B. `1/9

C. `4/9

D. $\frac{8}{9}$

Answer: A

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64. For the reaction $AB(g) \Leftrightarrow A(g) + B(g)$, AB is 33% dissociated at a total pressure of P, then

A. $P = K_p$

B. $P = 4K_p$

C. P = 3K_p`

D. P=8Kp`

Answer: D

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65. When two reactants A and B are mixed to give products C and D, the reactions quotient Q at the initial stages of the reaction

A. is zero

B. decreases with time

C. is independent of time

D. Increases with time

Answer: D

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66. The correct order of increasing $\left(H_3O^+\right)$ in the following aqueous solutions is

A. $0.01MH_2S < 0.01MH_2SO_4 < 0.01MNaCl < 0.01MNaNO_2$

B. $0.01MNaCl < 0.01MNaNO_2 < 0.01MH_2S < 0.01MH_2SO_4$

C. $0.01MNaNO_2 < 0.01MNaCl < 0.01MH_2S < 0.01MH_2SO_4$

D. $0.01MH_2S < 0.01MNaNO_2 < 0.01MNaCl < 0.01MH_2SO_4$

Answer: C

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67. The dissociation constant of benzoic acid at $25^{\circ} C$ is 1×10^{-4}. The pH of 0.01 M solution of its sodium salt is

A. 7.5

B. 8

C. 8.2

D. 6

Answer: B

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68. Passing $H_2 S gas \int oamixtureof$Cu^(2+), Mn^(2+), Ni^(2+) and Hg^(2+)` ions, in acidified aqueous solution precipitates

A. Cus and HgS

B. MnS and CuS

C. MnS and NiS

D. NiS and HgS

Answer: A

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69. The molarity of a solution obtained by mixing 750 mL of 0.5(M) HCl with 250 mL of 2(M) HCl will be

A. 0.875 M

B. 1.00 M

C. 1.75 M

D. 0.975 M

Answer: A

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70. The dissociation constants for acetic acid and HCN at $25^\circ C$ are 1.5×10^{-5} and 4.5×10^{-10} respectively. The equilibrium constant for the equilibrium,

$CN^- + CH_3COOH \Leftrightarrow HCN + CH_3COO^-$

A. 3.0×10^5

B. 3.0×10^{-5}

C. 3.0×10^{-4}

D. 3.0×10^4

Answer: D

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71. At $90^\circ C$, pure water has $[H_3O^+] = 10^{-6}$ mol/L. What is the value of K_w at $90^\circ C$

A. 10^{-6}

B. 10^{-12}

C. 10^{-14}

D. 10^{-8}

Answer: B

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72. The pH of water is 7.0 at $25^{\circ}C$. If water is heated to $60^{\circ}C$. Which of the following should be true?

A. pH will decrease

B. pH will increase

C. pH will remain seven

D. Concentration of H^{+} will increase but that of OH^{-} will decrease

Answer: A

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73. Which of the following statement relationship Is not correct?

A. Upon hydrolysis, Salt of a strong base and weak acid gives solution with $pH > 7$

B. $pH = \log\frac{1}{[H^+]}$

C. Only at $25^\circ C$, the pH of water is 7

D. The PKw of water at $25^\circ C$ is 7

Answer: D

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74. When in a saturated solution of Nacl, Pure Hcl gas is passed, pure NaCl is precipitated. This is due to the fact.

A. That solubility of NacL decreases

B. That Hcl gas Is highly soluble in water

C. That the ionic product $[Na^{+}][Cl^{-}]$ exceeds the K_sp of Nacl.

D. That Hcl is a strong acid

Answer: C

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75. The PK_a values of four acids are given below at $25^{\circ}C$. Indicate the strongest acid.

A. 2

B. 2.5

C. 3

D. 4

Answer: A

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76. Which of the following is most soluble in water?

A. $Bi_2S_3(K_{sp} = 1 \times 10^{-70})$,

B. $MnS(K_{sp} = 7 \times 10^{-16})$

C. $CuS(K_{sp} = 2 \times 10^{-37})$

D. $Ag_2s(K_{sp} = 6 \times 10^{-50})$

Answer: B

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77. pH of 10^{-8} molar solution of Hcl in water is

A. 8

B. -8

C. between 7 and 8

D. between 6 and 7

Answer: D

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78. Which of the following salts does not undergo hydrolysis?

A. Na_2CO_3

B. CH_3COONa

C. $Nacl$

D. $NaHSO_4$

Answer: C

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79. Dissociation of H_2S takes place is $H_2S \Leftrightarrow 2H^{+} + S^{2-}$, if NH_4OH` is added in this than

A. Dissociation will decrease

B. Sulphur will precipitate

C. S^{2-} Concentration increases

D. More H_2S will from

Answer: C

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80. The principal buffer present in human blood is

A. $NaH_2PO_4 + Na_2HPO_4$

B. $H_3PO_4 + NaH_2PO_4$

C. $Na_2HPO_4 + Na_3PO_4$

D. $H_2CO_3 + H_2CO_3^-$

Answer: D

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81. Which of the following will function as buffer?

A. $NaCl + NaOH$

B. Boras+sodium metaborate

C. $NaH_2PO_4 + NaHPO_4$

D. $NH_4Cl + NH_4OH$

Answer: D

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82. When some amount of sodium acetate is further added to a mixture of acetic acid and sodium acetate, then pH of the solution

A. Increases

B. decreases

C. remains same

D. None can be predicted from given late.

Answer: A

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83. What is a reversible reaction? What is rate of a reaction? Would you get the same result during heating of $CaCO_3$ separately in an open container and a closed container? Give reason.

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84. Why reaction between 1 mole ethyl alcohol and 1 mole acetic acid never produce 1 mole ester and 1 mole water? Write the characteristics of equilibrium constant?

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85. What is 'chemical equilibrium'? Chemical equilibrium is a dynamic equilibrium -explain. Give examples of homogeneous and heterogeneous equilibrium.

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86. What is equilibrium constant? Establish the relation between K_p and K_c for a reversible reaction in equilibrium.

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87. State law of mass action.

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88. Write K_p and K_c for the following reaction and show which one is greater between them?

$2NO(g) + O_2(g) \Leftrightarrow 2NO_2(g)$

Catalyst does not change magnitude of equilibrium constant. Explain.

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89. How is equilibrium affected by increase of pressure and increase of temperature in $P(g) + 3Q(g) \Leftrightarrow 2M(g) + N(g) + heat$

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90. What is the relation between equilibrium constants of the reaction and it's reverse:

$$\frac{1}{2}A_2 + \frac{1}{2}B_2 \Leftrightarrow AB$$

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91. Write equilibrium constant in terms of partial pressure and molar concentration. Why vaporisation of water takes place rapidly at low pressure and high temperature.

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92. State Le-chatelier's principle. To shift the equilibrium $PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ to the right what measures should be taken?

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93. Explain the effect of (i) increasing pressure and (ii) continuous removal of HI at constant temperature on the following equilibrium : $H_2(g) + l_2(g) \Leftrightarrow 2Hl(g)$

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94. The equilibrium pressure of CO_2, CO and O_2 for the reaction $2CO_2(g) \Leftrightarrow 2CO(g) + O_2(g)$ at 3000K are 0.6, 0.4 and 0.2 atm respectively calculate (i) K_p and (ii) K_c for this reaction at that temperature.

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95. $CO(g) + 2H_2(g) \Leftrightarrow CH_3OH(g)$, for this reversible reaction at equilibrium Keeping temperature constant what will happen if (i) the volume of the container is halved (ii) the partial pressure of H_2 is halved (iii) He gas is introduced at constant temperature and pressure.

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96. $H_2(g) + l_2(g) \Leftrightarrow 2Hl(g)$, This reaction is carried in a 2 litre flask taking 0.4 mol H_2 and 0.4 mol l_2. At equilibrium if 0.5 mol HI is produced then calculate the value of equilibrium constant K_c.

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97. Establish the relation between K_p and K_c for the reaction $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

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98. 2 moles of PCl_5 were heated at $327^\circ C$ in a 2 litre flask. It was found that 40% of PCl_5$dissociates \rightarrow give$PCl_3 and Cl_2 $atequilibrium. Calc\underline{a}tetheequilibriumcons\tan tf$ or $thedissociationof$ PCl_5` at equilibrium.

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99. The value of equilibrium constant for the reaction $2lCl(g) \Leftrightarrow l_2(g) + Cl_2(g)$ is K_c = 0.14. If the initial reaction mixture.

If the following reversible reaction is carried out at different concentrations of the reactant ,will there be any change in the value of K_c?

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100. 1 mole N_2 and 3 moles of H_2 are taken in a 4 litre flask. If 0.25% of N_2 is converted to NH_3 at equilibrium and the reaction is $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$. Then calculate the value of K_c under that condition.

Prove that for the reaction $aA_2(g) + bB_2(g) \Leftrightarrow cAB(g)$ the value of the ratio $\frac{K_p}{K_c}$ is 1 when a+b=c.

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101. Explain the process of leaching of alumina from red bauxite.

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102. Write physicochemical principle of manufacture of nitric acid.

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103. Write conjugate bases of HCO_3^-, HSO_4^-, $H_2PO_4^-$, HS^-. What is a standard solution? When the normality and molarity of a solution become equal?

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104. What is the difference between neutralisation and hydrolysis?

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105. Explain with example: Aprotic, amphiprotic, protophilic and protogenic solutions.

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106. Write short note on levelling effect.

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107. What is degree of dissociation? What is the ionic product of water? Define pH of a solution.

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108. Between two solutions of pH 2 and 6 respectively which one is more and how many times more acidic than the other? Define with examples acidic and alkaline buffer.

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109. Write the conjugate acids of $CN^{-}, Cl^{-}, Cl^{-}, H^{-}, HSO_3^{-}$. "The conjugate base of a strong acid is a weak base and vice versa" - explain. When a chemical reaction reaches equilibrium.

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110. Write the differences between :

Solubility and solubility product

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111. Write the differences between :

Solubility product and ionic product.

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112. Whether the pH of aqueous solution of ammonium chloride is more or less than 7?

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113. Write the Ostwald Dilution law. What are its limitations? Deduce the mathematical expression of Ostwald dilution law.

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114. What is common ion effect? Give example. What is buffer action?

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115. Explain why:

Solubility of magnesium hydroxide increases in ammonium chloride solution.

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116. Explain why:

Solubility of $PbCl_2$ decreases on addition of KCl solution.

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117. What is an isohydric solution?

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118. Explain what happens when

H_2S gas is passed through acidified mixture of the solutions of Cu^{2+} and Zn^{2+}.

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119. Explain what happens when

HCl gas is passed through saturated solution of $NaCl$.

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120. Explain buffer capacity of a buffer solution.

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121. An acid of pH 5 is diluted 1000 times. What is the pH of final solution?

A 0.05 M solution of acetic acid is found to be 1.9% ionised at $25^{\circ}C$. Calculate

pH of the solution.

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122. An acid of pH 5 is diluted 1000 times. What is the pH of final solution?

A 0.05 M solution of acetic acid is found to be 1.9% ionised at $25^{\circ}C$. Calculate

K_a of acid.

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123. The correct order of increasing basicily of the given conjugate bases (R=CH_3) is -

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124. Can methyl orange indicator be used in the titration of 0.1 M acetic acid with 0.1 (M) NaOH solution? Explain.

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125. Determine the pH of a solution which is obtained by mixing equal volume (50ml) of the solutions with pH 1 and 2. Given that the solubility product of $BaSO_4$ is 1.49×10^{-9}. Determine its solubility in 0.1 M $BaCl_2$ solution.

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126. Determine the pH of 10^{-8} M HCl acid solution. Show that, degree of dissociation of a weak monobasic acid, $\alpha = \dfrac{1}{1 + 10^{pk_a - pH}}$, where K_a is the dissociation constant of the weak acid at experimental temperature.

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127. The solubility product of $Mn(OH)_2$ at $25^\circ C$ is 1.9×10^{-13}. What is the pOH of the saturated solution of $Mn(OH)_2$ at $25^\circ C$.

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128. The pH of a buffer solution remains almost same on dilution - explain.

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129. Define solubility product. Derive the relation between solubility and solubility product of $A_{\times}B_y$. Give an example where solubility increases due to common ion effect.

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130. 50 ml 0.1 N CH_3COOH solution is mixed with 25 ml 0.1 N NaOH solution. What is the pH of the final solution? Given : pK_a of CH_3COOH

= 4.74

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131. 50 ml 0.1 N CH_3COOH solution is mixed with 25 ml 0.1 N NaOH solution. What is the pH of the final solution?

Show that pH+pOH=14 for pure water or any aqueous solution at $25^\circ C$.

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132. 50 ml 0.1 N CH_3COOH solution is mixed with 25 ml 0.1 N NaOH solution. What is the pH of the final solution? Given : pK_a of CH_3COOH = 4.74

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133. State five conditions by which the point of equilibrium of the following reversible reaction can be shifted towards left.

$N_2 + 3H_2 \Leftrightarrow 2NH_3 + Qcal.$

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134. What is concentration quotient or reaction quotient? For the reaction $aA + bB \Leftrightarrow xC + yD$. What do you conclude if (i) $Q = K_c$ (ii) $Q > K_c$ (iii) $Q < K_c$ where Q=reaction quotient and K_c = equilibrium constant.

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135. The equilibrium constant of a reaction is 2×10^{-3} at $25^\circ C$ and 2×10^{-2} at $50^\circ C$. Is the reaction exothermic on endothermic? Explain.

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136. The equilibrium constant for the reaction

$N_2(g) + O_2(g) \Leftrightarrow 2NO$ is K_1

and the equilibrium constant for the reaction

2NO(g)+O_2(g)iff2NO_2(g)isK_2

$W\widehat{w}illbetheequilibriumcons\tan tf\ \text{or}\ thereaction$

N_2(g)+2O_2(g)iff2NO_2(g)`

Watch Video Solution

137. What happens when Arsenic oxide reacts with hydrogen sulphide?

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138. Classifty the following as acid and base according ot Bronsted and Lowry concept and mention the name/formula of their respective conjugate base and acid.

(i) H_3O^+ (ii) Cl^- (iii) NH_3 (iv) CH_3COO^- (v) H^- (vi) HOO^- (vii) $S_2O_8^{2-}$ (viii) NH_4^+ (ix) H_2S (x) OH

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139. If 50 ml 0.2 (M) CH_3COOH is mixed with 20 ml 0.2 (M) NaOH solution, then what will be the pH of the mixed solution?

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140. At a given temperature, if the solubility product and solubility of a sparingly soluble salt M_2X_3 be K_{sp} and S, then prove that $S = \left(\frac{K_{sp}}{108}\right)^{\frac{1}{5}}$.

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141. Explain why pH of 0.1 (M) CH_3COOH solution is higher than that of 0.1 (M) HCl solution.

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142. Which of the given salts will undergo cationic or anionic or both cationic and anionic hydrolysis? Also mention the nature of the aqueous. Solution of the salts : NH_4Cl, $NaCN$, $AlCl_3CH_3COONH_4$, Na_2CO_3.

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143. At a ertain temperature, the ration of ionisation constants of a weak acid HA to a weak acid HB is 100 : 1. If the degree of ionisation of HA and HB in their aqueous solutions of equimolar concentration be α_1 and α_2, then show that $\alpha_1 = 10\alpha_2$.

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144. What would be nature of aqueous solutions of NaF and NH_4NO_3.

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145. In aqueous solution, a weak tribasic acid H_3A ionises in the following three steps:

(a) $H_3A(aq) + H_2O(l) \Leftrightarrow H_3O^+(aq) + H_2A^-(aq)$ (b)

$H_2A^-(aq) + H_2O(l) \Leftrightarrow H_3O^+(aq) + HA^{2-}(aq)$ (c)

$HA^{2-}(aq) + H_2O(l) \Leftrightarrow H_3O^+(aq) + A^{3-}(aq)$

If the ionisation constants of these three steps are K_1, K_2 and K_3 respectively, then determine the overall ionisation constant of H_3A.

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146. At $46^\circ C$, K_p for the reaction $N_2O_4(g) \Leftrightarrow 2NO_2(g)$ is 0.66. Calculate the partial pressure of N_2O_4 and NO_2 at equilibrium and at a total pressure of 0.5 atm.

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147. $Ca(HCO_3)_2$ decomposes as Ca(HCO3)2(s) → CaCO3 (s)+H2O (g)+CO2 (g). Total pressure at equilibrium is found to be 0.12 bar. Thus, Kp is ?

A. 0.24

B. 0.06

C. 0.0036

D. 0.0144

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148. α- D glucose undergoes mutarotation to $\beta - D$ glucose in aqueous solution. If at 298 K there is 60% conversion, calculate ΔG° for the reaction.

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149. The rate of the elementary gaseous phase reaction.

$2NO + O_2 \Leftrightarrow 2NO_2$ at $380^\circ C$ is given by rate $=2.6 \times 10^3 [NO]^2 [O_2]$

The rate of reverse reaction at $380^\circ C$ is given by Rate = $4.1[NO_2]^2$

A. 6.38×10^{2}

B. 7×10^{5}

C. 25.18

D. 4×10^{4}

Answer: C

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150. The following concentrations were obtained for the formation of NH_3 from N_2 and H_2 at equilibrium at $500K$. $[N_2] = 1.5 \times 10^{-2}M$. $[H_2] = 3.0 \times 10^{-2}M$ and $[NH_3] = 1.2 \times 10^{-2}M$. Calculate equilibrium constant.

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151. At equilibrium, the concentrations of $N_2 = 3.0 \times 10^{-3}M$, $O_2 - 4.2 \times 10^{-3}M$ and $NO = 2.8 \times 10^{-3}M$ in a sealed vessel at 800K. What will be K_c for the reaction

$N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

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152. The value of $K_c = 4.24$ at 800K for the reaction,

$CO(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g)$

Calculate equilibrium concentrations of CO_2, H_2, CO and H_2O at 800 K, if only CO and H_2O are present initially at concentrations of 0.10M each.

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153. Equilibrium constants are given (in atm) for the following reactions at $0^\circ C$

(a) $SrCl_{2.6}H_2O(s) \Leftrightarrow SrCl_{2.2}H_2O(s) + 4H_2.O(g), K_p = 6.89 \times 10^{-12}$

(b)

$Na_2HPO_{4.12}H_2O(s) \Leftrightarrow Na_2HPO_4.7H_2O(s) + 5H_2O(g), K_p = 5.25 \times 10$

(c)

$Na_2SO_4.10H_2O(s) \Leftrightarrow Na_2SO_4(s) + 10H_2O(g), K_p = 4.08 \times 10^{-25}$

The vapour pressure of water at $0^{\circ} C$ is 4.58 torr.

Calculate the pressure of water vapour in equilibrium at $0^{\circ} C$ with each of (a), (b) and (c)

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154. Equilibrium constants are given (in atm) for the following reactions at $0^{\circ} C$

(a) $SrCl_{2.6}H_2O(s) \Leftrightarrow SrCl_{2.2}H_2O(s) + 4H_2.O(g), K_p = 6.89 \times 10^{-12}$

(b)

$Na_2HPO_{4.12}H_2O(s) \Leftrightarrow Na_2HPO_4.7H_2O(s) + 5H_2O(g), K_p = 5.25 \times 10$

(c)

$Na_2SO_4.10H_2O(s) \Leftrightarrow Na_2SO_4(s) + 10H_2O(g), K_p = 4.08 \times 10^{-25}$

The vapour pressure of water at $0^{\circ} C$ is 4.58 torr.

Which is the most effective drying agent at $0^{\circ} C$?

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155. The value of K_c for the reaction

$2A \Leftrightarrow B + C$ is 2×10^{-3}, At a given time, the composition of reaction mixture is [A] = [B] = [C] = $3 \times 10^{-4} M$. In which direction the reaction will proceed ?

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156. The value of ΔG° for the phosphorylation of glucose in glycolysis is 13.8 ku/mol. Find the value of K_c at 298 K.

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157. The standard reaction enthalpy of $Zn(s) + H_2O(g) \rightarrow ZnO(s) - + H_2(g)$ is $224 kJ mol^{-1}$ from 920K upto 1250 K.The standard gibbs free energy is $33 kJ mol^{-1}$ at 1280 K. Assuming both quantity remained constant, estimate the temperature at which the equilibrium constant become greater than 1.

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158. The value of K_p for the reaction

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

is 0.035 atm at $400^\circ C$, when the partial pressure are expressed in atmosphere. Calculate the value of K_c for the same reaction.

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159. For the reaction, $SO_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow SO_3(g)$, the value of K_c is 1.7×10^{12} at 300K. Calculate the equilibrium constants for the following reactions at 300K :

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

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

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160. Determine K_p for the given reaction reaction :

$CO(g) + H_2O(g) \Leftrightarrow CO_2(g) + H_2(g), K_c = 23.2$ at 600K

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161. Determine K_p for the given reaction reaction :

$N_2O_4(g) \Leftrightarrow 2NO_2(g), K_c = 4.62 \times 10^{-3} M$ at 298 K

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162. Determine K_p for the given reaction reaction :

$2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g), K_c = 2.8 \times 10^2 M^{-1}$ at 1000K

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163. The equilibrium constants for the reaction,

$N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$, at $1727^\circ C$ and $2227^\circ C$ are 4.08×10^{-4} and

3.6×10^{-3} respectively. Calculate the enthalpy change for the reaction. (Given R = 1.987 cal.)

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164. For the equilibrium, $Ag_2CO_3(s) \Leftrightarrow Ag_2O(s) + CO_2(g)$, equilibrium constants are 3.98×10^{-4} and 1.41×10^{-2} respectively at 250K and 400K. Calculate the standard enthalpy of decomposition.

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165. Two moles of PCl_5 were introduced in a 2 litre flask and heated at 600K to attain equilibrium. PCl_5 was found to be 40% dissociate into PCl_3 and Cl_2. Calculate the value of K_c.

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166. One mole of H_2, 2 moles of I_2 and 3 moles of HI are injected in a one litre of flask. What will be the concentration of H_2, I_2 and HI at equilibrium when K_c is 45.9 ?

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167. The equilibrium constant, K_c, for the reaction,

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

is 56.8 at 800K. When the mixture was analysed, it was found to contain 0.316 mol/L HI at 800K. What are the concentrations of H_2 and I_2 at equilibrium? (Assume that initial concentrations of H_2 and I_2 were the same.)

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168. For the reaction, $A_g + 2B_g \Leftrightarrow 2C_g$, the rate constants for the forward and the reverse reactions are 1×10^{-4} and 2.5×10^{-2}

respectively. The value of equilibrium constant, K for the reaction would be

A. 1×10^{-4}

B. 2.5×10^{-2}

C. 4×10^{-3}

D. 2.5×10^{-2}

Answer: C

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169. The concentration of a pure solid or liquid phase is not included in the expression of equilibrium constant because :

A. solid and liquid concentrations are independent of their quantities

B.

C.

D.

Answer: A

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170. $NO(g) + O_3(g) \Leftrightarrow NO_2(g) + O_2(g)$

Both the forward and reverse reactions in the equilibrium are elementary bimolecular reactions and K_c for the given reaction is 6.3×10^{14}. What is K_c for the reverse reaction ?

A. 15.9×10^{-15}

B. 1.59×10^{-15}

C. 5×10^{-15}

D. 9×10^{-15}

Answer: B

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171. At certain temperature compound $AB_2(g)$ dissociates according to the reaction $2AB_2(g) \Leftrightarrow 2AB(g) + B_2(g)$. With degree of dissociation α, which is small compared with unity. The expression of K_p, in terms of α and initial pressure P is :

A. $P\dfrac{\alpha^3}{2}$

B. $\dfrac{P\alpha^3}{3}$

C. $P\dfrac{\alpha^2}{3}$

D. $\dfrac{P\alpha^2}{2}$

Answer: A

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172. For an equilibrium reaction involving gases, the forward reaction is 1^{st} order while the reverse reaction is 2^{nd} order. The units of K_p for the forward equilibrium is,

A. atm

B. atm^2

C. atm^{-1}

D. atm^{-2}

Answer: A

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173. Find out the value of K_c for each of the following equilibria from the value of K_p: 2NOCl(g)⇌2NO(g)+Cl2(g);KP=1.8×10−2 at 500 K

$CaCO_3(s) \Leftrightarrow CaO(s)CO_2(g), K_p = 167$ at 1073 K

A. $4.4 \times 10^{-4} \& 1.90$

B. $8.8 \times 10^{-4} \& 3.8$

C. $4.4 \times 10^{4} \& 1.90$

D. $8.8 \times 10^{4} \& 3.8$

Answer: A

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174. Find out the value of K_c for each of the following equilibria from the value of K_p: 2NOCl(g)⇌2NO(g)+Cl2(g);KP=1.8×10−2 at 500 K

$CaCO_3(s) \Leftrightarrow CaO(s)CO_2(g), K_p = 167$ at 1073 K

A. $4.4 \times 10^{-4} \& 1.90$

B. $8.8 \times 10^{-4} \& 3.8$

C. $4.4 \times 10^{4} \& 1.90$

D. $8.8 \times 10^{4} \& 3.8$

Answer: B

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175. Given :

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g), K_1$

$N_2(g) + O_2(g) \Leftrightarrow 2NO(g), K_2$

$H_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow H_2O(g), K_3$

The equilibrium constant for,

$2NH_3(g) + \frac{5}{2}O_2(g) \Leftrightarrow 2NO(g) + 3H_2O(g)$ will be :

A. $K_1K_2K_3$

B. $\frac{K_1K_2}{K_3}$

C. $\frac{K_1K_3^2}{K_2}$

D. $\frac{K_2K_3^3}{K_1}$

Answer: D

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176. If K_p of an equilibrium $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$ is 1.5 atm at $29^\circ C$ then the moles of CaO formed if excess$CaCO_3(s)$ is being placed in a 1 lt of closed container containing CO_2 gas at 0.5 atm pressure at same temperature is :

A. 1/(56)

B. 1/(25)

C. 1/(12)

D. 1/(13)

Answer: B

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177. When 0.087 mol of NO and 0.0437 mal of Br_2 are mixed in a closed container at constant temperature, 0.0518 mol of NOBr is obtained at equilibrium. The equilibrium amount of NO and Br_2 are :

A. NO = 0.352 mol, Br_2 = 0.0178 mol

B. NO = 0.352 mol, Br_2 = 0.178 mol

C. NO = 0.0352 mol, Br_2 = 0.0178 mol

D. NO = 0.3052 mol, Br_2 = 0.0178 mol

Answer: D

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178. For the reaction, $2HI(g) \Leftrightarrow H_2(g) + I_2(g)$ the degree of dissociation (α) of HI (g) is related to the equilibrium constant, K_p by expression

A. $\dfrac{1+2\sqrt{K_p}}{2\sqrt{K_p}}$

B. $\sqrt{\dfrac{1+2K_p}{2}}$

C. $\sqrt{\dfrac{2K_p}{1+2K_p}}$

D. $\dfrac{2\sqrt{K_p}}{1+2\sqrt{K_p}}$

Answer: D

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179. K_c for the synthesis of HI(g) from $H_2(g)$ and $I_2(g)$ is 50 The degree of dissociation of HI is

A. 0.1

B. 0.14

C. 0.18

D. 0.22

Answer: D

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180. One mole of H_2O and one mole of CO,are taken in 10 L vessel and heated to 725 K. At equilibrium 40% of water (by mass) reacts with CO according to the equation,

$$H_2O(g) + CO(g) \Leftrightarrow H_2(g) + CO_2(g)$$

What is the value of equilibrium constant (K_c) for the reaction.

A. 44

B. 4.4

C. 0.44

D. 2.22

Answer: C

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181. At a certain temperature, the equilibrium constant K_c is 16 for the reaction,

$SO_2(g) + NO_2(g) \Leftrightarrow SO_3(g) + NO(g)$. If 1.0 mol each of all the four gases is taken in a one litre container the concentration of NO_2 at equilibrium would be

A. $1.6 mol L^{-1}$

B. $0.8 mol L^{-1}$

C. $0.4 mol L^{-1}$

D. $0.6 mol L^{-1}$

Answer: C

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182. What is the equilibrium concentration of each of the substances of RHS in the equilibrium when the initial concentration of ICl was 0.78 M ?

"$2ICl(g) \rightleftharpoons I_2(g) + Cl_2(g); K_c = 0.14$"

A. 0.167 M

B. 0.42 M

C. 4.2 M

D. 2.1 M

Answer: A

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183. K_p = 0.04 atm at 899 K for the equilibrium shown below, what is the equilibrium pressure of C_2H_6 when it is placed in a flask at 4.0 atm pressure and allowed to come to equilibrium ?

$C_2H_6(g) \Leftrightarrow C_2H_4(g) + H_2(g)$

A. 7.24 atm

B. 3.62 atm

C. 1 atm

D. 1.5 atm

Answer: B

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184. XY_2 dissociates as $XY_2(g) \Leftrightarrow XY(g) + Y(g)$. When the initial pressure is 600 mm of Hg, the total pressure at equilibrium developed is 800 mm of Hg. Therefore pressure of Y at equilibrium is

A. 200 mm

B. 50 mm

C. 100 mm

D. 150 mm

Answer: A

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185. A mixture of 1.57 mol of N_2, 1.92 mol of H, and 8.13 mol of NH_3 is there in a 20 L reaction vessel at 500 K. At this temperature, the equilibrium constant, K_c for the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ is 1.7×10^2. Is the reaction mixture at equilibrium ? If not, what is the direction of the net reaction?

A. not at equilibrium, forward shift

B. not at equilibrium, backward shift

C. cannot be predicted

D. in equilibrium

Answer: B

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186. When sulphur in the form of S, is heated at 900K, the initial pressure of one atm of S_8 falls by 29% at equilibrium. This is because of conversion of some S_8 to S_2. Find the value of equilibrium constant for this reaction

A. $1.16atm^3$

B. $0.71atm^3$

C. $2.55atm^3$

D. $5.1atm^3$

Answer: C

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187. A reaction system in equilibrium according to reaction $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$ in one litre vessel at a given temperature was found to be 0.12 mole each of SO_2 and SO_3 and 5 mole of O_2. In another vessel of one litre contains 32 g of SO_2 at the same temperature. What mass of O_2 must be added to this vessel in order that at equilibrium $20\,\%$ of SO_2 is oxidized to SO_3 ?

A. 0.4125 g

B. 11.6 g

C. 1.6 g

D. None of these

Answer: B

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188. $X_2 + X^- \Leftrightarrow X_3^-$ (x = iodine) This reaction is set up in aqueous medium. We siart with 1 mol of X_2 and 0.5 mol of X^- in 1L flask. After equilibrium is reached, excess of $AgNO_3$ gave 0.25 mol of yellow ppt. equilibrium constant is

A. 1.33

B. 2.66

C. 2

D. 3

Answer: A

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189. Bromine Monochloride, BrCl decomposes into bromine and chlorine and reaches the equilibrium : $2BrCl(g) \Leftrightarrow Br_2(g) + Cl_2(g)$ for which K = 32 at 500 K. if initially pure BrCl is present at a concentration of $3.3 \times 10^{-3} mol L^{-1}$, what is its molar concentration in the mixture at equilibrium ?

A. 3×10^{-4}

B. 1×10^{-4}

C. 1.5×10^{-4}

D. 6×10^{-4}

Answer: A

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190. An aqueous solution of volume 500 mi contains the reaction $2Ag^{+}(aq.) + Cu(s) \Leftrightarrow Cu^{2+}(aq.) + 2Ag(s)$ in equilibrium with $[Cu^{2+}(ag.)] = xM$. Now 500 ml of water is further added. On reset of above equilibrium $[Cu^{2+}(aq.)]$ will be

A. xM

B. 2xM

C. Between xM and x/(2M)

D. less than x/(2M)

Answer: D

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191. What are the values of ΔG° and the equilibrium constant for the formation of NO_2 from NO and O_2 at 298K. Given $\log\left(1.365 \times 10^{6}\right)6.14$

$NO(g) + \frac{1}{2}O_2(g) \Leftrightarrow NO_2(g)$

where $\Delta G_f^0(NO_2) = 52.0k\frac{J}{m}ol$

$\Delta G_f^0(NO) = 87.0k\frac{J}{m}ol$

A. $35kJmol^{-1}$ and 1.365×10^{6}

B. $-35kJmol^{-1}$ and 1.365×10^{-6}

C. $-350kJmol^{-1}$ and 1.3×10^{6}

D. $-35kJmol^{-1}$ and 1.365×10^{6}

Answer: D

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192. For the equilibrium, $H_2O(s) \Leftrightarrow H_2O(l)$

which of the following statement is true ?

A. The pressure changes do not affect the equilibrium.

B. More of ice melts, if pressure on the system is increased.

C. More of liquid freezes, if pressure on the system is increased,

D. The pressure changes may increase or decrease the degree of advancement of the reaction depending upon the temperature of the system.

Answer: B

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193. For the gas phase reaction, $C_2H_4(g) + H_2(g) \Leftrightarrow C_2H_6 : \Delta H = -32.7$ kcal carried out in a vessel, the equilibrium concentration of C_2H_4 can be increased by

A. increasing temperature

B. decreasing temperature

C. adding some H_2

D. removing some C_2H_6

Answer: A

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194. When $NaNO_3$ is heated in a closed vessel, oxygen is liberated and $NaNO_2$ is left behind. At equilibrium

A. addition of $NaNO_2$ favours reverse reaction

B. addition of $NaNO_2$ favours forward reaction

C. increasing temperature favours backward reaction

D. Increasing pressure favours reverse reaction

Answer: D

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195. The equilibrium $SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$ is attained at $25^\circ C$ in a closed container and inert gas helium is introduced. Which of the following statements is/are correct ?

A. Concentration of SO_2, Cl_2 and SO_2Cl_2 change

B. More chlorine is formed

C. Concentration of SO_2 is reduced

D. No change in concentration of reactants and products

Answer: D

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196. For the reaction $PCI_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ the forward reaction at constant temperature is favoured by

(1) introducing an inert gas at constant volume

(2) introducing chlorine gas at constant volume

(3) introducing an inert gas at constant pressure

(4) decreasing the volume of the container

(5) introducing PCl, at constant pressure

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197. For the reaction: $CaCO3(s) \rightleftharpoons CaO(s) + CO2(g)$. Kp= 1 atm at 927°C. If 20g of CaCO3 were kept in a10 liter vessel at 927°C, then calculate percentage of CaCO3 remaining at equilibrium:

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198. For the reaction $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$, the addition of more of CaO(s) causes :

A. the decrease in the concentration of $CO_2(g)$

B. the increase in the concentration of $CO_2(g)$

C. no change in the concentration of $CO_2(g)$

D. the increase in the concentration of $CaCO_3(s)$

Answer: C

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199. Predict which of the following facts for the equilibrium reaction $2NH_3(g) \Leftrightarrow N_2(g) + 3H_2(g)$ holds good?

A. K_p of the reaction is changed with increase in Pressure of the system

B. K_p of the reaction remains unaffected with increase in pressure of the system

C. More of $NH_3(g)$ is decreased with increase in Pressure

D. Less of $H_2(g)$ is formed as compared to $N_2(g)$

Answer: B

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200. For the reversible reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ at $500^\circ C$, the value of K_p is 1.44×10^{-5}, when partial pressure is measured in atmospheres, the corresponding value of K_c with concentration in mol $Litre^{-1}$, is

A. $1.44 \times \dfrac{10^{-5}}{(0.082 \times 500)^{-2}}$

B. $1.44 \times \dfrac{10^{-5}}{(8.314 \times 773)^{-2}}$

C. $1.44 \times \dfrac{10^{-5}}{(0.082 \times 733)^{2}}$

D. $1.44 \times \dfrac{10^{-5}}{(0.082 \times 773)^{-2}}$

Answer: D

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201. When 1 mole of ethanol Is mixed with 1 mole of acetic acid, 0.67 mole of ethyl acetate is produced at equilibrium. Calculate K_c for the reaction.

A. 0.25

B. 6

C. 4

D. 2

Answer: C

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202. For the equilibrium $AB(g) \Leftrightarrow A(g) + B(g)$ at a given temperature, the pressure at which one third of AB is dissociated is numerically equal to

A. 8 times K_p

B. 16 times K_p

C. 4 times K_p

D. 9 times K_p

Answer: A

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203. 8 moles ofa gas AB_3 are introduced into $1.0 dm^3$ vessel. it dissociates as $2AB_3(g) \Leftrightarrow A_2(g) + 3B_2(g)$. At equilibrium 2 mol of A_2 are found to be present. The equilibrium constant of the reaction is.

A. 2

B. 3

C. 27

D. 36

Answer: C

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204. A 500 ml vessel contains 1.5 M each of A, B, C and D at equilibrium if 0.5 M each of C and D are taken out the value of K_c for $A + B \Leftrightarrow C + D$ will be

A. 1

B. 44440

C. 44443

D. 44447

Answer: A

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205. 1:1 mole of A are mixed with 2.2 mole of B and the mixture is kept in one litre flask till the equilibrium is reached $A + 2B \Leftrightarrow 2C + D$.

At equilibrium 0.2 mole of C is formed. The equilibrium constant in presence of catalyst at 2000K is

A. 0.002

B. 0.004

C. 0.001

D. 0.003

Answer: C

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206. 28g of N_2 and 6g of H_2 were mixed. At equilibrium 17g of NH_3 was produced. The masses of N_2 and H_2 at equilibrium are respectively

A. 11g, 0g

B. 1g, 3g

C. 14g, 3g

D. 11g, 3g

Answer: C

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207. Consider the reaction $2CO(g) + O_2(g) \Leftrightarrow 2CO_2(g)$ + heat. Which of the following is incorrect ?

A. The addition of CO and removal of CO_2 at constant volume will shift the equilibrium to the right

B. The addition of O_2 and decrease in volume will shift the equilibrium to the right

C. The effect of removal of CO and increase in temperature at constant volume shift the equilibrium to the left

D. The addition of catalyst and decrease in temperature will shift the equilibrium to the left

Answer: D

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208. For reaction $2BaO_2(s) \Leftrightarrow 2BaO(s) + O_2(g); \Delta H = +ve,$ At equilibrium condition, Pressure of O2 is depends on:

A. Increase mass of BaO_2

B. Increase mass of BaO

C. Increase temp. at Equilibrium .

D. Increase mass of BaO and BaO_2 both

Answer: A

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209. The dissociation of phosgene, which occurs according to the equation $COCl_2(g) \Leftrightarrow CO(g) + Cl_2(g)$ is an endothermic process. Which of the following will increase the degree of dissociation of $COCl_2$ at constant pressure.

A. adding Cl_2 to the system

B. adding helium to the system

C. decreasing the temperature

D. Increasing the total pressure

Answer: B

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210. For an equilibrium reaction, which of the following statements is/are correct ?

A. If the reaction quotient of a reaction is greater than K_{eq} the section has a tendency to move in the backward direction

B. Ifthe reaction quotient of a reaction is greater than K_{eq} the reaction has a tendency ito the move in the forward direction

C. The addition of an inert gas at constant volume does not affect the extent of reaction

D. The addition of an inert gas at constant pressure does not affect the extent of the reaction

Answer: A::C

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211. State four Thermodynamic Processes :

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212. Which is correct :

A. $2.303 \log K = \frac{\Delta H^\circ}{RT} + \frac{\Delta S^\circ}{R}$

B. $\Delta G^\circ = -2.303 RT \log K$

C. $\log K = \frac{1}{RT}(\Delta H^\circ + \Delta S^\circ)$

D. $2.303 \log K = \frac{1}{RT}(\Delta H^\circ + \Delta S^\circ)$

Answer: B

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213. Which of the following statement/s is/are wrong?

A. At equilibrium, concentrations of reactants and products become constant because the reaction stops

B. Addition of catalyst speeds up the forward reaction more than the backward reaction

C. Equilibrium constant of an exothermic reaction decreases with increase of temperature

D. K_p is always greater than K_c

Answer: A::B::D

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214. At constant temperature, the equilibrium constant (K_p) for the decomposition reaction .

$N_2O_4 \Leftrightarrow 2NO_2$, is expressed by $K_p = \dfrac{4x^2P}{1-x^2}$ where P = pressure, x = extent of decomposition. Which one of the following statements are false ?

A. K_p increases with increase of P

B. K_p increases with increase of x

C. K_p increases with decrease of x

D. K_p remains constant with change in P and x

Answer: C::D

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215. $N_2 + O_2 \Leftrightarrow 2NO, K_1, \dfrac{1}{2}N_2 + \dfrac{1}{2}O_2 \Leftrightarrow NO, K_2$

$2NO \Leftrightarrow N_2 + O_2, K_3 : NO \Leftrightarrow \dfrac{1}{2}N_2 + \dfrac{1}{2}O_2, K_4$

Correct relation between K_1, K_2, K_3 and K_4 Is :

A. $K_1 \times K_3 = 1$

B. $\sqrt{K}_1 \times K_4 = 1$

C. $\sqrt{K}_3 \times K_2 = 1$

D. None

Answer: A::B::C

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216. Which of the following relationship/s describe the quantitative effect of temperature on the equilibrium constant?

A. $\frac{d \ln K_P}{dT} = \frac{\Delta H}{RT^2}$

B. $\frac{d \ln K_P}{dT} = \frac{\Delta E}{RT^2}$

C. $\frac{d \ln K_C}{dT} = \frac{\Delta E}{RT^2}$

D. $\frac{d \ln K_C}{dT} = \frac{\Delta H}{RT^2}$

Answer: A::C

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217. For the gas phase reaction $C_2H_4 + H_2 \Leftrightarrow C_2H_6 \Delta H = -136.8 kJ mol^{-1}$ carried out in a vessel, the equilibrium concentration of C_2H_4 can be increased by

A. increasing the temperature

B. decreasing the pressure

C. removing some H_2

D. adding some C_2H_6

Answer: A::B::C::D

Watch Video Solution

218. When $NaNO_3$ is heated in a closed vessel, oxygen is liberated and $NaNO_2$ is left behind. At equilibrium

A. addition of $NaNO_2$ favours reverse reaction

B. addition of $NaNO_3$ favours forward reaction

C. increasing temperature favours forward reaction

D. increasing pressure favours reverse reaction

Answer: C::D

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219. For the reaction $PCI_5(g) \Leftrightarrow PCI_3(g) + Cl_2(g)$, the forward reaction at constant temperature is favoured by:

A. introducing an inert gas at constant volume,

B. introducing chlorine gas at constant volume

C. introducing an inert gas at constant pressure

D. increasing the volume of the container

Answer: C::D

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220. Let ΔG° be the difference in free energy of the reaction when all the reactants and products are in the standard state (1 atmospheric pressure and 298K) and K_c and Kp be the thermodynamic equilibrium constant of the reaction. Both are related to each other at temperature T by the following relation :

$\Delta G^\circ = -2.303 RT \log K_c$

? and ΔG° = -2,303 RT log K_p

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$\bmod ynamicallycalc\underline{a}tedas \Delta G^\circ = \Delta H^\circ - T\Delta S^\circ$

Here ΔH° = standard enthalpy change

ΔS° = standard entropy change.

At $490^\circ C$, the value of equilibrium constant, K_p is 45.9 the reaction

$H_2(g) + I_2(g) \Leftrightarrow 2Hi(g)$

Calculate the value of ΔG° for the reaction at that temperature

A. -3.5 kcal

B. 3.5 kcal

C. 5.79 kcal

D. -5.79 kcal

Answer: D

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221. Let ΔG° be the difference in free energy of the reaction when all the reactants and products are in the standard state (1 atmospheric pressure and 298K) and K_c and Kp be the thermodynamic equilibrium constant of the reaction. Both are related to each other at temperature T by the following relation :

$\Delta G^{\circ} = -2.303RT\log K_c$

? and ΔG° = -2,303 RT log K_p

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$\mod ynamicallycalc\underline{a}tedas\Delta G^{\circ} = \Delta H^{\circ} - T\Delta S^{\circ}$

Here ΔH° = standard enthalpy change

ΔS° = standard entropy change.

Calculate the equilibrium concentration ratio of C to A If 2.0 mol each of A and B were allowed to come to equilibrium at 300 K

$A + B \Leftrightarrow , \Delta G^\circ = 460 cal$

A. 1

B. 0.5

C. 0.8

D. 0.679

Answer: D

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222. If the composition of the system does not change with time, the system is said to be in chemical equilibrium. itis the state in which net reaction of a system Is zero. in another words we can say that in reversible reactions, a stage is reached when the rate of transformation of reactants into products equals the rate of transformation of products into reactants. At this stage, the composition of reactants and products does not change with time. This does not mean that the reaction has ceased, as both reverse and forward reactions are still taking place but with equal speed. Such equilibria are called dynamic equilibria,

Let us consider a reaction of the type

$A_g + B_g \Leftrightarrow C_g + D_g$K_c = ([C][D])/([A][B])$where$K_c

$is equilibrium cons \tan t when the ratio of the concentrations of the \prod uct \rightarrow$

K_p = (P_C xx P_O)/(P_A xx P_B)$where$K_P

$is the equilibrium cons \tan t f$ or $the ratio of \partial pressure of \prod ucts \rightarrow react$

K_P and K_C$is as follows$K_P = K_C(RT)^(Deltan)

$The mass ratio of steam$ and $hydro \geq n is found \rightarrow be 1 : 2 at equilibrium.$

3 Fe(s) + 4H_2O(g) iff Fe_3O_4(s) + 4H_2(g)

$The value of equilibrium cons \tan t$(K_C)` for the above reaction is

A. 3.05×10^3

B. 1.05×10^5

C. 0.75×10^2

D. 2.42×10^7

Answer: B

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223. If the composition of the system does not change with time, the system is said to be in chemical equilibrium. itis the state in which net reaction of a system Is zero. in another words we can say that in reversible reactions, a stage is reached when the rate of transformation of reactants into products equals the rate of transformation of products into reactants. At this stage, the composition of reactants and products does not change with time. This does not mean that the reaction has ceased, as both reverse and forward reactions are still taking place but with equal speed. Such equilibria are called dynamic equilibria,

Let us consider a reaction of the type

$A_g + B_g \Leftrightarrow C_g + D_g$K_c = ([C][D])/([A][B])$where$K_c $is equilibrium cons \tan t when the ratio of the concentrations of the \prod uct \rightarrow$

K_p = (P_C xx P_O)/(P_A xx P_B)$where$K_P $is the equilibrium cons \tan t f$ or $the ratio of \partial pressure of \prod ucts \rightarrow react$

K_P and K_C$is as follows$K_P = K_C(RT)^(Deltan)F or $the reaction$

NH_2COONH_4(s) iff 2NH_3(g) + CO_2(g)$The equilibrium cons \tan t$K_p = 2.9 xx 10^-5 atm^3`. The total pressure of gases at equilibrium when 1 mole of reactant was heated will be

A. 0.0194 atm

B. 0.0388 atm

C. 0.0580 atm

D. 0.0667 atm

Answer: C

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224. Match Column-I with Column-II

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225. Match Column-I with Column-II

View Text Solution

226. Match Column-I with Column-II

View Text Solution

227. Match Column-I with Column-II

View Text Solution

228. Match Column-I with Column-II

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229. In an experiment starting with 1 mole C_2H_5OH 1 mole CH_3COOH and 1 mole of water, the equilibrium mixture on analysis shows that 54.3% of the acid is esterified. Calculate K_c.

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230. When C_2H_5OH and CH_3-COOH are mixed in equivalent proportion, equilibrium is reached when 2/3 of acid and alcohol are used. How much ester will be present when 2g molecules of acid were to react with 2g molecule of alcohol ?

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231. 0.16g of N_2H_4 are dissolved in water and the total volume made upto 500ml. Calculate the percentage of N_2H_4 that has reacted with water in this solution. The K_b for N_2H_4 is 4×10^{-6} M

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232. If ΔG° for the reaction is -8290.8 cal. The K_c for the reaction at 300 K is 10^n. The value of n

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233. In an experiment, at a total of 10 atmospheres and $400^{\circ}C$, in the equilibrium mixture $2NH_3(g) \Leftrightarrow N_2(g) + 3H_2(g)$ the ammonia was found to have dissociated to the extent of 96%. Calculate K_p for the reaction.

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234. At 700 K, CO_2 and H_2 react to form CO and H_2O. For this process K is 0.11. A mixture of 0.45 mole of CO_2 and 0.45 mole of H_2 is heated to 700 K, then Find out the amount of each gas at equilibrium.

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235. At 700 K, CO_2 and H_2 react to form CO and H_2O. For this process K is 0.11. [fa mixture of 0.45 mole of CO_2 and 0.45 mole of H_2 is heated to 700 K, then After equilibrium is reached another 0.34 mole of CO_2 and 0.34 mole of H_2 are added to the reaction mixture. Find the composition of the mixture at the new equilibrium state. (Assume volume to be $1dm^3$)

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236. What is the concentration of CO in equilibrium at $25^\circ C$ in a sample of a gas originally containing $1.00 mol L^{-1}$ of CO_2? For the dissociation of CO_2 at $25^\circ C$, Kc = 2.96 xx10^(-92)`

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237. If $Ag + 2NH_3 \Leftrightarrow \left[Ag(NH_3)_2\right]$

$K_1 = 1.8 \times 10^7$

$Ag^{+} + Cl^{-} \Leftrightarrow AgCl$

$K_2 = 5.6 \times 10^9$

Then for $AgCl + 2NH_3 \Leftrightarrow \left[Ag(NH_3)_2\right]^{+} + Cl^{-}$

What will be the value of equilibrium constant?

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238. At $448^\circ C$, the equilibrium constant (K_C) for the reaction $H_2(g) + I_2(g) \Leftrightarrow 2HI(g)$ is 50.5. Predict the direction in which the reaction will proceed to reach equilibrium at $448^\circ C$, if we start with $2.0 \times 10^{-2} mol$ of HI, 1.0×10^{-2} mol of H_2 and 3.0×10^{-2} mol of I_2 In a 20L- container.

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239. At certain temperature compound $AB_2(g)$ dissociates according to the reaction $2AB_2(g) \Leftrightarrow 2AB(g) + B_2(g)$. With degree of dissociation α, which is small compared with unity. The expression of K_p, in terms of α and initial pressure P is :

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240. At1000K, water vapour at 1 atm has been found to be dissociated Into hydrogen and oxygen to the extent of $3 \times 10^{-5}\%$. Calculate the free energy decrease of the system, assuming ideal behaviour.

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241. When HgI2 is added to aqueous solution of KI, why there is an increase in vapour pressure of solution ?

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242. $FeSO_4$ solution mixed with $(NH_4)_2SO_4$ solution in 1:1 molar ratio gives the test of $Fe2+$ ion but $CuSO_4$ solution mixed with aqueous ammonia in 1:4 molar ratio does not give the test of $Cu2+$ ion. Explain why?.

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243. Predict the change, in adding $Al(OH)_3$ to aqueous caustic soda solution.

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244. The concentration of a pure solid or liquid phase is not included in the expression of equilibrium constant because :

A. solid and liquid concentrations are independent of their quantities

B. solids and liquids react slowly

C. solids and liquids at equilibrium do not interact with gaseous phase

D. the molecules of solids and liquids cannot migrate fo the gaseous phase

Answer: A

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245. For a reversible gaseous reaction $N_2 + 3H_2 \Leftrightarrow 2NH_3$ at equilibrium, if some moles of H_2 are replaced by same number of moles of T_2 (T is tritium, isotope of H and assume isotopes do not have different chemical properties) without affecting other parameters, then incorrect statement

A. The sample of ammonia obtained after sometime will be radioactive.

B. Moles of N_2 after the change will be different as compared to moles of N_2 present before the change

C. The value of K_p or K_c will change

D. The average molecular mass of new equilibrium will be same as that of old equilibrium

Answer: D

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246. Consider the reactions: (i)

$CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g); K1$ (ii)

$CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g); K2$ (iii)

$CH4(g) + 2H_2O(g) \rightleftharpoons CO_2(g) + 4H_2(g); K3$

A. $K_3 = \frac{K_1}{K_2}$

B. $K_3 = \frac{K_1^2}{K_2^3}$

C. $K_3 = K_1 K_2$

D. $K_3 = \sqrt{K}_1 . K_2$

Answer: D

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247. When a sample of NO_2 Is placed in a container, this equilibrium is rapidly established. If this equilibrium mixture is of a darker colour at

high temperatures and at tow pressures, which of these statements about the reaction is true?

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

A. The reaction is exothermic and $2O_4$ is darker in colour than NO_2

B. The reaction is exothermic and NO_2 Is darker in colour than N_2O_4

C. The reaction is endothermic and NO_2 is darker in colour than N_2O_4,

D. The reaction is endothermic and N_2O_4, is darker in colour than NO_2

Answer: B

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248. Phosphorus reacts with chlorine as shown

$P_4(s) + 6Cl_2(g) \Leftrightarrow 4PCl_3(g)$. What is the equilibrium constant expression, K_p for this reaction ?

A. $\dfrac{4P_{PCl_3}}{6P_{PCl_3}P_{CL_2}}$

B. $\dfrac{4P_{PCl_3}}{6P_{Cl_2}}$

C. $\dfrac{P_{PCl_3}}{P_{P_4}P_{Cl_2}^6}$

D. $\dfrac{P_{PCl_3}^4}{P_{Cl_2}^6}$

Answer: D

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249. The equilibrium constant for the reactions -

(i) $N_2 + 3H_2 \Leftrightarrow 2NH_3$

(ii) $N_2 + O_2 \Leftrightarrow 2NO$ and

(iii) $H_2 + \dfrac{1}{2}O_2 \Leftrightarrow H_2O$ are K_1, K_2 and K_3 respectively.

The equilibrium constant of the reaction $2NH_3 + \dfrac{5}{2}O_2 \Leftrightarrow 2NO + 3H_2O$ in terms of K_1, K_2 and K_3 is

A. $K_1K_2K_3$

B. $\dfrac{K_1K_2}{K_3}$

C. $\dfrac{K_1K_3^2}{K_2}$

D. $\dfrac{K_2K_3^3}{K_1}$

Answer: D

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250. At $527^\circ C$, the reaction given below has K_c = 4

$$NH_3(g) \Leftrightarrow \frac{1}{2}N_2(g) + \frac{3}{2}H_2(g)$$

What is the K_p for the reaction ?

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

A. $16 \times (800R)^2$

B. $\left(\dfrac{800R}{4}\right)^{-2}$

C. $\left(\dfrac{1}{4 \times 800R}\right)^2$

D. None of these

Answer: C

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251. For the equilibrium $SO_2Cl_2(g) \Leftrightarrow SO_2\{g) + Cl_2(g)$, what is the temperature at which $\frac{K_p(atm)}{K_c(M)} = 3$?

A. 0.027 K

B. 0.36 K

C. 36.54 K

D. 273 K

Answer: C

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252. The equilibrium constant $(K_c)$for the reaction

$2HCl(g) \Leftrightarrow H_2(g) + Cl_2(g)$ Is 4×10^{-34} at $25^\circ C$. What is the equilibrium constant for the reaction ?

$\frac{1}{2}H_2(g) + \frac{1}{2}Cl_2(g) \Leftrightarrow HCl(g)$

A. 2×10^{-17}

B. 2.5×10^{33}

C. 5×10^{16}

D. None of these

Answer: C

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253. In the presence of excess of anhydrous $SrCl_2$, the amount of water taken up is governed by $K_p = 10^{12} atm^{-4}$ for the following reaction at 273 K

$SrCl_2 . 2H_2O(s) + 4H_2O(g) \Leftrightarrow SrCl_2 . '6H_2O(s)$

What fs equilibrium vapour pressure (in torr) of water in a closed vessel that contains $SrCl_2 . 2H_2O(s)$?

A. 0.001 torr

B. $10^3 \rightarrow rr$

C. 0.76 torr

D. 1.31 torr

Answer: C

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254. In a system $A(s) \Leftrightarrow 2B(g) + 3C(g)$, if the concentration of C at equilibrium is increased by a factor of 2, it will cause the equilibrium concentration of B to change to:

A. two times the original value

B. one half of its original value

C. $2\sqrt{2}$ times to the original value

D. $\frac{1}{2\sqrt{2}}$ times the original value

Answer: D

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255. N_2O_4 is dissociated to 33% and 50% at total pressure P_1 and P_2 atm respectively. The ratio of $\frac{P_1}{P_2}$ is

A. 3 : 8

B. 2 : 1

C. 8 : 3

D. 1 : 2

Answer: C

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256. If 340 g of a mixture of N_2 and H_2 in the correct ratio has a 20% yield of NH_3. The mass produced would be

A. 16g

B. 12g

C. 20g

D. 68g

Answer: D

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257. For the following equilibrium reaction $N_2O_4(g) \Leftrightarrow 2NO_2(g)$ NO_2 is 50% of the total volume at a given temperature. Hence, vapour density of the equilibrium mixture is ?

A. 34.5

B. 36.8

C. 23

D. 20

Answer: A

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258. $20\ \%\ N_2O_4$ molecules are dissociated in a sample of gas at $27^\circ C$ and 760 mm hg .calculate the density of equilion mixture.

A. 3.11 g/litre

B. 2.11 g/litre

C. 4.5 g/litre

D. None of these

Answer: A

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259. For the reaction $XCO_3(s) \Leftrightarrow XO(s) + CO_2(g)$. $K_p = 1.642 atm$ at $727^\circ C$. if 4 moles of $XCO_3(s)$ was put into a 50 litre container and heated to $727^\circ C$,

What mole percent of the XCO_3 remains unreacted at equilibrium ?

A. 20

B. 25

C. 50

D. 75

Answer: D

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260. At $200^{\circ} CPCI_5$ dissociates as follows :

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

It was found that the equilibrium vapours are 62 times as heavy as hydrogen. The degree of dissociation of PCl_5 at $200^{\circ} C$ Is nearly :

A. $10\ \%$

B. $42\ \%$

C. $50\ \%$

D. $68\ \%$

Answer: D

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261. For the reaction (1) and (2)

$A(g) \Leftrightarrow B(g) + C(g)\ldots\ldots(1)$

$X(g) \Leftrightarrow 2Y(g)$ ....(2)

Given, $K_{p_1} : K_{p_2} = 9 : 1$

If the degree of dissociation of A(g) and X(g) be same then the total pressure at equilibrium (1) and (2) are in the ratio :

A. 3:1

B. 36:1

C. 1:1

D. 0.5:1

Answer: B

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262. For the following equilibrium

$NH_2COONH_4(s) \Leftrightarrow 2NH_3(g) + CO_2(g)$

If equilibrium pressure is 3 atm for the given reaction, $K_p$will be:

A. 4

B. 20

C. 15

D. 25

Answer: C

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263. The equilibrium pressure of $NH_4CN(s) \Leftrightarrow NH_3 + HCN$ is 0.298 atm, Calculate K_p. If NH_4CN (s) is allowed to decompose in presence of NH_3 at 0.25 atm, calculate partial pressure of HCN at equilibrium.

A. 0.06 atm

B. 0.08 atm

C. 0.04 atm

D. 0.02 atm

Answer: B

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264. Assume that the decomposition of HNO_3 can be represented by the following equation

$4HNO_3(g) \Leftrightarrow 4NO_2(g) + 2H_2O(g) + O_2(g)$

and the reaction approaches equilibrium at 400 K temperature and 30 atm pressure. At equilibrium partial pressure of HNO_3 is 2 atm.

Calculate K_c in $\left(mo\frac{l}{L}\right)^3$ at 400 K:

(use : R = 0.08 atm-L/mol-K)

A. 4

B. 8

C. 16

D. 32

Answer: D

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265. Determine the degree of association (polymerization) for the reaction in aqueous solution

$6HCHO \Leftrightarrow C_6H_{12}O_6$

if observed (mean) molar mass of $HCHO$ and $C_6H_{12}O_6$ is 150:

A. 0.5

B. 0.833

C. 0.9

D. 0.96

Answer: D

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266. Rate of diffusion of ozonized oxygen is 0.894 times that of pure oxygen. What is the percent degree of association of oxygen assuming pure O_2 in the sample initially ?

A. 20

B. 40

C. 60

D. None of these

Answer: C

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267. The equilibrium constant K, at $27^\circ C$ for a homogeneous reaction is 10^{-8}. The standard free energy change ΔG° for the reaction (using R = $2calK^{-1}mol^{-1}$)

A. 11.05 Kcal

B. -1.8 Kcal

C. -4.145 Kcal

D. 4.145 Kcal

Answer: A

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268. For this reaction,

$Ag^{+}(Aq) + 2NH_3(aq) \Leftrightarrow [Ag(NH_3)_2]^{+}(aq), k = 1.7 \times 10^7$ at $25^{\circ}C$.

What is the value of ΔG° ?

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269. A vessel of 250 litre was filled with 0.01 mole of Sb_2S_3 and 0.01 mole of H_2 to altain the equilibrium at $440^{\circ}C$ as:

$Sb_2S_3(s) + 3H_2(g) \Leftrightarrow 2Sb(s) + 3H_2S(g)$

After equilibrium, the H_2S formed was analysed by dissolving it in water and treating with excess of Pb^{2+} to give 1.19 g of PbS as precipitate. What is the value of K_c at $440^{\circ}C$?

A. 1

B. 2

C. 4

D. 8

Answer: A

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270. The equilibrium constant for the ionization of $RNH_2(g)$ in water as

$RNH_2(g) + H_2O(l) \Leftrightarrow RNH_3^+(aq) + OH^{-(aq)}$

is 8×10^{-6} at $25^{\circ}C$. Find the pH of a solution at equilibrium when pressure of $RNH_2(g)$ is 0.5 bar :

A. ≈ 12.3

B. ≈ 10.6

C. ≈ 11.30

D. None

Answer: C

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271. Two solid compounds X and Y dissociates at a certain temperature as follows

$X(s) \Leftrightarrow A(g) + 2B(g) : K_{P1} = 9 \times 10^{-3} atm^3$

$Y(s) \Leftrightarrow 2B(g) + C(g), K_{P2} = 4.5 \times 10^{-3} atm^3$

The total pressure of gases over a mixture of X and Y is:

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272. For the equilibrium

$LiCl.\ 3NH_3(s) \Leftrightarrow LiCl.\ NH_3(s) + 2NH_3(g)$

$K_P = 9atm^2$ at $37^\circ C$. A 5 litre vessel contains 0.1 mole of $LiCl.NH_3$ How many moles of NH_3 should be added to the flask at this temperature to derive the backward reaction for completion?

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273. In the system, $CaF_2(s) \Leftrightarrow Ca^{2+}_{aq} +$ 2F "_(aq)^- $\in crea\sin gtheconcentrationof$Ca^(2+) $ion4 \times willcausetheequilibriumconcentrationof$F^-` ions to change to:

A. 1/4 of the initial value

B. 1/2 of the initial value

C. 2 times the initial value

D. none of these

Answer: B

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274. Calculate $\Delta_r G$ for the reaction at $27^\circ C$

$H_2(g) + 2Ag^+(aq) \Leftrightarrow 2Ag(s) + 2H^+(aq)$

Given: $P_{H_2} = 0.5;\ [Ag^+] = 10^{-5} M,$

$[H^+] = 10^{-3} M,\ \Delta_r G^\circ [Ag^+(aq)] = -77.1 k\frac{J}{m} ol$

A. -154.2 kJ

B. -178.9 kJ

C. -129.5 kJ

D. none of these

Answer: C

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275. For the gas phase reaction $C_2H_4 + H_2 \Leftrightarrow C_2H_6 \Delta H = -136.8 kJ mol^{-1}$ carried out in a vessel, the equilibrium concentration of C_2H_4 can be increased by

A. increasing the temperatures

B. increasing the pressure

C. adding some H_2

D. removing some C_2H_6

Answer: A

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276. If the pressure of an equilibrium mixture of the three gases NO, Cl_2 and NOCl,

2NO(g)+ Cl_2(g) iff 2NOCl(g)`

Is suddenly decreased by doubling the volume of the container at constant temperature, when the system returns to equilibrium :

A. the concentration of NOCl will have increased

B. the value of the equilibrium constant K_C will have increased

C. the number of moles of Cl_2 will have increased

D. the number of moles of NOCl will have increased

Answer: C

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277. $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$ in closed container at equilibrium. What would be the effect of addition of $CaCO_3$ on the equilibrium concentration of CO_2 :

A. Increases

B. Remains unaffected

C. Decreases

D. Data is not sufficient

Answer: B

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278. K_1 and K_2 are the respective equilibrium constants for the following two reactions :

(i) $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$

$(ii) 2NO(g) + O_2(g) \Leftrightarrow 2NO_2(g)$

Then the equilibrium constant for the reaction

$N_2(g) + 2O_2(g) \Leftrightarrow 2NO_2(g)$ will be

A. $\frac{K_1}{K_2}$

B. $K_2 \times K_1$

C. $\frac{K_2}{K_1}$

D. $1/K_2 \times K_1$

Answer: B

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279. The equilibrium constant for the reaction $H_2O(g) + CO(g) \Leftrightarrow H_2(g) + CO_2(g)$ at 160 K is 0.44. What will be the equilibrium const. at 1260K for the reaction

$2CO(g) + 2H_2O(g) \Leftrightarrow 2CO_2(g) + 2H_2(g)$? $\Delta H = 615.7 cal mol^{-1}$

A. 9.44

B. 0.88

C. 5.57

D. 126

Answer: C

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280. 2 moles of N_2 and 5 moles of H_2 are mixed in a one litre flask. If 75% of N_2 is converted into ammonia by the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$, then the total number of moles of gas at equilibrium Is :

A. 3

B. 3.5

C. 5.5

D. 4

Answer: D

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281. The equilibrium constant for the reaction

$SO_3(g) \Leftrightarrow SO_2(g) + \frac{1}{2}O_2(g)$ Is K_c= 4.9×10^{-2} The value of K_c for the reaction

$2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$ will be

A. 416

B. 2.4×10^{-3}

C. 9.8×10^{-2}

D. 4.9×10^{-2}

Answer: A

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282. For the equilibrium $AB(g) \Leftrightarrow A(g) + B(g) K_p$ is equal to 4 times the total pressure. The number of moles of 'A' formed is

A. $\frac{\sqrt{5}}{2}$

B. 2

C. $\sqrt{5}$

D. $\frac{2}{\sqrt{5}}$

Answer: D

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283. A and B are gaseous substances which react reversibly to give two gaseous substances C and D, accompanied by the liberation of heat. When the reaction reaches equilibrium, itis observed that $K_P = K_C$. the equilibrium can not be disturbed by

A. adding A

B. adding B

C. raising the temperature

D. increasing the pressure

Answer: D

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284. Two samples of HI each of 5g were taken separately in two vessels of volume 5 and 10 litres respectively at $27^{\circ}C$, The extent of dissociation of HI will be

A. More in the 5 litre vessel

B. More in the 10 litre vessel

C. Equal in both vessels

D. Nil at both

Answer: B

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285. When the ionic product of a solution exceeds the solubility product, the solution becomes:

A. saturated

B. Unsaturated.

C. a colloid

D. super saturated and precipitation of salts occur

Answer: C

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286. Solubility of which among the following substances in water increases slightly with rise in temperature?

A. Potassium chloride

B. Potassium bromide

C. Potassium nitrate

D. Sodium nitrate

Answer: C

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287. Chemical equilibrium for a reversible change means for:

A. the forward reaction proceeds as fast as the backward reaction, i.e,, velocity of opposing reaction is equal

B. no change in conc. of reaction species with time

C. dynamic equilibrium

D. none of the above.

Answer: A::B::C

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288. The equilibrium constants of the reactions :

$SO_2 + \frac{1}{2}O_2 \Leftrightarrow SO_3$ and $2SO_2 + O_2(g) \Leftrightarrow 2SO_3(g)$ and K_1 and K_2 respectively. The relationship between K_1 and K_2 is

A. $K_1 = K_2$

B. $K_2 = K_1^2$

C. $K_1 = \sqrt{K_2}$

D. $K_2 = \sqrt{K_1}$

Answer: B::C

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289. The relationship between K_P, and K_c is correctly shown as,

A. $K_C = K_P(RT)^{\Delta n}$

B. $K_P = K_C(RT)^{-\Delta n}$

C. $K_P = K_C(RT)^{\Delta n}$

D. $K_C = K_P(RT)^{-\Delta n}$

Answer: C::D

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290. Which of the following are correct about the reaction:

$A + 2B \Leftrightarrow C + D$

A. $K_P = \dfrac{n_C \times n_D}{n_A \times (n_B)^2} \times \left[\dfrac{P}{RT}\right]^{-1}$

B. $K_P = \dfrac{n_C \times n_D}{n_A \times (n_B)^2} \times \left[\dfrac{P}{\sum T}\right]^{-1}$

C. $K_P = \dfrac{n_C \times n_D}{n_A \times (n_B)^2} \times \left[\dfrac{V}{RT}\right]^{-1}$

D. $K_C = \dfrac{[C][D]}{[A][B]^2}$

Answer: B::C::D

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291. Pure NH_3 is placed ina vessel at a temperature Where its dissociation constant (K) is appreciable, At equilibrium

A. K does not change with pressure

B. K does not change with $[NH_3]$

C. concentration of NH_3 does not change with pressure

D. concentration of hydrogen is double the initial

Answer: A::B

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292. The equilibrium $SO_2Cl_2(g) \Leftrightarrow SO_2(g) + Cl_2(g)$ is attained at $25^\circ C$ in a closed container at constant P and an inert gas, helium is introduced. Which of the following statements are incorrect ?

A. Concentrations of SO_2, Cl_2, and SO_2Cl_2, change

B. More Cl_2 is formed

C. Concentration of SO_2 is reduced

D. more SO_2Cl_2 is formed

Answer: C::D

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293. For the reaction $PCI_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$ the forward reaction at constant temperature is favoured by

(1) introducing an inert gas at constant volume

(2) introducing chlorine gas at constant volume

(3) introducing an inert gas at constant pressure

(4) decreasing the volume of the container

(5) introducing PCl, at constant pressure

A. introducing an inert gas at constant volume

B. introducing chlorine gas at constant volume

C. Introducing an inert gas at constant pressure

D. increasing the volume of the container

Answer: C::D

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294. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement - I: A catalyst increases the speed of the forward reaction and hence equilibrium shifts forward.

Statement - II : The catalyst forms a complex with the reactants and provides an alternate path with lower energy of activation for the reaction.

A catalyst increases the speed of the forward as well as backward reaction to the same extreme and hence equilibrium is not disturbed.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- Il is false.

D. Statement -I is false, Statement- II is true

Answer: D

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295. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement - I: The active mass of a pure solid or a pure liquid is taken as 1.

Statement - Il, The active mass of a pure solid or a pure liquid depends upon the density and molecular mass of the substance both of which are constant for the pure substance.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- Il is false.

D. Statement -I is false, Statement- II is true

Answer: A

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296. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I : Quicktime dissolves more in hot water than in water at room temperature.

Statement - II : Dissolution of quicklime in water is exothermic,

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - I is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: D

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297. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I : If equilibrium constant for

$N_2 + 3H_2 \Leftrightarrow 2NH_3$ is K,

the equilibrium constant for

$\frac{1}{2}N_2 + \frac{3}{2}H_2 \Leftrightarrow NH_3$ will be K/2

Statement II: On dividing or multiplying an equation with any number, the equilibrium constant of the reaction changes

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - I is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: D

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298. This question has Statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I: For the equilibrium $N_2O_4(g) \Leftrightarrow 2NO_2(g)$, if volume of the vessel is reduced to half of its original volume, equilibrium constant will be doubled.

Statement - II , Decrease of volume to half doubles the concentration of N_2O_4 as well as NO_2

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- Il is false.

D. Statement -I is false, Statement- II is true

Answer: D

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299. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two

Statements

Statement I: K_p can be equal to or less than or greater than K_c.

Statement-II: $K_p = K_c(RT)^{\Delta n}$. Thus, K_p and K_c depend upon temperature.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - I is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: B

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300. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two

Statements

Statement - 1: If an inert gas is added to a dissociation equilibrium keeping pressure constant, the dissociation increases.

Statement - II: inert gas exerts its own pressure in the vessel.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- Il is false.

D. Statement -I is false, Statement- II is true

Answer: B

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301. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two

Statements

Statement - I : If reaction quotient (Q_c) is less than the equilibrium constant (K_c), the equilibrium tends to shift in the direction of products.

Statement - II : The expression for equilibrium constant is different than the expression for reaction quotient.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: C

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302. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I: Equilibrium constant$K = \frac{k_f}{k_b}$. With increase of temperature, k_f and k_b, change by the same amount, hence K remains constant.

Statement - II : The increase of temperature of a reaction lowers its activation energy. Hence, both forward and backward reaction become faster to the same extent.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- Il is false.

D. Statement -I is false, Statement- II is true

Answer: D

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303. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I: If to the equilibrium $PCI_5(g) \Leftrightarrow PCI_3(g) + Cl_g$, in a closed vessel, an inert gas is added, total pressuré will increase and hence, equilibrium will shift backward.

Statement - II: Addition of an inest gas to an equilibrium mixture at constant pressure shifts the equilibrium in the forward direction.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: D

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304. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I : Equilibrium constant of all reactions changes with change of temperature.

Statement - II : With increase in temperature, both forward and backward reactions are speeded up but to different extents.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: B

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305. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I: The equilibrium mixture

$Co(H_2O)\_6\hat{}(2+)\ \text{(aq)} + 4\ \text{Cl}\hat{}\text{- (aq) iff CoCl}_4^{2+}(aq) + 6H_2O(l)$

turns pink from deep blue on cooling in a freezing mixture.

Statement.II : The reaction is endothermic. On cooling, equilibrium shifts in the backward direction.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - l is true, Statement- Il is false.

D. Statement -I is false, Statement- II is true

Answer: A

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306. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement~ I: In Bosch process for manufacture of H_2 from water gas, pressure has no effect on equilibrium.

Statement - II: The reaction makes use of steam which does not allow the reaction to be affected by pressure.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - I is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: C

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307. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I : For the reaction

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

Units of $K_c = L^2 mol^{-2}$

Statement - II : For the reaction

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

Equilibrium constant, $K_c = \frac{[NH_3]^2}{[N_2][H_2]^3}$

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - I is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: A

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308. This question has Statement I and Statement It. Of the four choices given after the Statements, choose the one that best describes the two Statements

Statement - I: At high pressure melting of ice is favoured.

Statement - II : Density of ice is less than that of water.

A. Statement - I is true, Statement - II is true,

Statement - II is a correct explanation of Statement - I

B. Statement - I is true, Statement - II ts true,

Statement - II is not a correct explanation of Statement I.

C. Statement - I is true, Statement- II is false.

D. Statement -I is false, Statement- II is true

Answer: A

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309. For a reversible reaction at a certain temperature when it is at equilibrium or equilibrium has been attained whether physical or chemical, a change in certain variables might change the state of equilibrium. These variables include pressure, volume, concentration and temperature. Due to these changes, a system under equilibrium changes its state in such a manner, i.e., the equilibrium moves in forward direction or backward direction, so that the effect of change is annulled. A gaseous phase endothermic decomposition of phosphorus pentachloride, can be made spontaneous by increasing concentration of PCl_5, lowering the pressure and increasing temperature of the system.

Which of the following reactions proceed in forward direction with increase in temperature ?

A. $H_2(g) + I_2(g) \Leftrightarrow 2HI(g) + 3000cal$

B. $N_2(g) + O_2(g) \Leftrightarrow 2N)(g) - 43200cal$

C. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g) + 22400cal$

D. $C(s) + O_2(g) \rightarrow CO_2(g) + 94300cal$

Answer: B

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310. For a reversible reaction at a certain temperature when it is at equilibrium or equilibrium has been attained whether physical or chemical, a change in certain variables might change the state of equilibrium. These variables include pressure, volume, concentration and temperature. Due to these changes, a system under equilibrium changes its state in such a manner, i.e., the equilibrium moves in forward direction or backward direction, so that the effect of change is annulled. A gaseous phase endothermic decomposition of phosphorus pentachloride, can be made spontaneous by increasing concentration of PCl_5, lowering the pressure and increasing temperature of the system.The change in Gibbs energy, for a reaction at equilibrium, e.g. $PCI_5(g) \Leftrightarrow PCI_3(g) + Cl_2(g)$. on addition of an inert gas at constant pressure and then at constant volume respectively are :

A. decrease, no change

B. increase, no change

C. change, no change

D. no change, decrease

Answer: A

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311. For gaseous reaction

$aA(g) + bB(g) \Leftrightarrow cC(g) + dD(g)$

equilibrium constant K_c, K_p and K_x are represented by the following relations

$K_c = \frac{[C]^c[D]^d}{[A]^a[B]^b}, K_p = \frac{P\_C\hat{}c.P_D^d}{P\_A\hat{}a.P_B^b}$ and K_x = (x"_C^c.x"_C^c)/(x"_A^a.x"_B^b)

$where[A]representsmolarconcentrationof$A, P_A $represents\,\partial pressureofA$ and $Prepresents \rightarrow talpressure$, x_A`, represents mole fraction of A

On the basis of above work up. Select write option

A. $K_p = K_c(RT)^{\Delta n_g}, K_x = K_p(RT)^{\Delta n_g}$

B. $K_c = K_p(RT)^{-\Delta n_g}, K_p = K_x P^{\Delta n_g}$

C. $K_c = K_x P^{\Delta n_g}, K_p = K_x P^{\Delta n_g}$

D. $K_c = K_p(RT)^{-\Delta n_g}, K_x = K_p(RT)^{\Delta n_g}$

Answer: B

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312. For gaseous reaction

$aA(g) + bB(g) \Leftrightarrow cC(g) + dD(g)$

equilibrium constant K_c, K_p and K_x are represented by the following relations

$K_c = \frac{[C]^c[D]^d}{[A]^a[B]^b}, K_p = \frac{P\_C\hat{}c.P_D^d}{P\_A\hat{}a.P_B^b}$ and K_x = (x"_C^c.x"_C^c)/(x"_A^a.x"_B^b)

$where[A]representsmolarconcentration of$A, P_A $represents \partial pressure of A$ and $P represents \rightarrow tal pressure$, x_A $, represents mo \leq \frac{t}{i} ono f AF$ or $the reaction$SO_2Cl_2(g) iff SO_2(g) + Cl_2(g), K_p gt K_x` is obtained at :

A. 0.5 atm

B. 0.8 atm

C. 1 atm

D. 2 atm

Answer: D

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313. Match the Column-I with Column-II

View Text Solution

314. Match the Column-I with Column-II

View Text Solution

315. Match the Column-I with Column-II

View Text Solution

316. Match the Column-I with Column-II

View Text Solution

317. Match the Column-I with Column-II

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318. The equilibrium constant for, $2H_2S(g) \Leftrightarrow 2H_2(g) + S_2(g)$ is 0.469 atm at $1065^\circ C$ and heat of dissociation is 42.4 $kcal mol^{-1}$. Calculate the equilibrium constant at $1132^\circ C$.

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319. For the reaction at 288 K $A(g) + B(g) \Leftrightarrow C(g) + D(g)$,

ΔH° = -$29.8 kcal$ and ΔS°=-$100 cal/K$. Find the value of equilibrium constant.

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320. For the equilibrium, $N_2O_4 \Leftrightarrow 2NO_2$, $\Delta G^0_{N_2O_4} = 100 kJmol^{-1}$ and $\Delta G^0_{NO_2} = 50 kJmol^{-1}$ at 298 K. When 5 mol / lit of each is taken then find the value of ΔG for the reaction at.298 K

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321. N_2O_4 is 66% dissociated into NO_2 at 340 K and 1 atm pressure. Find the volume occupied by 10 g N_2O_4, under these condition.

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322. If a mixture of 3 mole H_2 and 1 mole of N_2 is completely converted into NH_3 what would be final volume at same P and T.

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323. The equilibrium constant K_p for the gas phase decomposition of ter-butyl chloride is 3.45 at 500 K :

$(CH_3)_3\mathbb{C}I(g) \Leftrightarrow (CH_3)_2C = CH_2(g) - \ + HCI(g)$

Calculate molar concentration of reactants and Products in the equilibrium mixture obtained by heating 4.0 mole of ter butyl chloride in a 5.0 L container at 500K.

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324. A 79.2 g chunk of dry ice and 30 g of graphite were placed in an empty 5.0 L container, and the mixture was heated fo achieve equilibrium. The reaction is :

$CO_2(g) + C(s) \Leftrightarrow 2CO(g)$

What is the value of K_p at 1000 K if the gas density at this temperature is 16.3 g/L. What is the value of K_p at 1100 K if the gas density at this temperature is 16.9 g/L.

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325. The reaction : $N_2 + 3H_2 \Leftrightarrow 2NH_3$ Is started with an equal number of moles of N_2 and H_2, Calculate mote fraction of NH_3 at 723 K at a total pressure of 0.5 atm, given $K_p = 6 \times 10^{-3}$,

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326. A flask containing 0.06 mole of $F_2(g)$ is allowed to equilibrate with F(g) at 1000 K. If the total pressure of the gases at equilibrium is 2.07 bar, calculate mole fraction of each gases at equilibrium.

Given $F_2(g) \Leftrightarrow 2F(g), K_p(1000K) = 9.5 \times 10^{-3}$

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327. 0.2 mole of each $Cl_2(g)$ and $F_2(g)$ are introduced in a seated flask and heated to 2000 K where following equilibrium is established. $Cl_2(g) + F_2(g) \Leftrightarrow 2CIF(g)$, and at equilibrium, moles of CIF 0.267. At this stage, 0.1 mol of Br_2 is added and equilibrium is reestablished as :

$Cl_2 + F_2(g) \Leftrightarrow 2CIF(g), Cl_2(g) + Br_2(g) \Leftrightarrow 2BrCl(g)$ Now moles of CIF found to be 0.25. Calculate K_c for the second equilibrium reaction.

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328. $N_2 + 3H_2 \rightleftharpoons 2NH_3 + heat$. What is the effect of the increase of temperature on the equilibrium of the reaction?

A. Equilibrium is shifted to the left

B. Equilibrium is shifted to the Right

C. Equilibrium is unaltered

D. Reaction rate does not change

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329. PCl_5 dissociates as $PCl_5 \rightleftharpoons PCl_3 + Cl_2$.When 0.03 mol of PCl_5 was brought to equilibrium at 500 K and 1.0 atmosphere the equilibrium volume was 2.09 L.The equilibrium constant for the reaction is ?

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330. Consider the following reaction :

$2NO_2 + O_3 \Leftrightarrow N_2O_5(g) + O_2(g), \Delta H_f^0(O_3) = 143 kJmol^{-1}$,

$\Delta H_f^0(N_2O_5) = 11 kJmol^{-1}$ and $\Delta H_f^0(NO_2) = 33 kJmol^{-1}$

The above reaction is spontaneous at lower temperature but turned non spontaneous as temperature approaches to 1175 K. Assuming ΔH° and ΔS° to be independent of temperature, determine K_p at 500 K.

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331. At certain temperature, a 10 lit vessel contains 0.4 mole H_2, 0.4 mole I_2 and 0.1 mole HI at equilibrium. Then K_p for $H_2 + I_2 \rightleftharpoons 2HI$ is:

A. `

B.

C.

D.

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332. For the reaction, $C(s) + CO_2(g) \rightarrow 2CO(g), K_p = 63 atm$ at 1000 K. if at equilibrium $P_{CO} = 10P_{CO_2}$, than the total pressure of the gases at equilibrium is

(1) 6.3 atm

(2) 6.93 atm

(3) 0.63 atm

(4) 0.693 atm

(5) 69.3 atm

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333. For the reaction $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$ at 300K, the value of ΔG° is - 690.9R. The equilibrium constant value for the reaction at that temperature is (R is gas constant)

A. $10atm^{-1}$

B. 10 atm

C. 10

D. 1

Answer: A

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334. If the equilibrium constant for $N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$ is K, the equilibrium constant for $\frac{1}{2}N_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow NO(g)$ will be:

A. $K^{\frac{1}{2}}$

B. 1/2K

C. K

D. K^2

Answer: A

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335. For the reaction $SO_2(g) + \frac{1}{2}O_2(g) \Leftrightarrow SO_3(g)$ if $K_p = K_c(RT)^x$ where the symbols have usual meaning then the value of x is: (assuming ideality)

A. -1

B. -1/2

C. 44228

D. 1

Answer: B

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336. For the reversible reaction

$N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ +heat

The equilibrium shifts in forward direction

A. by increasing the concentration of $NH_3(g)$

B. by decreasing the pressure'

C. by decreasing the concentrations of $N_2(g)$ and $H_2(g)$

D. by increasing pressure and decreasing temperature.

Answer: D

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337. For a given exothermic reaction, K_p and K"_p^' $aretheequilibriumcons\tan tsattemperatures$T_1 and T_2 $respectively. As\sum \in g\widehat{theato}freactioniscons\tan t \in temperatureran \geq$ T_1 and T_2` it is readily observed that

A. `K_p gt K"_p^'

B. $K_p < K'_p$

C. $K_p = K'_p$

D. $K_p = \frac{1}{K'_p}$

Answer: A

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338. For the equilibrium, $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g), K_p$ is 1.64 atm at 1000 K.

50g of $CaCO_3$ in a 10L closed vessel is heated to 1000K. Percentage of $CaCO_3$ that remains unreacted at equilibrium is (Given, $R = 0.082 Latm K^{-1} mol^{-1}$)

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339. For the reaction, $CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$, the $\frac{K_c}{K_p}$ is equal to

A. 1

B. 1/RT

C. 2RT

D. RT

Answer: A

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340. In the lime kiln, the reaction

$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$ goes to completion because

of high temperature

CaO is more stable than $CaCO_3$

CO_2 escapes simultaneously

CaO is not dissociated

CO_2 is a gaseous product

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341. In the synthesis of ammonia

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

When 100 mL of N_2 has reached, the volume of H_2 which has also reacted and ammonia produced are

A. 300 mt H_2 and 200 mL NH_3

B. 300 mL H_2 and 300 mL NH_3

C. 100 mL H_2 and 100 mL NH_2

D. 100 mL H_2 and 200 mL NH_3

Answer: A

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342. A quantity of PCl_5 was heated in a $10 dm^3$ vessel at $250^\circ C$.

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

At equilibrium the vessel contains 0.1 mole of PCl_5 and 0.2 mole of Cl_2

The equilibrium constant of the reaction is

A. 0.05

B. 0.02

C. 0.025

D. 0.04

Answer: D

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343. In which of the following equilibrium systems is the rate of the backward reaction favoured by increase of pressure ?

A. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

B. $2SO_2 + O_2 \Leftrightarrow 2SO_3$

C. $N_2 + 3H_2 \Leftrightarrow 2NH_3$

D. $N_2 + O_2 \Leftrightarrow 2NO$

Answer: A

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344. In which of the following equilibrium systems is the rate of the backward reaction favoured by increase of pressure ?

A. $PCl_5 \Leftrightarrow PCl_3 + Cl_2$

B. $2SO_2 + O_2 \Leftrightarrow 2SO_3$

C. $N_2 + 3H_2 \Leftrightarrow 2NH_3$

D. $N_2 + O_2 \Leftrightarrow 2NO$

Answer: A

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345. At $490^\circ C$, the equilibrium constant for the synthesis of HI is 50, the value of K for the dissociation of HI will be

A. 20

B. 2

C. 0.2

D. 0.02

Answer: D

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346. For which of the following reactions are the numerical value of K_p and K_c the same ?

A. $H_2(g) + Cl_2(g) \Leftrightarrow 2HCl(g)$

B. $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$

C. $2NOCl(g) \Leftrightarrow 2NO(g) + Cl_2(g)$

D. $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$

Answer: A

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347. In a reversible chemical reaction at equilibrium, if the concentration of any one of the reactants is doubled then the equilibrium constant will -

A. also be doubled

B. be halved

C. remains the same

D. becomes one-fourth

Answer: C

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348. For the reaction,

$$2NO_2(g) + \frac{1}{2}O_2 \Leftrightarrow N_2O_5(g)$$

if the equilibrium constant is K_p, then the equilibrium constant for the reaction

$2N_2O_5(g) \Leftrightarrow 4NO_2 + O_2(g)$ would be

A. K_p^2

B. $\frac{2}{K_p}$

C. $\frac{1}{K_p^2}$

D. $2K_p$

Answer: C

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349. For, $2NOBr(g) \Leftrightarrow 2NO(g) + Br_2(g)$, at equilibrium $p_{Br_2} = \frac{p}{9}$ and p is the total pressure, the ratio $\frac{K_p}{p}$ will be

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350. Given that the equilibrium constant for the reaction,

2SO_2(g) + O_2(g) iff 2SO_3(g)

$hasavalueof278ataparticu\underline{a}rtemperature. W\hat{i}sthevalueoftheequilibrium$

SO_3(g) iff SO_2(g) + 1/2 O_2(g)`

A. 1.8×10^{-3}

B. 3.6×10^{-3}

C. 6.0×10^{-2}

D. 1.3×10^{-5}

Answer: C

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351. Given, the reaction between two gases represented by A_2 and B_2 to give the compound $AB(g)$.

$A_2(g) + B_2(g) \Leftrightarrow 2AB(g)$

At equilibrium, the concentration

of $A_2 = 3.0 \times 10^{-3} M$

of $B_2 = 4.2 \times 10^{-3} M$

of $AB = 2.8 \times 10^{-3} M$

If the reaction takes place in a sealed vessel at $527^{\circ} C$, then the value of K_c will be

A. 2

B. 1.9

C. 0.62

D. 4.5

Answer: C

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352. Reactions which can go farthest for completion should have

A. K = 100

B. K = 1

C. K = 0.1

D. $K = 10^{-2}$

Answer: D

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353. For the reaction, $2NH_3(g) \Leftrightarrow N_2(g) + 3H_2(g)$ the units of K_p will be

A. atm

B. $(atm)^3$

C. $(atm)^{-2}$

D. $(atm)^2$

Answer: D

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354. In the reaction, $H_2(g) + Cl_2(g) \Leftrightarrow 2HCl(g)$

A. $K_p \neq K_c$

B. $K_p = K_c$

C. $K_p > K_c$

D. $K_p < K_c$

Answer: B

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355. The equilibrium constants of the reactions :

$SO_2 + \frac{1}{2}O_2 \Leftrightarrow SO_3$ and $2SO_2 + O_2(g) \Leftrightarrow 2SO_3(g)$ and K_1 and K_2 respectively. The relationship between K_1 and K_2 is

A. $2K_1 = K_2^2$

B. K_1^2

C. $K_2^2 = \frac{1}{K_1}$

D. $K_2 = \frac{2}{K}{}_1^2$

Answer: B

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356. At 1000 K temperature CO_2 has pressure fo 0.5 atm in a closed container. On adding some amount of graphite inside the container . some amount of CO_2 is converted to CO. At equilibrium the pressure becomes 0.8 atm. Find out the value of k_p

A. 1.8 atm

B. 3 atm

C. 0.3 atm

D. 0.18 atm

Answer: A

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357. Four moles of PCl_5 are heated in a closed $4dm^3$ container to reach equilibrium at 400 K, At equilibrium 50% of PCl_5 is dissociated. What is the value of K_c for the dissociation of PCl_5 into PCl_3 and Cl_2 at 400 K ?

(1) 0.50

(2) 1.00

(3) 1.15

(4) 0.05

(5) 0.25

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358. Final pressure is higher than initial pressure of a container filled with an ideal gas at constant temperature. What will be the value of equilibrium constant ?

A. K = 1.0

B. $K < 1$

C. $K > 1.0$

D. None of these

Answer: D

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359. The value of ΔH for the reaction,

$X_2(g) + 4Y_2(g) \Leftrightarrow 2XY_4(g)$ is less than zero, Formation of $XY_4(g)$ will be favoured at

A. high pressure and low temperature

B. high temperature and high pressure

C. low pressure and low temperature

D. high temperature and low pressure

Answer: A

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360. For the reactions, $I_2(aq) \Leftrightarrow I_2(oil)$. Equilibrium constant is K_1

$I_2(oil) \Leftrightarrow I_2$ (ether) Equilibrium constant is K_2 for reaction,

$I_2(aq) \Leftrightarrow I_2(ether)$ Equilibrium constant K_3.

The relation between K_1, K_2, K_3 is

A. $K_3 = K_1 + K_2$

B. $K_3 = K_1K_2$

C. $K_3 = \frac{K_1}{K_2}$

D. $K_3 = \frac{K_2}{K_1}$

Answer: B

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361. Which statement is not correct ?

A. Rate of an exothermic reaction increases with temperature.

B. Solubility of NaOH increases with temperature.

C. K_p for $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ increases with increase in pressure.

D. For gaseous reaction $2B \rightarrow AK_p$ is smaller than K_c.

Answer: C

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362. For a chemical reaction of the type $A \Leftrightarrow B, K = 2.0$ and $B \Leftrightarrow C, K = 0.01$. Equilibrium constant for the reaction $2C \Leftrightarrow 2A$ is

A. 25

B. 50

C. 2500

D. 4×10^{-4}

Answer: C

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363. For the gas phase reaction $2NO \Leftrightarrow N_2 + O_2$, $\Delta H = -43.5$ kcals. Which one of the following is true for the reaction?

A. K_c decreases as T decreases

B. K_c increases as T decreases

C. K_c is independent of temparature

D. K_c varies with addition of NO

Answer: D

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364. The equilibrium constants of the reactions :

$SO_2 + \frac{1}{2}O_2 \Leftrightarrow SO_3$ and $2SO_2 + O_2(g) \Leftrightarrow 2SO_3(g)$ and K_1 and K_2 respectively. The relationship between K_1 and K_2 is

A. $2K_1 = K_2^2$

B. $K_1^2 = \frac{1}{K_2}$

C. $K_2^2 = \frac{1}{K_1}$

D. $K_2 = \frac{2}{K}{}_1^2$

Answer: B

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365. For the reaction, $C(s) + CO_2(g) \rightarrow 2CO(g), K_p = 63 atm$ at 1000 K. if at equilibrium $P_{CO} = 10P_{CO_2}$, than the total pressure of the gases at equilibrium is

(1) 6.3 atm

(2) 6.93 atm

(3) 0.63 atm

(4) 0.693 atm

(5) 69.3 atm

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366. In the reaction, $AB(g) \Leftrightarrow A(g) + B(g)$ at $30^\circ C, K_p$ for the dissociation equilibrium is 2.56×10^{-2} atm. If the total pressure at equilibrium is 1 atm, then the percentage dissociation of AB ?

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367. Which of the following statements are correct for this exothermic reaction ?

$$CoCl_4^{2-}(aq) + 6H_2O(l) \Leftrightarrow \left[Co(H_2O)_6\right]^{2+}(aq) + 4Cl^-\ (aq)$$

(Consider initially only $CoCl_4^{2-}$ is added to water)

A. If HCl is added to above equilibrium then concentration of [CoCl4]2− (aq) will increase

B. On dilution with water the concentration of [CoCl4]2− (aq) will decrease

C. On doubling the volume of solution by addition of water the final concentration of [Co(H2O)6]2+ will be double than its initial concentration

D. On increasing temperature the concentration of [CoCl4]2− will increase

Answer: C

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368. The thermal dissociation of equilibrium of $CaCO_3(s)$ is studied under different conditions.

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

For this equilibrium, the correct statements(s) is (are)

A. ΔH is dependent on T

B. K is independent of the initial amount of $CaCO_3$

C. K is dependent on the pressure of CO_2 ata given temperature

D. ΔH is independent of the catalyst, if any

Answer: A::B::D

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369. The equilibrium constant $(K_c)$for the reaction $N_2(g) + O_2(g) \to 2NO(g)$ at temperature T is 4×10^{-4}. The value of

K_c for the reaction

$NO(g) \rightarrow \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$ at the same temperature is

A. 0.02

B. 2.5×10^2

C. 4.0×10^{-4}

D. 50

Answer: D

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370. The species : $H_2O, HCO_3 -$, $HSO_4 -$, and NH_3 can act both as bronsted acids and bases. For each case give the corresponding conjugate acid and conjugate base

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371. Calculate the H^{+} ion concentration of a 0.01N weak monobasic acid. The value of dissociation constant is 4.0×10^{-10}.

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372. When 0.10 mol of ammonia NH_3 is dissolved in sufficient water to make 1.0L of solution, the solution is found to have a hydroxide ion concentration of 1.34×10^{-3}. Calculate k_b for Ammonia.

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373. What is the pH of the solution when 0.2 mol of HCl is added to one litre of a solution containing 1M acetic acid and acetate ions. Assume that the total volume is one litre. K_a for CH_3COOH = 1.8×10^{-5}.

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374. Calculate the pH of 0.08M solution of hypochlorous acid, HOCI. The ionization constant of the acid is 2.5×10^{-5}. Determine the percent dissociation of HOCI

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375. The pH of a buffer is 4.745. When 0.01 mol of NaOH is added to 1 litre of it, the pH changes to 4.832. Calculate its buffer capacity.

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376. Calculate the pH of the solution in which $0.2MNH_4CI$ and $0.1MNH_3$ are present. The pk_b of ammonia solution is 4.75.

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377. Calculate pH of $1MPO_4^{-3})$ (aq) solution.

$pk_b(PO_4^{-3}) = 1.62$

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378. Hydrolysis constant of NH_4^+ is 5.55×10^{-10}. What is ionisation constant of NH_4^+ (as a conjugate acid) ?

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379. A weak acid HX has the dissociation constant 1×10^{-5}M. It forms a salt NaX on reaction with alkali. The degree of hydrolysis of 0.1 M solution of NaX is

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380. The solubility product of $Mg(OH)_2$ is 1×10^{-11}. At what pH, precipitation of $Mg(OH)_2$ will begin from 0.1 M Mg^{2+} solution ?

A. 9

B. 7

C. 3

D. 5

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381. If a saturated solution is prepared by dissolving Ag_2CO_3 in water has $\left[Ag^{+}\right] = 2.56 \times 10^{-4}$, what is the value of k_sp for Ag_2CO_3 ?

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382. Calculate the solubility of A_2X_3 in pure water, assuming that neither kind of ion reacts with water. The solubility product of $A_2X_3, K_sp = 1.1 \times 10^{-23}$

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383. Calculate the molar solubility of $Ni(OH)_2$ in 0.10 M NaOH. The solubility product of $Ni(OH)_2$ is 2.0×10^{-15}.

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384. An indicator has $pk_{\in} = 5.3$. In a certain solution, this indicator is found to be 80% in its acid from. What is the pH of the solution ?

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385. An indicator has $pk_{\in} = 5.3$. In a certain solution, this indicator is found to be $80\,\%$ in its acid from. What is the pH of the solution ?

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386. The ionization constant of an acid-base indicator (a weak acid) is 1.0×10^{-6}. The ionized form of the indicator is red whereas the unionized form is blue. The pH change required to alter the colour of the indicator from 80% blue to 80% red is:

A. 2.00

B. 1.40

C. 1.20

D. 0.80

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387. Calculate the degree of ionization of 0.1 M acetic acid. The dissociation constant of acetic acid is 1.8×10^{-5}

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388. Calculate the concentration of OH^{-} ions of $0.01 M NH_4OH : K_b = 1.58 \times 10^{-5}$

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389. At $15^{\circ} C$ 0.05 N solution of a weak monobasic acid is 3.5% ionised. Calculate k_a

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390. Calculate k_a for a dibasic acid if its concentration is 0.05 N and hydrogen ion concentration is $1 \times 10^{-3} mol L^{-1}$

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391. Calculate the approximate pH of 0.1 M aqueous H_2S solution. K_1 and k_2 for H_2S are 1.0×10^{-7} and 1.3×10^{-13} respectively at $25^{\circ} C$

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392. 9.8 g of H_2SO_4 is present in 500 mL of the solution. Calculate the pH of the solution.

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393. Find the concentration of H^{+}, HCO_3^{-}, and CO_3^{2-} in a 0.01 M solution of carbonic acid if the pH of the solution is 4.18. $k_1 = 4.45 \times 10^{-7}, k_2 = 4.69 \times 10^{-11}$

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394. The degree of dissociation of water is 1.8×10^{-9} at 298 K. Calculate the ionisation constant and ionic product of water at 298 K

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395. The pH of a solution of $B(OH)_2$ is 10.6. Calculate the solubility and solubility product of hydroxide.

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396. What happens to the pH of 500 mL of a solution that is 0.1 molar in sodium acetate and 0.1 molar acetic when 10ml of0.1M sodium hydroxide is added ?

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397. The concentration of HCN and NaCN in a solution is 0.01 M each. Calculate the concentration of hydrogen and hydroxyl ions if dissociation constant of HCN is 7.2×10^{-10}

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398. One litre of a buffer solution is prepared by dissolving 0.6 mole. of NH_3 and 0.4 mole of NH_4CI. What is the pH of the solution ? For $NH_3K_b = 1.8 \times 10^{-5}$. What is the pH of the buffer after addition of 0.1 mole of of HCl ?

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399. One litre of a buffer solution is prepared by dissolving 0.6 mole. of NH_3 and 0.4 mole of NH_4CI. What is the pH of the solution ? For $NH_3K_b = 1.8 \times 10^{-5}$. What is the pH of the buffer after addition of 0.1 mole of NaOH ?

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400. Calculate the ratio of pH of a solution containing 1 mole $CH_3COONa + 1$ mole of HCl per litre and of the other solution containing 1 mole of $CH_3COONa + 1$ mole of CH_3COOH per litre

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401. K_a for HCN is 1.4×10^{-9}. Calculate for 0.01 N KCN solution. Degree of hydrolysis

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402. K_a for HCN is 1.4×10^{-9}. Calculate for 0.01 N KCN solution: $[OH^-]$ and $[CN^-]$?

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403. K_a for HCN is 1.4×10^{-9}. Calculate for 0.01 N KCN solution. pH

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404. Calculate the degree of hydrolysis of 0.10 M solution of KCN. Dissociation constant of $HCN = 7.2 \times 10^{-10}$ at $25 \circ C$ and $K_w = 1.0 \times 10^{-14}$

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405. The solubility of $CaSO_4$ at $25^\circ C$ is 2.036 g L^{-1} and degree of dissociation of the saturated solution at this temperature is 52.25% . k_sp for $CaSO_4$. $(Molmass of CaSO_4 = 136)$

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406. A solution is saturated with respect to strontium fluoride and strontium carbonate. The fluoride ion concentration in the solution is found to be $3.7 \times 10^{-2} mol L^{-1}$. What is the value of $\left[CO_2^2 -\right]$?

$K_s p(SrF_2) = 8 \times 10^{-10}$ and $k_s p(SrCO_3) = 9.3 \times 10^{-10}$

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407. The solubility product of AgCl is 1.5×10^{-10}). Predict whether there will be any precipitation by mixing 50 mL of 0.01 M NaCl and 50 ml of 0.01 M AgNo3 solution.

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408. Consider the complete ionization of H_2SO_4 (strong acid) and $(COOH)_2$ oxilic acid (weak acid) in liquid NH_3

$H_2SO_4 + 2NH_3 \rightarrow 2NH_4^+ + SO_4^2 -$

$(COOH)_2 + 2NH_3 \rightarrow 2NH_4^+ + (COO)_2^{2-}$

Liquid NH_3 is called

A. proton acceptor

B. leveling solvent

C. both

D. none of these

Answer: A

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409. Which one of the following is the strongest base

A. CIO_3^-

B. CIO_2^-

C. CIO_4^-

D. CIO^-

Answer: D

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410. Ionisation constant of NH4+in water is 5.6×10^(−10) at 25oC. The rate constant for reaction of NH4+ and OH− to form NH3 and H2O at 25 oC is 3.4×10^10 litre.mol−1.sec−1 .Calculate rate constant for proton transfer from water to NH3 .

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411. The self ionization constant for pure formic acid $K=\left[(HCOOH_2)^+\right]\left[(HCOO)^-\right]$ has been estimated as 10^{-6} at room temperature. The density of formic acid is 1.15g/cm^3. What percentage of formic acid molecules in pure formic acid are converted to formate ion ?

A. 0.002%

B. 0.008%

C. 0.004%

D. 0.006%

Answer: A

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412. At $-50^{\circ} C$, the self-ionisation constant (ion product) of NH_3 is $K_{NH_3} = \left[(NH_4)^{+}\right][(NH_2)] = 10^{-30} M^2$. How many amide ions are present per mm^3 of pure liquid ammonia?

A. 600 ions/mn cube

B. 6×10^6 ions/mm cube

C. 6×10^4 ions/mm cube

D. 60 icons/mm cube

Answer: A

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413. The degree of dissociation of water at $25^{\circ}C$ is $1.9 \times 10^{-7}\%$ and density is 1g cm cube. The ionic constant for water is

A. 1.0×10^{-14}

B. 2.0×10^{-16}

C. 1.0×10^{-16}

D. 1.0×10^{-8}

Answer: A

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414. Nicotinic acid $(K_a = 1.4 \times 10^{-5})$ is represented by the formula HNIC. Calculate is percent dissociation in a solution which contain 0.10 mole of nicotinic acid per 2.0 litre of solution.

A. 2.67

B. 1.87

C. 1.67

D. 1.37

Answer: C

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415. The pH of $10^{-3} M H_2SO_4$ will be

A. 3.5

B. 2.69

C. 3

D. 4.69

Answer: B

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416. Given that the dissociation constant for $H_2O, K_w = 1 \times 10^{-14} mol^2$ by litre square, the pH of a 0.001 M KOH solution will be

A. 10^{-11}

B. 10^{-3}

C. 3

D. 11

Answer: D

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417. Which of the following solution will have pH value close to 1.0 ?

A. 100mL,0.1M HCl + 100mL,0.1M NaOH

B. 55mL,0.1M HCl + 45mL,0.1M NaOH

C. 10 mL,0.2M HCl + 90mL,0.1M NaOH

D. 75mL,0.2MHCl + 25mL,0.2MNaOH

Answer: D

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418. The pH of an aqueous solution of a 0.1 M solution of weak monoprotic acid, which is 1% ionized is

A. 1

B. 2

C. 3

D. 11

Answer: C

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419. $H_2O + H_3PO_4 \Leftrightarrow H^+_{H_3O} + H_2(PO_4)^-, pK_1 = 2.15$

$H_2O + H_2PO_4^{-} \Leftrightarrow H^+_{H_3O} + H(PO_4)^{2-} pK_2 = 7.20$

Hence, pH of 0.01 M NaH_2PO_4 is

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420. An acid solution of pH=6 is diluted thousand times. The pH of solution becomes approx.

A. 6.99

B. 6

C. 4

D. 9

Answer: A

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421. A solution of contains 0.1 M H_2S and 0.3 M HCl, Calculate the conc. Of S^{2-} and HS^{-} ions in solution, Given $K_a 2$ for H_2S are 10^{-7} and 1.3

$XX10^{-13}$ respectively.

A. $1.44 \times 10^{-19}, 3.3 \times 10^{-7}$

B. $1.44 \times 10^{-20}, 3.3 \times 10^{-8}$

C. $1.44 \times 10^{-22}, 3.3 \times 10^{-3}$

D. $1.44 \times 10^{-18}, 3.3 \times 10^{-5}$

Answer: B

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422. To what volume must one litre of 1MCH_3COOH solution be diluted so that the pH of resulting solution becomes twice the original value. [Given: $K_a = 1.8 \times 10^{-5}$]

A. 2.78×10^5

B. 2.78×10^4

C. 2.78×10^3

D. 2.78×10^2

Answer: B

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423. An aqueous solution contains 10% ammonia by mass and has density of 0.99 gm /cm cube. The pH of this solution is $[Ka = 5 \times 10^{-10} M]$

A. 11.0..

B. 12.033

C. 9.033

D. 7.20..

Answer: B

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424. A solution of HCl is diluted so that its pH changes by 0.3. How much concentration of H^{+} ion change?

A. 0.5 times of initial value

B. 0.3 times of initial value

C. 10^{-3}times increase

D. 0.2 times of initial value

Answer: A

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425. 1 ml of 0.1 M HCl is added into 99 ml of water. Assume volumes are additive, what is pH of resulting solution.

A. 3

B. 1

C. 2

D. 4

Answer: A

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426. 20 mL of 0.2 M sodium hydroxide is added to 50 mL of 0.2 M acetic acid to give 70 mL of the solution. The additional volume of 0.2M NaOH required to make the pH of the solution 4.74 is

A. 2.86 ml

B. 14.86 ml

C. 4.86 ml

D. 8.46 ml

Answer: C

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427. A weak acid HX has the dissociation constant 1×10^{-5}M. It forms a salt NaX on reaction with alkali. The degree of hydrolysis of 0.1 M solution of NaX is

A. 0.0001

B. 0.01

C. 0.1

D. 0.15

Answer: B

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428. The pH of 0.02 M solution of ammonium chloride at $25^{\circ}C$ is [$k_b(NH_3) = 1.8 \times 10^{-5}$]

A. 5.477

B. 8.523

C. 7

D. 4.8732

Answer: A

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429. Which one is more acidic in aqueous solutions?

A. $NiCl_2$

B. $FeCl_2$

C. $AlCl_3$

D. $BeCl_2$

Answer: C

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430. In a buffer solution containing equal concentration of B^{-} and HB, the K_b for B^{-} is 10^{-10}. The pH of buffer solution is

A. 3

B. 4

C. 5

D. 10

Answer: B

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431. A 40 mL solution of weak base, BOH, is titrated with 0.1 N HCl solution. The pH of the solution is found to be 10.04 and 9.14 after the addition of 5 mL and 20 mL of the acid respectively. The dissociation constant of the base will be

A. 1.82×10^{-3}

B. 1.82×10^{-4}

C. 1.82×10^{-5}

D. 1.82×10^{-6}

Answer: C

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432. 0.1 mole of $CH_3NH_2(Kb =$ 5xx10^-4)` is mixed with 0.08 mole of HCl and diluted to 1 L What will be the H+ ion concentration in the solution

A. 8×10^{-2} M

B. 8×10^{-11} M

C. 1.6×10^{-11} M

D. 8×10^{-5} M

Answer: B

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433. A buffer solution contains 100 mL of 0.01 M CH_3COOH and 200 mL of 0.02 M CH_3COONa. 700mL of water is added. pH before and after dilution are : $(pK_a = 4.74)$

A. 5.04,5.04

B. 5.04,0.504

C. 5.04,1.54

D. 5.34,5.34

Answer: D

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434. In which of the following solvents, will AgBr have have highest solubility?

A. $10^{-3} MNaBr$

B. $10^{-3} M NH_4OH$

C. pure water

D. $10^{-3} M HBr$

Answer: B

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435. $M(OH)_x$ has $K_{sp} = 4 \times 10^{-12}$ and solubility 10^{-4} M. hence x is:

A. 1

B. 2

C. 3

D. -4

Answer: B

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436. The solubility products of $Al(OH)_3$ and $Zn(OH)_2$ are 8.5×10^{-23} and 1.8×10^{-14} respectively. If both Al3+ and Zn2+ ions are present in a solution, which one will precipitate first on addition of NH_4OH?

A. $Al(OH)_3$

B. $Zn(OH)_2$

C. Both together

D. None at all

Answer: A

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437. Let the solubilities of AgCl in H2O, 0.01 M CaCl2, 0.01 M NaCl and 0.05 M AgNO3 be S1,S2,S3,S4 respectively. What is the correct relationship between these quantities.

A. $S_1 < S_2 < S_3 < S_4$

B. $S_1 > S_2 = S_3 > S_4$

C. $S_1 > S_3 > S_2 > S_4$

D. $S_4 > S_2 > S_3 > S_1$

Answer: C

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438. One litre of a saturated solution of $CaCO_3$ is evaporated to dryness due to which 7.0 mg of residue is left. The solubility product for $CaCO_3$ is

A. 4.9×10^{-8}

B. 4.9×10^{-5}

C. 4.9×10^{-9}

D. 4.9×10^{-7}

Answer: C

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439. Given the solubility product of $Pb_3(PO_4)_2$ is 1.5×10^{-32} Determine the solubility in g/litre

A. $1.37 \times 10^{-3} \frac{g}{L}$

B. $1.37 \times 10^{-2} \frac{g}{L}$

C. $1.37 \times 10^{-4} \frac{g}{L}$

D. $1.37 \times 10^{-5} \frac{g}{L}$

Answer: C

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440. How much $(Ag)^+$ would remain in solution after mixing equal volumes of 0.080 M $AgNO_3$ and 0.08 N HOCN. [Given that : $k_{sp} AgOCN = 2.3 \times 10^{-7}, Ka(HOCN) = 3.3 \times 10^{-4}$]

A. $5 \times 10^{-5} M$

B. $5 \times 10^{-4} M$

C. $5 \times 10^{-3} M$

D. $5 \times 10^{-2} M$

Answer: C

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441. An acid base indicator has K_a of 3×10^{-5}. The acid form of the indicator is red and the basic form is blue. By how much must the pH change in order to change the indicator from 75% red to 75% blue?

A. 1.95

B. 2.95

C. 0.95

D. 3.95

Answer: C

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442. Calculate the pH of 0.001 M solution of $Ca(OH)_2$ assuming complete ionisation.

A. 2.69

B. 3.69

C. 11.3

D. 10.3

Answer: C

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443. If K_a of $HCN = 4 \times 10^{-10}$, then the pH of 2.5×10^{-1} molar HCN (aq) is

A. 2×10^{-5}

B. 4.7

C. 2

D. 5

Answer: D

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444. At $55^{\circ} C$ a 0.01 (N) aqueous solution of CH_3COOH undergoes dissociation by 4.26%. The value of dissociation constant of acetic acid is

A. 1.89×10^{-5}

B. 2.09×10^{-4}

C. 3.269×10^{-2}

D. None of these

Answer: A

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445. If the dissociation constant and ionic product of water be K_d and K_w respectively then their relation is

A. $K_d = K_w$

B. $K_d = 55.5 \times K_w$

C. $K_w = 55.5 \times K_d$

D. None of these

Answer: B

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446. 5 ml of 0.4NNaOH is mixed with 20 ml of 0.1N HCl. The pH of the resulting solution will be:

A. 6

B. 7

C. 8

D. 5

Answer: A

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447. A buffer solution contains 0.01 gm. Mole NH_4OH and 0.02 gm mole NH_4Cl per litre. If K_b for NH_4OH is 1.8×10^{-5} then the pH of the solution is

A. 5.04

B. 8.96

C. 7.327

D. None of these

Answer: B

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448. How many gram moles of HCl will be required to prepare one litre of a buffer solution (containing NaCN and HCN) of pH 8.5 using 0.10g formula mass of NaCN?

(K_a HCN=4.1×10^{-10})

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449. 0.1 M acetic acid solution is titrated against 0.1 M NaOH solution. What would be the difference in pH between 1/4 and 3/4 stages of neutralisation of acid?

A. 2 log 3/4

B. 2 log 1/4

C. log 1/3

D. 2 log 3

Answer: D

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450. The pH of 0.01 (M) acetic solution at $25^{\circ} C \; (K_a = 1.85 \times 10^{-5})$

A. 2.34

B. 3.366

C. 2.76

D. 7.2

Answer: B

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451. The solubility of CaF2 (Ksp=3.4×10^(−11)) in 0.1M solution of NaF would be?

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452. If concentration of two weak acids are different and degree of ionization (α) is very less, then their relative strength can be compared by:

A. $\frac{[H^+]_1}{\left[(H)^+\right]_2}$

B. $\frac{\alpha_1}{\alpha_2}$

C. $\frac{C_1\alpha_1}{C_2\alpha_2}$

D. $\frac{K_{a_1}C_1}{K_{a_2}C_1}$

Answer: A::C

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453. $NH4^+$ ion an aqueous solution will behave as:

A. An base

B. An acid

C. Both acid and base

D. Neutral

Answer: A::B::C

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454. Assuming complete dissociation, which of the following solutions will have pH=13?

A. 2g of NaOH in 500 ml solution

B. 100 ml of solution of 0.05 M $Ca(OH)_2$

C. 100 ml of solution of 0.1 N $Ca(OH)_2$

D. 4g of NaOH in 500 ml solution

Answer: A::B

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455. Which of the following mixtures can be regarded as buffer?

A. $HCOOH + HCOONa$

B. $Na_2CO_3 + NaHCO_3$

C. $NaCl + HCl$

D. $NH_4Cl + (NH_4)_2SO_4$

Answer: B::D

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456. When equal volumes of the following solution mixed, precipitation of Agcl $(K_{ap} = 1.8 \times 10^{-11})$ occur only with

A. $10^{-4}M(Ag)^{+}$ and $10^{-4}M(Cl)^{-}$

B. $10^{-1}M(Ag)^{+}$ and $10^{-5}M(Cl)^{-}$

C. $10^{-6}M(Ag)^{+}$ and $10^{-6}M(Cl)^{-}$

D. $10^{-10}M(Ag)^{+}$ and $10^{-10}M(Cl)^{-}$

Answer: A::B

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457. An acid-base indicator has K a of 3.0×10^{-5}. The acid form of the indicator is red and the basic form is blue. Then

A. pH is 4.05 when indicator is 75% red

B. pH is 5.00 when indicator is 75% blue

C. pH is 5.00 when indicator is 75% red

D. pH is 4.05 when indicator is 75% blue

Answer: A::B::C::D

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458. The solution which consumes $[H^{+}]$ or $[(OH)^{-}]$ or both simultaneously from externally added base in order to give negligible change in pH, is known as buffer solution. In general, the solution resists the change in pH. Buffer solution does not mean that there does not occur a pH change at all. It implies the pH change occurs but in negligible amount. There are two types of buffer

(i) Acidic buffer: it is a mixture of weak acid and its salt with strong base.

(ii) Basic buffer: it is a mixture of weak base and its salt with strong acid.

Answer the following questions based on above passage:

pH of 0.01 M $(NH_4)^2SO_4$ and 0.02 M $(NH_4)^{+}, pK_a((NH_4)^{+})$=9.26 is

A. 4.74 + log2

B. 4.74 -log2

C. 4.74+log1

D. 9.26+ log1

Answer: D

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459. The solution which consumes $\left[H^{+}\right]$ or $\left[(OH)^{-}\right]$ or both simultaneously from externally added base in order to give negligible change in pH, is known as buffer solution. In general, the solution resists the change in pH. Buffer solution does not mean that there does not occur a pH change at all. It implies the pH change occurs but in negligible amount. There are two types of buffer

(i) Acidic buffer: it is a mixture of weak acid and its salt with strong base.

(ii) Basic buffer: it is a mixture of weak base and its salt with strong acid.

Answer the following questions based on above passage:

To prepare buffer of pH=8.26, amount of $((NH_4))^2SO_4$ to be added into 500mL of 0.01 M NH_4OH solution [`pK_a((NH_4))^+=9.26]

A. 0.05 mol

B. 0.025 mol

C. 0.01 mol

D. 0.005 mol

Answer: B

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460. pH of a saturated solution of $Ba(OH)_2$ is 12. Hence K_{sp} of $Ba(OH)_2$ is

A. $5 \times 10^{-7} M^3$

B. $5 \times 10^{-4} M^2$

C. $1 \times 10^{-6} M^3$

D. $4 \times 10^{-6} M^3$

Answer: A

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461. If a sparingly soluble salt is placed in water, after some time an equilibrium is established when the rate of dissolution of ions from the solid equals the rate of precipitation of ions from the saturated solution at a particular temperature. Thus, a dynamic equilibrium exists between the undissociated solid species and the dissolved ionic species ina saturated solution at a particular temperature. For example, in AgCl, we have the equilibrium

$AgCl \Leftrightarrow Ag^{+}(aq) + Cl(aq)$

$K_{eq} = \frac{[Ag^{+}][Cl^{-}]}{AgCl}$

$K_{eq} \times [AgCl] = \left[Ag^{+}\right]\left[Cl^{-}\right]$......... (A)

$K_{sp}(AgCl) = \left[Ag^{+}\right]\left[Cl^{-}\right]$ Therefore [AgCl] is constant If there would not have been a saturated solution, then from equation (A), Keq. $[AgCl] \neq K_{sp}$ but $K_{eq}.\,[AgCl] = Q_{AgCl}$ where Q is ionic product. It implies that for a saturated solution„br> $Q = K_{sp}$

K_{sp} is temperature depended.

When Q $< K_{sp}$, then the solution is unsaturated and there will be no precipitate formation.

When $Q = K_{sp}$, then solution will be saturated, no ppt, will be formed

When $Q > K_{sp}$, the solution will be supersaturated and there will be formation precipitate

A solution is a mixture of 0.05 M NaCl and 0.05 M NaI. The concentration of iodide ion in the solution when AgCl just starts precipitating is equal to

A. $4 \times 10^{-6} M$

B. $2 \times 10^{-8} M$

C. $2 \times 10^{-7} M$

D. $8 \times 10^{-15} M$

Answer: C

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462.

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463.

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464.

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465.

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466.

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467. 0.16g of N_2H_4 are dissolved in water and the total volume made upto 500ml. Calculate the percentage of N_2H_4 that has reacted with water in this solution. The K_b for N_2H_4 is 4×10^{-6} M

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468. Calculate the pH of a solution which contains 100 ml of 0.1 M HCl and 9.9 ml 1 M NaOH

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469. A certain buffer solution contains equal concentration of X^{-} and HX. Calculate pH of buffer solution.(k_b for $X^{-i}s10^{-9}$)

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470. The ionisation constant of nitrous acid is 4.5×10^{-4} Calculate the pH of 0.04 M sodium nitrite solution.

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471. $M(OH)_x$ has $K_{sp} = 4 \times 10^{-12}$ and solubility 10^{-4} M. hence x is:

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472. AT $25^{\circ}C$ acid dissociation constant of HCN is 4.9×10^{-10}M. Calculate the degree of dissociation of HCN if its conc. Are(1) 0.1 M (2) 0.01 M

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473. A 0.1 M solution of weak acid HA is 1% dissociated at `25^@C. What is the Ka ? If this solution is with respect to NaA 0.2M, what will be new degree of dissociation of HA and pH?

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474. When mercuric iodide is added to aqueous solution of KI:

A. Freezing point is raised

B. Freezing point does not change

C. Freezing point is lowered

D. boiling point does not change

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475. In an attempted determination of the solubility product constant of Tl_2S, the solubility of this compound in pure CO_2 free water was determined as 6.3×10^{-6} mol/litre. Assume that the dissolved sulfide hydrolysis almost completely to HS^- and that the further hydrolysis to

H_2S can be neglected. What is the solubility product of Tl_2S. K_2 of $H_2S = 1 \times 10^{-14}$.

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476. On the basis of H-bonding explain that the second ionization constant K_2 for fumaric acid is greater than for maleic acid.

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477. Calculate the amount of $(NH_4)^2SO_4$ in g which must be added to 500 mL of $0.2 M NH_3$ to yield a solution of $pH = 9.35, K_b$ for $NH_3 = 1.78 \times 10^{-5}$

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478. Two buffers, (X) and (Y) of pH 4 and 6 respectively are prepared from acid HA and salt Na A. Both the buffers are 0.5 M in HA. What would be the pH of the solution obtained by mixing equal volume of the two buffers?(ka=1x10^-5`)

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479. If $Ag^{+}+2NH_3 \Leftrightarrow \left[Ag(NH_3)_2\right]^{+}$

$K_1=1.8\times10^7$

$Ag^{+}+Cl^{-} \Leftrightarrow AgCl$

$K_2=5.6\times10^9$

Then for $AgCl+2NH_3 \Leftrightarrow \left[Ag(NH_3)_2\right]^{+}+Cl^{-}$

What will be value of equilibrium constant?

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480. The value of K for a reaction can be changed by changing ____.

A. temperature

B. volume

C. concentration

D. pressure

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481. Consider the reversible reaction, $HCN(aq) \rightleftharpoons H^+(aq) + CN^-(aq)$. At equilibrium, the addition of $CN^-(aq)$ would :

A. reduce HCN (aq) concentration

B. decrease the $H^+(aq)$ ion concentration

C. increase the equilibrium constant

D. decrease the equilibrium constant

Answer: A

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482. Which of the following is the set of amphiprotic species?

A. $(H_3O)^+, (HPO_4)^{2-}, (HCO_3)^-$

B. $(H_2O), (HPO_3)^{2-}, (H_2PO_2)^-$

C. $(H_2O), (H_2PO_4)^-, (H_2PO_3)^-$

D. All of these

Answer: C

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483. Amphoteric behaviour is shown by the oxides of:

A. Al and Ca

B. Pb and Ba

C. Cr and Mg

D. Sn and Zn

Answer: B

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484. Which salt can furnish H^{+} in its aqueous solution?

A. NaH_2PO_2

B. Na_2HPO_3

C. Na_2HPO_4

D. All of these

Answer: C

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485. One litre of water contains 10^{-7} mole H^{+} ions. Degree of ionisation of water is

A. $1.8 \times 10^{-7} \%$

B. $1.8 \times 10^{-9} \%$

C. $3.6 \times 10^{-7} \%$

D. $3.0 \times 10^{-9} \%$

Answer: A

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486. Given $HF + H_2O \xrightarrow{k_a} H_3O^+ F^-$

$F^- + H_2O \xrightarrow{K_b} HF + OH^-$

Which relation is correct

A. $K_b = K_w$

B. $K_b = \dfrac{1}{K_w}$

C. $K_a \times K_b = (K_w)$

D. $\dfrac{K_a}{K_b} = K_w$

Answer: C

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487. A certain weak acid has a dissociation constant of $1.0 \times 10^{-4} M$. The equilibrium constant for its reaction with a strong base is:

A. $1.0 \times 10^{-4} M^{-1}$

B. $1.0 \times 10^{-10} M^{-1}$

C. $1.0 \times 10^{10} M^{-1}$

D. $1.0 \times 10^{14} M^{-1}$

Answer: B

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488. Given that K_w for water is $10^{13} M^2$ at $62^\circ C$, compute the sum of pOH and pH for a neutral aqueous solution at $62^\circ C$

A. 7

B. 13.3

C. 14

D. 13

Answer: D

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489. Liquid NH_3 ionises to a slight extent. At a certain temp. It's self ionization constant $K_{SIC}(NH_3) = 10^{-30}$, The number of $(NH_4)^+$ ions are present per 100 cm^3 of pure liquid are

A. 10^{15}

B. 6.022×10^8

C. 6.022×10^7

D. 6.022×10^6

Answer: C

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490. The pK_a of acetylsalicylic acid (aspirin) is 3.5. The pH of gastric juice in the human stomach is about 2 to 3 and the pH in small intestine is about 8. Aspirin will be:

A. unionized in the small intestine and in the stomach

B. completely ionized in the small intestine and in the stomach

C. ionized in the stomach and almost unionized in the small intestine

D. ionized in the small intestine and almost unionized in the stomach

Answer: D

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491. The pH of a solution of H_2SO_4 is 1. Assuming complete ionisation, find the molarity of H_2SO_4 solution

A. 0.1

B. 0.2

C. 0.05

D. 2

Answer: C

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492. Equal volumes of two HCl solutions of pH=3 and pH=5 were mixed. What is the pH of the resulting solution?

A. 3.5

B. 4

C. 4.5

D. 3.3

Answer: D

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493. The pH of 10^{-8} N HCl is approximately:

A. 8

B. 7.02

C. 7

D. 6.96

Answer: D

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494. A weak mono acid base has $p^{H} = 10$ at $0.01M\,\%$ ionisation of base is

A. $0.01\,\%$

B. $0.001\,\%$

C. $0.0001\,\%$

D. $1\,\%$

Answer: D

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495. Assuming $100\,\%$ ionisation which will have maximum pH

A. $0.01MNH_4Cl$

B. $0.01M(NH_4)_2SO_4$

C. $0.01M(NH_4)_3PO_4$

D. equal

Answer: C

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496. $H_2O + H_3PO_4 \Leftrightarrow (H_3O)^+ + (H_2PO_4)^{-p}K_1 = 2.15$

$H_2O + H_3PO_4 \Leftrightarrow (H_3O)^+ + (HPO_4)^{-2}pK_2 = 7.20$

Hence pH of 0.01 M NaH_2PO_4 is:

A. 9.35

B. 4.675

C. 2.675

D. 7.35

Answer: B

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497. The pH of solution obtained by mixing 10 ml of 10^{-1} N HCl and 10 ml of 10^{-1} N NaOH is

A. 8

B. 2

C. 7

D. None of these

Answer: C

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498. Calculate the $\left[OH^{-}\right]$ in 0.01 M aqueous solution of NaOCN $\left(K_b\right.$ for $\left.OCN^{-}=10^{-10}\right)$

A. $10^{-6}M$

B. $10^{-7}M$

C. $10^{-8}M$

D. None of these

Answer: A

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499. If a salt of strong acid and weak base hydrolysis appreciably ($\alpha = 0.1$, which of the following formula is to be used to calculate degree of hydrolysis α?

A. $\alpha = \sqrt{\frac{K_w}{(K_a)a}}$

B. $\alpha = \sqrt{\frac{K_w}{(K_b)a}}$

C. $\alpha = \sqrt{\frac{K_w}{K_a(K_b)a}}$

D. None of these

Answer: B

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500. Calculate $\left[H^{+}\right]$at equivalence point between titration of 0.1 M, 25 mL of weak acid HA$\left(K_a(HA)=10^{-5}\right)$ with 0.05 M NaOH solution.

A. 1.73×10^{-9}

B. 2.74×10^{-10}

C. 8

D. 10

Answer: A

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501. 1 M NH_4OH and 1 M HCl are mixed to make total volume of 300 mL. If pH of the mixture is 9.26 and $pK_a\left(\left(NH_4\right)^{+}\right)=9.26$ then volume ratio of NH_4OH and HCl will be

A. $1:1$

B. $1:2$

C. $2:1$

D. $3:1$

Answer: C

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502. A solution of weak acid HA was titrated with base NaOH. The equivalent point was reached when 40 mL of 0.1 M NaOH has been added. Now 20 mL of 0.1 M HCl were added to titrated solution, the pH was found to be 5.0. What will be the pH of the solution obtained by mixing 20 mL of 0.2 M NaOH and 20 mL of 0.2M HA?

A. 7

B. 9

C. 11

D. None of these

Answer: B

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503. P^H of a solution made by mixing 50 ml of 0.2 M NH_4Cl and 75 ml of 0.1 M NaOH is $\left[P^{k_b} \text{ of } NH_3(aq) = 4.74\right]$

A. 7.02

B. 1.3

C. 9.74

D. 12.7

Answer: C

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504. In the titration of NH4OH with HCl, the indicator which cannot be used is:

A. Phenolphthalein

B. Methyl Orange

C. Methyl Red

D. Both orange and methyl red

Answer: A

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505. A buffer solution 0.04 M in Na_2HPO_4 and 0.02 M in Na_3HPO_4 is prepared. The electrolytic oxidation of 1.0 mili-mole of the organic compound RNHOH is carried out in 100 mL of the buffer. The reaction is

RNHOH+$H_2O \rightarrow RNO_2 + 4H^+ + 4e^-$

The approximate of pH of solution after the oxidation is complete is

[Given$H_3PO_4, pK_{a1} = 2.2, pK_a2 = 7.20, pK_a3 = 12$]

A. 6.9

B. 7.2

C. 7.5

D. None of these

Answer: C

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506. 0.1 M formic acid solution is titrated against 0.1 M NaOH solution. What would be the difference is pH between 1/5 and 4/5 stages of neutralization of acid?

A. 2 log 3/4

B. 2 log 1/5

C. log1/3

D. 2 log 4

Answer: D

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507. When a 20 mL of 0.08 M weak BOH is titrated with 0.08 M HCl, the pH of the solution at the end point is 5. What will be the pOH if 10 mL of 0.04 M NaOH is added to the resulting solution?

[Given, log 2=0.30 and log 3=0.48]

A. 5.4

B. 5.88

C. 4.92

D. None of these

Answer: B

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508. What is [Ag^+] in a solution made by dissolving both Ag_2CrO_4 and $Ag_2C_2O_4$ until saturation is reached with respect to both salts?[$K_{sp}(Ag_2C_2O_4) = 2 \times 10^{-11}$,$K_{sp}(Ag_2CrO_4) = 2 \times 10^{-12}$

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509. $M(OH)_x$ has $K_{sp} = 4 \times 10^{-12}$ and solubility 10^{-4} M. hence x is:

A. 1

B. 2

C. 3

D. 4

Answer: B

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510. The volume of the water needed to dissolve 1g of $BaSO_4$ $(K_{sp} = 1.1 \times 10^{-10})$ at $25^\circ C$ is

A. 820 litre

B. 409 litre

C. 205 litre

D. None of these

Answer: B

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511. A solution contains 0.05 M each of NaCl and Na_2CrO_4 solid $AgNO_3$ is gradually added to it. Which of the following facts is true? Given $K_{sp}(AgCl) = 1.7 \times 10^{-10} M^2$ and $K_{sp}(AgCrO_4) = 1.9 \times 10^{-12} M^3$

A. Cl^- ions are precipitated first

B. CrO_4^{2-} ions are precipitated first

C. Both Cl^- and CrO_4^{2-} ions are precipitated together

D. The second ion starts precipitating when half of the first ion is pricipitated

Answer: A

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512. Calculate the pH at the equivalence point when a solution of 0.1M acetic acid is titrated with a solution of 0.1M sodium hydroxide. K_a for acetic acid =1.9×10^{-5} is:

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513. The hydroxyl ion concentration in 0.001 (M) HCl solution is

A. $10^{-3} mol L^{-1}$

B. $10^{-12} mol L^{-1}$

C. $10^{-6} mol L^{-1}$

D. $10^{-11} mol L^{-1}$

Answer: D

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514. A sulphuric acid solution has pH=2, Its molarity is (Assume 100% ionisation of H_2SO_4)

A. 1/100

B. 1/200

C. $\frac{1}{50}$

D. $\frac{1}{2}$

Answer: B

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515. The H^+ ion concentration of 0.2 M CH_3COOH which is 30% dissociated is

A. 0.4 M

B. 0.8 M

C. 8 M

D. 0.08 M

Answer: D

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516. 4 gm of NaOH is added in 1 litre. The pH value of the solution

A. 1

B. 0

C. 7

D. 13

Answer: D

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517. The conjugate base of $[Al(H_2O)_5OH]^{3+}$ is

A. $\left[Al(H_2O)_6\right]^{2+}$

B. $\left[Al(H_2O)_5OH\right]^{3+}$

C. $\left[Al(H_2O)_5OH\right]^{2+}$

D. None of these

Answer: C

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518. Which of the following, when mixed, may give a solution with pH greater than 7?

A. 0.01 M HCl+0.2 M NaCl

B. 100 ml of 0.2 M H_2SO_4+100 ml of 0.3 M NaOH

C. 100 ml. of 0.1 M $C_2H_4O_2$+100 ml of 0.2 M KOH

D. 25 ml. of 0.1 M HNO_3+25 ml of 0.2 M NH_3

Answer: C

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519. What would be the pH of an ammonia solution if that of an acetic acid solution of equal strength is 3.2 ? Assume dissociation constant for NH_3 and acetic acid are equal

A. 3.2

B. 6.4

C. 9.6

D. 10.8

Answer: D

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520. The solubility product of $CaSO_4$ is 6.4×10^{-5} The solubility of salt in moles/litre is

A. 8×10^{-16}

B. 8×10^{-2}

C. 8×10^{-3}

D. 1.6×10^{-3}

Answer: C

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521. $M(OH)_x$ has $K_{sp} = 4 \times 10^{-12}$ and solubility 10^{-4} M. hence x is:

A. 1

B. 2

C. 3

D. 4

Answer: B

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522. On adding 20 ml. of N/10 NaOH solution to 10 ml. of N/10 HCl, the resulting solution will

A. turn blue litmus red

B. turn phenolphthalein solution pink

C. turn methyl orange red

D. will have no effect on red or blue litmus solution

Answer: B

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523. A weak electrolyte obeys Ostwald's dilution law. Select the correct statements.

A. A decrease in concentration of salts shows an increase in its degree of dissociation (α)

B. As c $\rightarrow$ 0, the degree of dissociation approaches unity

C. A plot of $(\alpha)^2$ versus 1/c gives a straight line with slope equal to dissociation constant of weak electrolyte when $\alpha 0.05$

D. A plot of $(\alpha)^2$ versus c gives a straight line with slope equal to dissociation constant of weak electrolyte

Answer: A::B::C

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524. Which among following qualifies as a Lewis base?

A. BCl_3

B. CH_4

C. PH_3

D. NH_3

Answer: C::D

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525. Which of the following statement(s) is/are correct about the ionic product of water?

A. K(equibrium constant of water) $< K_w$ (ionic product of water)

B. $pK > pK_w$

C. At 300K, K_w of water becomes 10^{-12}

D. Ionic product of water at 25^{o}C is 10^{-14}

Answer: A::B

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526. If K_{a1}, K_{a2}andK_{a3} be the first, second and third ionization constant of H_3PO_4 and $K_{a1} \gg K_{a2} \gg K_{a3}$. Then which is/are correct ?

A. $[H^{+}] = \sqrt{K_{a_1}[H_3PO_4]}$

B. $[H^+] = [HPO_4^{2-}]$

C. $K_{a2} = [HPO_4^{2-}]$

D. $[HPO_4^{2-}] = [PO_4^{3-}]$

Answer: A::C

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527. Aqueous solution of HNO_3, KOH, CH_3COOH and CH_3COONa of identical concentration are provided. The pair (s) of solutions which form a buffer upon mixing is (are)

A. HNO_3 and CH_3COOH

B. KOH and CH_3COONa

C. HNO_3 and CH_3COONa

D. CH_3COOH and CH_3COONa

Answer: C::D

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528. Which of the following statements is/are correct?

A. The conjugate acid of NH_2^{-} is NH_3

B. Solubility product constant increases with increase in concentration of ions

C. On diluting a buffer solution pH change is negligible

D. In alkaline buffer solution, if some HCl is added, it's $[OH^{-}]$ will increase

Answer: A::C

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529. The compound whose 0.1 M solution is acidic

$[pK_a$ of HCOOH=3.75, pK_bofNH_4OH=4.74]`

A. Ammonium formate

B. Ammonium sulphate

C. Ammonium chloride

D. Sodium formate

Answer: A::B::C

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530. K_{sp} of $AgBr, AgCl, Ag_2CO_3$ and Ag_3AsCO_4 are $5 \times 10^{-13}, 1.8 \times 10^{-10}, 8.1 \times 10^{-12}$ and 10^{-22} respectively. Silver nitrate is added to the solution each having 0.1 M concentration of Br^-, Cl^- CO_3^- and AsO_4^(3-)` . Select the correct statement:

A. AgBr will be precipitated before AgCl

B. Ag_2CO_3 will be precipitated after Ag_3AsO_4

C. Ag_3AsO_4 will be precipitated after AgCl

D. Ag_3AsO_4 will be precipitated after Ag_2CO_3

Answer: A::B::C

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531. If you have a saturated solution of CaF_2 , then

A. $\left[Ca^{2+}\right] = \left[F^{-}\right]$

B. $2 \times \left[Ca^{2+}\right] = \left[F^{-}\right]$

C. $\left[Ca^{2+} = 2\left[F^{-}\right]$

D. None of the above

Answer: A::B

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532. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: All strong acid with same concentration in dilute solution show same pH

Statement-II: Water shows levelling effect.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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533. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: When 0.1 M weak diprotic acid H_2A dissociates with its dissociation constants $K_{a_1} = 10^{-3}$ and $K_{a_2} = 10^{-8}$, then $\left[A^{-2}\right]$ is almost equal to 10^{-3} M.

Statement-II: Since $K_{a_2} < < K_{a_1}$ for 0.1 M H_2A, So $\left[A^{-2}\right]$ is negligible $\left[HA^{-}\right]$

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: D

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534. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: pH value of acidic buffer solution change, if buffer solution is diluted upto very larger extent.

Statement-II : $[H^+]$ decrease due to change in concentration as well as α and decrease in concentration is more as compared to increase in α

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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535. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: In a titration of weak acid with strong base, the pH at the half equivalence point is pK_a.

Statement-II: At half equivalence point, it will form acidic buffer at it's maximum capacity where [acid]=[salt]

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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536. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

In the titration of Na_2CO_3 with HCl using methyl orange indicator, the volume of the acid required at the equivalence point is twince that of the acid required using phenolphthalein as indicator

Statement-II: Two moles of HCl are required for the complete neutralisation of one mole of Na_2CO_3

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: B

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537. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements. Statement-1 In the acid-base titration involving strong base and weak acid, methyl red can be used as an indicator.

Statement-II: Methyl red changes its colour in the pH range 4.2 to 6.3

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement-I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is false.

Answer: D

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538. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: Sparingly soluble salts AB and XY_2 with the same solubility product, will have different solubility.

Statement-II: Solubility of sparingly soluble salt depend upon solubility product.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: B

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539. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: Solubility product of BaF_2 will increase on dilution.

Statement-II: Solubility of BaF_2 will change of changing temperature.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: D

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540. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: Solubility of sparingly soluble salt decreases due to common ion effect.

Statement-II: Solubility product constant does not depend on common ion effect.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: B

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541. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: Solubility of AgCN in acidic solution is greater than that in pure water.

Statement-II: Solubility equilibria of AgCN in water is shifted in forward direction due to formation of HCN.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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542. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: On passing HCl(g) through a saturated solution of $BaCl_2$, a white turbidity appears.

Statement -II:The common ion effect is responsible for white turbidity.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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543. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: Degree of hydrolysis and pH of a salt say NH_4CN is independent of concentration of NH_4CN

Statement-II: The solution of NH_4CN in water has pH slightly greater than 7

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: B

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544. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: HCl acts as weak base in liquid HF but weak acid in acetic acid.

Statement-II: The tendency to act as acid or base also depends upon the nature of other substance to accept or donate a proton.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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545. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: The dissociation constants of polyprotic acid are in the order $K_1 > K_2 > K_3$

Statement-II: The $[H^+]$ furnished in first step of dissociation exerts common ion effect to reduce the second dissociation so on.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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546. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: In a pair of two electrolytes one having higher value of K_{sp} is more soluble in water than the other having lower value of K_{sp}

Statement-II: Solubility of electrolyte depends upon K_{sp} as well as on the nature of electrolyte.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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547. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: The acidic nature of some cations is $Al^{3+} > Be^{2+} > Na^{+} > K^{+}$

Statement-II: More is the effective nuclear charge on cation more is its acidic nature.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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548. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: Solubility of AgCl is more in conc. HCl than in water.

Statement-II: AgCl form a complex with conc. HCl and thus solubility of AgCl increases in conc. HCl.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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549. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: All arrhenius acids are also Bronsted acids.

Statement-II: All Bronsted bases are also Lewis bases.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: B

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550. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: In water orthoboric acid behaves as a weak monobasic acid.

Statement-II: In water orthoboric acid behaves as a proton donor.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: C

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551. This question has statement I and Statement II. Of the four choices given after the Statements, choose the one that best describes the two Statements.

Statement-I: 0.1M NaCN+0.05 M HCl solution on mixing in equal volume form a buffer solution.

Statements-II: The solution after mixing contains a weak acid and its conjugate base and thus act as buffer.

A. (1) Statement-I is true, Statement-II is true,

Statement-II is a correct explanation of Statement-I

B. Statement-I is true, Statement-II is true,

Statement-II in not a correct explanation of Statement-I.

C. Statement_I is ture, Statement-II is false .

D. Statement-I is false, Statement-II is true.

Answer: A

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552. When a salt reacts with water to form acidic or basic solution, the process is called hydrolysis. The pH of salt solution can be calculated using the following reactions:

$$pH = \frac{1}{2}[pK_w + pK_a + \log C]$$

for salt of weak acid and strong base.

$pH = \frac{1}{2}[pK_w - pK_b - \log C]$ for salt of weak base and strong acid

$$pH = \frac{1}{2}[pK_w + pK_a - pK_b]$$

for salt of weak acid and weak base where 'C' represents the concentration of salt When a weak acid or a weak base is not completely neutralized by strong base or strong acid respectively, then formation of buffer takes place. The pH of buffer solution can be calculated using the following relation:

$$pH = pK_a + \frac{\log[sa <]}{acid}, pOH = pK_b + \frac{\log[sa <]}{base}$$

Answer the following questions using the following data

$$pK_a = 4.7447, pK_b = 4.7447, pK_w = 14$$

Answer the following questions based on above passage:

When 50 mL lof 0.1 M NH_4OH is added to 50 mL of 0.05 M HCl solution, the pH is:

A. 1.6021

B. 12.979

C. 4.7447

D. 9.2553

Answer: D

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553. 0.001 M NH_4Cl aqueous solution has pH:

A. 6.127

B. 7.126

C. 2.167

D. 1.267

Answer: A

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554. The solubility product K_{sp}, of sparingly soluble salt MX at $25^{\circ} C$ is 2.5×10^{-9}. The solubility of the salt in mol per litre at this temperature is :

A. 1×10^{-14}

B. 5×10^{-8}

C. 1.25×10^{-9}

D. 5×10^{-5}

Answer: D

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555. The concentration of Ag^{+} ions in a given saturated solution of AgCl at $25^{\circ} C$ is 1.06×10^{-5} g ion per litre. the solubility product of AgCl is :

A. 0.353×10^{-10}

B. 0.530×10^{-10}

C. 1.12×10^{-10}

D. 2.12×10^{-10}

Answer: C

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556. Match Column-I with Column-II

View Text Solution

557. Match Column-I with Column-II

View Text Solution

558. Match Column-I with Column-II

View Text Solution

559. Match Column-I with Column-II

View Text Solution

560. Match Column-I with Column-II

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561. The dissociation constant of a substituted benzoic acid at $25^{\circ}C$ is 1×10^{-4}. Find the pH of a 0.01 M solution of its sodium salt.

Watch Video Solution

562. Assuming complete dissociation, calculate the pH : $0.003 M HCl$

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563. K_a for HCN is 5×10^{-10} at $25^{\circ} C$. For maintaining a constant pH of 9, calculate the volume of 5M KCN solution required to be added to 10 ml of 2M HCN solution.

Watch Video Solution

564. If P^{K_a} of acetic acid and $P^{K_b} NH_4OH$ are 4.76 each. Find the pH of CH_3COONH_4.

Watch Video Solution

565. A solution with pH 2.699 is diluted two times, then calculate the pH of the resulting solution. (Given antilog of 0.3010=2)

Watch Video Solution

566. Calculate the extent of hydrolysis and the pH of 0.02 M CH_3COONH_4. $\left[K_b(NH_3) = 1.8 \times 10^{-5}, K_a(CH3COOH) = 1.8 \times 10^{-5}\right]$

Watch Video Solution

567. Heat of neutralization for the reaction, is $57.1 kJ mol^{-1}$. The heat released when 0.25 mole of NaOH is titrated against 0.25 mole HCl will be:

$NaOH + HCl \rightarrow NaCl + H_2O$

Watch Video Solution

568. The measured freezing point depression for a 0.1m aqueous CH_3COOH solution is 0.19^oC. The acid dissociation constant K_a at this concentration will be ? (Given K_f the molal cryoscopic constant = $1.86Kkgmol^{-1}$

Watch Video Solution

569. Pure water can be obtain from sea water by:

A. Centrifugation

B. Plasmolysis

C. Reverse osmosis

D. Sedimentation

Watch Video Solution

570. How many g of NaOH will be needed to prepare 250 mL of 0.1 M solution?

A. 1g

B. 4g

C. 6g

D. 10g

Watch Video Solution

571. The solubility product of Pbl_2 is 7.47×10^{-9} at $17^{\circ} C$ and 1.4×10^{-8} at $27^{\circ} C$. Calculate

The molar heat of solution of Pbl_2

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572. The solubility product of PbI_2 is 7.47×10^{-9} at $15^{\circ}C$ and 1.39×10^{-8} at $25^{\circ}C$. Calculate the molar heat of solution of PbI_2

Watch Video Solution

573. In a 0.250 M solution of Na_3PO_4 , the concentration of the sodium ions would be:

A. 0.250 M

B. 0.750 M

C. 1.99 M

D. 0.0833 M

Watch Video Solution

574. Determine the simultaneous solutbiltiy of $AgCN\left(K_{sp}=2.2\times10^{-16}\right)$ and $AgCl\left(K_{sp}=1.6\times10^{-10}\right)$ in 1.0 M ammonia solution. $K_f\left[Ag(NH_3)_2^+\right]=1.5\times10^7$

Watch Video Solution

575. The boiling point of a solution of 0.11g of a substance in 15 g of ether was found to be 0.1^0C higher than that of pure ether. The molecular weight of the substance will be: $\left[K_b=2.16Kkgmol^{-1}\right]$

A. 148

B. 158

C. 168

D. 178

Watch Video Solution

576. The ratio of volumes of CH_3COOH 0.1 (N) to CH_3COONa 0.1 (N) required to prepare a buffer solution of pH5.74 is (given: pKa of CH_3COOH is 4.74)

A. $10:1$

B. $5:1$

C. $1:5$

D. $1:10$

Answer: D

Watch Video Solution

577. Which one of the following pairs of solution is not an acidic buffer?

A. $HClO_4$ and $NaClO_4$

B. CH_3COOH and CH_3COONa

C. H_2CO_3 and Na_2CO_3

D. H_3PO_4 and Na_3PO_4

Answer: A

Watch Video Solution

578. What is the pH of the resulting solution when equal volumes of 0.1 M NaOH and 0.01 M HCl are mixed?

A. 12.65

B. 2

C. 7

D. 1.04

Answer: A

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579. Among the following oxoacids, the correct decreasing order of acid strength is :

A. $HOCl > HClO_2 > HClO_2 > HClO_4$

B. $HClO_4 > HOCl > HClO_2 > HClO_3$

C. $HClO_4 > HClO_3 > HClO_2 > HOCl$

D. $HClO_2 > HClO_4 > HClO_3 > HOCl$

Answer: C

Watch Video Solution

580. The pH of 10^{-4} M KOH solution will be

A. 4

B. 11

C. 10.5

D. 10

Answer: D

Watch Video Solution

581. Which of the following salts will give highest pH in water?

A. KCl

B. NaCl

C. Na_2CO_3

D. $CuSO_4$

Answer: C

Watch Video Solution

582. The ionization constant of nitrous acid is 4.5×10^{-4}. Calculate the pH of 0.04 M sodium nitrite solution and also its degree of hydrolysis.

Watch Video Solution

583. Acidity of diprotic acids in aqueous solutions increases in the order

A. $H_2S < H_2Se < H_2Te$

B. $H_2Se < H_2S < H_2Te$

C. $H_2Te < H_2S < H_2Se$

D. $H_2Se < H_2Te < H_2S$

Answer: A

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584. A fertile soil is likely to have a pH of:

A. 14

B. 8 - 9

C. 5.5 - 7

D. 2-4

Answer: C

Watch Video Solution

585. The product of molar concentrations of hydrogen ions and hydroxide ions in a 0.01 M aqueous solution of sodium chloride is known as

A. hydrolysis constant of salt

B. dissociation constant of acid

C. dissociation constant of base

D. ionic product of water

Answer: D

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586. What is the pH of millimolar solution of ammonium hydroxide which is 20% dissociated?

A. 3.699

B. 10.301

C. 4.691

D. 9.301

Answer: D

Watch Video Solution

587. By adding 20 ml 0.1 M HCl to 20 mL 0.001 N KOH, the pH of the obtained solution will be

A. 2

B. 1.3

C. 0

D. 7

Answer: B

Watch Video Solution

588. The strongest Bronsted base in the following anion is

A. ClO_3

B. ClO_4^-

C. ClO^-

D. ClO_2^-

Answer: C

Watch Video Solution

589. Then pK_a of a certain weak acid is 4.0. What should be the [salt] ratio if we have to prepare a buffer with pH=5 using the acid and one of the salts?

A. $10:1$

B. $1:10$

C. $4:5$

D. $5:4$

Answer: A

Watch Video Solution

590. The solubility product of a binary weak electrolyte is 4×10^{-10} at 298K. Its solubility in mol dm^{-3} at the same temperature is

A. 4×10^{-5}

B. 2×10^{-5}

C. 8×10^{-10}

D. 16×10^{-20}

Answer: B

Watch Video Solution

591. The solubility of CaF_2 is s mol/L. Then solubility product is

A. s^2

B. $4s^2$

C. $3s^2$

D. s^3

Answer: B

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592. What kind of a molecule $AlCl_3$ is ?

A. Bronsted acid

B. Lewis acid

C. Lewis base

D. Bronsted base

Answer: B

Watch Video Solution

593. Which is a Lewis base?

A. B_2H_6

B. $LiAIH_4$

C. AlH_3

D. NH_3

Answer: D

Watch Video Solution

594. pH of an acid buffer is given by

A. $pH = pk_a + \frac{\log[Salt]}{Acid}$

B. $pH = pk_a - \frac{\log[Salt]}{Acid}$

C. $pH = k_a + \frac{\log[Salt]}{Acid}$

D. None of the above

Answer: A

Watch Video Solution

595. If the solubility of $PbBr_2$ in water is S mol/L then what is its k_{sp} considering 100% ionisation?

Watch Video Solution

596. Which is the strongest acid in the following?

A. $HClO_3$

B. $HClO_2$

C. $HClO_4$

D. $HClO$

Answer: C

Watch Video Solution

597. The pH value of N/10 NaOH is

A. 9

B. 10

C. 12

D. 13

Answer: D

Watch Video Solution

598. Solution of 0.1 N NH_4OH and $0.1 NH_4Cl$ has has pH 9.25 Then pK_b of NH_4OH is

A. 9.25

B. 4.75

C. 3.75

D. 8.25

Answer: B

Watch Video Solution

599. The solubility product of a binary weak electrolyte is 4×10^{-10} at 298K. Its solubility in mol dm^{-3} at the same temperature is

A. 4×10^{-5}

B. 2×10^{-5}

C. 8×10^{-10}

D. 16×10^{-20}

Answer: B

Watch Video Solution

600. Which one of the following can be classified as a Bronsted base?

A. NO_3^-

B. H_3O^+

C. CH_3COOH

D. NH_4^+

Answer: A

Watch Video Solution

601. pH of a solution produced when an aqueous solution of pH 6 is mixed with an equal volume of an aqueous solution of pH 3 is about

A. 3.3

B. 4.3

C. 4

D. 4.5

Answer: A

Watch Video Solution

602. Normality of 1 molar sodium carbonate solution is :

A. 2 N

B. 1 N

C. 0.5 N

D. 1.5 N

Answer: B

Watch Video Solution

603. The dissociation constant of two acids HA_1 and HA_2 are 3.0×10^{-4} and 1.8×10^{-5} respectively. The relative strengths of the acids is

A. $1:16$

B. $1:4$

C. $4:1$

D. $16:1$

Answer: C

Watch Video Solution

604. A solution of pH 9.0 is 1000 times as basic as a solution. The pH of this solution is

A. 9

B. 8

C. 7

D. 6

Answer: D

Watch Video Solution

605. The solubility product of calcium. Fluoride is $3.2 \times 10^{-11} M^3$. Its solubility in saturated solution is

A. 8×10^{-12}mol L^{-1}

B. 2×10^{-4}mol L^{-1}

C. 4×10^{-12}mol L^{-1}

D. 1×10^{-4}mol L^{-1}

Answer: B

Watch Video Solution

606. If 36.0 g of glucose is present in 400 ml of solution, molarity of the solution is:

A. 0.05 M

B. 11 M

C. 0.5 M

D. 2 M

Answer: C

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607. 20 mL 0.1 (N) acetic acid is mixed with 10 mL 0.1 (N) solution of NaOH. What is The pH of the resulting solution ? (pK_a of acetic acid is 4.74)

Watch Video Solution

608. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionisation constant K_a of the acid is

A. 3×10^{-1}

B. 1×10^{-3}

C. 1×10^{-5}

D. 1×10^{-7}

Answer: C

Watch Video Solution

609. Which of the following acids is stronger than benzoic acid $\left(K_a = 1.67 \times 10^{-5}\right)$?

A. $A\left(K_a = 1.67 \times 10^{-8}\right)$

B. $B(pK_a = 6.0)$

C. C($pK_a = 4.0$)

D. D($K_a = 1.0 \times 10^{-5}$)

Answer: C

Watch Video Solution

610. For a diprotic acid, which of the following is true for 1^{st} and 2^{nd} ionisation constant (K_{a_1} and K_{a_2}?

A. $K_{a_1} = K_{a_2}$

B. $K_{a_1} > K_{a_2}$

C. $K_{a_2} > K_{a_1}$

D. $K_{a_2} \geq K_{a_1}$

Answer: B

Watch Video Solution

611. Number of ion pairs in $CsCl$ unit cell is:

A. 1

B. 2

C. 4

D. 8

Answer: C

Watch Video Solution

612. A buffer solution is prepared by mixing equal concentration of weak base with its salt of strong acid. K_b for the base is 10^{-9}, pH of this buffer solution will be

A. 9

B. 4

C. 5

D. 13

Answer: A

Watch Video Solution

613. In Lowry-Bronsted concept, H^{+} donor is known as

A. acid

B. base

C. Both (1) and (2)

D. None (1) and (2)

Answer: A

Watch Video Solution

614. An acidic buffer solution could be prepared by mixing the solution of the following

A. sodium acetate and acetic acid

B. ammonium sulphate and sulphuric acid

C. Ammonium chloride and ammonium hydroxide

D. sodium chloride and hydrochloric acid

Answer: A

Watch Video Solution

615. 5 mL of 0.4 N NaOH is mixed with 20 mL of 0.1 N HCl The pH of the resulting solution will be

A. 7

B. 8

C. 5

D. 6

Answer: A

Watch Video Solution

616. Number of ions present in 500 ml of 2M Na2SO4 solution are ?

Watch Video Solution

617. The pH of the solution obtained by mixing 100 mL of a solution of pH=3 with 400 mL of a solution of pH=4 is

A. 7-log 2.8

B. 4-log 2.8

C. 5-log 2.8

D. 3-log 2.8

Answer: B

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618. If K_a of $HCN = 4 \times 10^{-10}$, then the pH of 2.5×10^{-1} molar HCN (aq) is

A. 1

B. 2.5

C. 4

D. 5

Answer: D

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619. In the titration of NaOH and HCl, which of the following indicator will be used?

A. Methyl orange

B. Methyl red

C. Both (1) and (2)

D. None of (1) and (2)

Answer: C

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620. For, $2NOBr(g) \Leftrightarrow 2NO(g) + Br_2(g)$, at equilibrium $P_{Br_2} = \frac{P}{9}$ and p is the total pressure, the ratio $\frac{K_p}{P}$ will be

A. $\frac{1}{3}$

B. $\frac{1}{9}$

C. $\frac{1}{27}$

D. $\frac{1}{81}$

Answer: D

Watch Video Solution

621. pH of a saturated solution of $Ba(OH)_2$ is 12. The value of solubility product K_{sp} of $Ba(OH)_2$ is

A. 3.3×10^{-7}

B. 5.0×10^{-7}

C. 4.0×10^{-6}

D. 5.0×10^{-6}

Answer: B

Watch Video Solution

622. If the formula weight of H_2SO_4 is 98, then the amount of acid present in 400 ml of 0.1 molar solution of acid will be:

A. 2.45 gm

B. 3.92 gm

C. 4.90 gm

D. 9.80 gm

Answer: A

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623. Buffer solutions have constant acidity and alkalinity because

A. these give unionised acid or base on reaction with added acid or alkali

B. acids and alkalis in these solutions are shielded from attack by other ions

C. they have large excess of H^{+} or OH^{-} ions

D. they have fixed value of pH

Answer: A

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624. Ammonia gas dissolves in water to form NH_4OH. In this reaction water acts as

A. conjugate base

B. a non-molecule

C. an acid

D. a base

Answer: C

Watch Video Solution

625. A weak acid HX has the dissociation constant 1×10^{-5}M. It forms a salt NaX on reaction with alkali. The degree of hydrolysis of 0.1 M solution of NaX is

A. 0.0001%

B. 0.01%

C. 0.1%

D. 0.15%

Answer: B

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626. A 100 mL,0.1 (M), solution of ammonium acetate is diluted by adding 100 mL of water. The pH of the resulting solution will be(pk_a of acetic acid is nearly equal to pK_b of NH_4OH)

A. 4.9

B. 5

C. 7

D. 10

Answer: C

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627. 20 mL 0.1 (N) acetic acid is mixed with 10 mL 0.1 (N) solution of NaOH. The pH of the resulting solution is $(pK_a$ of acetic acid is 4.74)

A. 3.74

B. 4.74

C. 5.74

D. 6.74

Answer: B

Watch Video Solution

628. The pH of the solution obtained by mixing 100 mL of a solution of pH=3 with 400 mL of a solution of pH=4 is

A. 7-log 2.8

B. 4-log 2.8

C. 5-log 2.8

D. 3-log 2.8

Answer: B

Watch Video Solution

629. What is the value of K_{sp} for $Fe(OH)_3$?

A. s^2

B. $4S_3$

C. $27S^4$

D. $64S^4$

Answer: C

Watch Video Solution

630. The most important buffer in the blood consists of

A. HCl and Cl^-

B. H_2CO_3 and HCO_3^-

C. H_2CO_3 and HCO_3^-

D. HCl and HCO_3^-

Answer: B

Watch Video Solution

631. Find the hydroxide concentration for a solution with a pH of 10 at $25^{o}C$.

A. $10^{-14}M$

B. $10^{-10}M$

C. $10^{-4}M$

D. $10^{-1}M$

Answer: A

Watch Video Solution

632. Which of the following is not a conjugate acid-base pairs?

A. HPO_3^{2-}, PO_3^{3-}

B. $H_2PO_4^-, HPO_4^{2-}$

C. $H_2PO_4^-, H_3PO_4$

D. $H_2PO_4^-, PO_3^{3-}$

Answer: D

Watch Video Solution

633. If the solubility of $Ca_3(PO_4)_2$ in water be y mol L^{-1}, the solubility product of the salt will be -

A. $6y^4$

B. $36y^4$

C. $64y^5$

D. $108y^5$

Answer: D

Watch Video Solution

634. The pH of an aqueous solution of CH_3COONa of concentration C(M) is given by

A. $7-\frac{1}{2}pK_a-\frac{1}{2}\log C$

B. $\frac{1}{2}pK_w-\frac{1}{2}pK_b+\frac{1}{2}\log C$

C. $\frac{1}{2}pK_w-\frac{1}{2}pK_b-\frac{1}{2}\log C$

D. $\frac{1}{2}pK_w+\frac{1}{2}pK_b+\frac{1}{2}\log C$

Answer: D

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635. What is the best description of the change that occurs when $Na_2O(s)$ is dissolved in water?

A. Oxidation number of sodium decrease

B. Oxide ion accepts sharing in a pair of electrons

C. Oxide ion donates a pair of electrons

D. Oxidation number of oxygen increases

Answer: C

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636. An acid HA ionises as,

$HA \Leftrightarrow H^{+} + A^{-}$

The pH of 1.0 M solution is 5. its dissociation constant would be

A. 1×10^{-10}

B. 5

C. 5×10^{-8}

D. 1×10^{-5}

Answer: A

Watch Video Solution

637. The K_{sp} for $Cr(OH)_3$ is 1.6×10^{30}. The molar solubility of this compound in water is

A. $\sqrt[2]{1.6 \times 10^{30}}$

B. $\sqrt[4]{1.6 \times 10^{30}}$

C. $\sqrt[4]{1.6 \times \frac{10^{30}}{27}}$

D. $\left(1.6 \times \frac{10^{30}}{27}\right.$

Answer: C

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638. A weak monobasic acid is 1% ionised in 0.1 M solution at $25^{\circ}C$. The percentage of ionisation in its 0.025 M solution is

A. 1

B. 2

C. 3

D. 4

Answer: B

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639. 0.023 of sodium metal is reacted with $100cm^3$ of water. The pH of the resulting solution is

A. 10

B. 11

C. 9

D. 12

Answer: D

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640. The ratio of molarity and normality of a dibasic acid solution is :

A. 4

B. 2

C. $\frac{1}{5}$

D. $\frac{1}{2}$

Answer: C

Watch Video Solution

641. A measured temperature on the Fahrenheit scale is $200^{0}F$. What will this reading be on the Celsius scale?

A. $40^{0}C$

B. $94^{0}C$

C. $93.3^{0}C$

D. $30^{0}C$

Answer: B

Watch Video Solution

642. A buffer solution contains 0.1 mole of sodium acetate dissolved in $1000cm^3$ of 0.1 M acetic acid. To the above buffer solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is

A. pK_a

B. $pK_a + 2$

C. $pK_a - \log 2$

D. $pK_a + \log 2$

Answer: D

Watch Video Solution

643. Which of the following is least likely to behave as Lewis base?

A. OH^-

B. H_2O

C. NH_3

D. BF_3

Answer: D

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644. A buffer solution is prepared in which the concentration of NH_3 is 0.30 M and the concentration of NH_4^+ is 0.20 M. If the equilibrium constant, K_b for NH_3 equals 1.8×10^{-5}, what is the pH of this solution?

A. 8.73

B. 9.08

C. 9.43

D. 11.72

Answer: C

Watch Video Solution

645. Which one of the following is not acid-base conjugate pair?

A. $HONO, NO_2^-$

B. $CH_3NH_3^+, CH_3NH_2$

C. $C_6H_5 - COOH, C_6H_5COO^-$

D. H_3O^+, OH^-

Answer: D

View Text Solution

646. Which one of the following species acts only as a base?

A. H_2S

B. HS^-

C. S^{2-}

D. H_2O

Answer: C

Watch Video Solution

647. A monobasic weak acid solution has a majority of 0.005 and pH of 5. What is its percentage ionisation in this solution ?

A. 2

B. 0.2

C. 0.5

D. 0.25

Answer: B

Watch Video Solution

648. An aqueous solution has $\left[H^{+}\right]$ ion concentration = $1.0 \times 10^{-7} mol^{-1}$. What is the value of pH ?

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649. 0.023 of sodium metal is reacted with $100 cm^3$ of water. The pH of the resulting solution is

A. 10

B. 8

C. 9

D. 12

Answer: D

Watch Video Solution

650. H_2S is passed into one dm^3 of a solution containing 0.1 mole of Zn^{2+} and 0.01 mole of Cu^{2+} till the sulphide ion concentration reaches 8.1×10^{-10} moles. Which one of the following statements is true?

[K_{sp} of ZnS and CuS are 3×10^{-22} and 8×10^{-36} respectively]

A. Only ZnS precipitates

B. Both CuS and ZnS precipitates

C. Only CuS precipites

D. NO precipitation occurs

Answer: B

View Text Solution

651. pH value of which one of the following is not equal to one?

A. 0.1 M CH_3COOH

B. 0.1 M HNO_3

C. 0.05 M H_2SO_4

D. 50 cm^3 of 0.4 M HCl+50 cm^3 of 0.2 M NaOH

Answer: A

Watch Video Solution

652. At $25^{\circ} C$, the solubility product of Hg_2Cl_2 in water is $3.2 \times 10^{-17} mol^3 dm^{-9}$. What is the solubility of Hg_2Cl_2 in water at $25^{\circ} C$?

A. 1.2×10^{-12}

B. 3.0×10^{-6}

C. 2.0×10^{-6}

D. 1.2×10^{-16}

Answer: C

Watch Video Solution

653. For preparing a buffer solution of pH=7.0, which buffer system you will choose?

A. $H_3PO_4, H_2PO_4^-$

B. $H_2(PO_4)^-, HPO_4^{2-}$

C. HPO_4^{2-}, PO_4^{3-}

D. H_3PO_4, PO_4^{3-}

Answer: B

Watch Video Solution

654. A buffer solution contains 0.1 mole of sodium acetate dissolved in $1000cm^3$ of 0.1 M acetic acid. To the above buffer solution, 0.1 mole of sodium acetate is further added and dissolved. The pH of the resulting buffer is

A. pK_a

B. $pK_a + 2$

C. $pK_a + \log 2$

D. $pK_a + \log 2$

Answer: D

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655. The mojar conductivity of a solution of a weak acid HX (0.01 M) is 10 times smaller than the mojar conductivity of a solution of a weak acid HY (010M). If $\lambda^0_{x^-} \approx \lambda^0_{y^-}$, the difference in their pK_a values, $pK_a(HX) - pK_a(HY)$, is (consider degree of ionization both acids to be $> \; > 1$

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656. When 100 mL of 1.0 M HCl was mixed with 100 mL of 1.0 M NaOH in an insulated beaker at constant pressure, a temperature increase of $5.7^\circ C$ was measured for the beaker and its contents (expt.1) Because the enthalpy of neutralization of a strong acid with a strong base is a constant (-57.0 kJ mol^{-1}), this experiment could be used to measure the calorimeter constant. In a second experiment (Expt.2), 100 mL of 2.0 M acetic acid (K_a=2.0xx10^-5

)$wasmixedwith100mLof1.0MNOH(underidenticalconditionsof(Expt.1$

^@C$wasmeasured. (Considerheat \cap acityofallsolutionsas4.2Jg$^-1

K_-1 and $densityofallsolutionsas$1.0 g m L^-1)$Enthalpyofdissociation$

(In KJ mol^-1`) of acetic acid obtained from the Expt.2 is

A. 1

B. 10

C. 24.5

D. 51.4

Answer: A

View Text Solution

657. When 100 mL of 1.0 M HCl was mixed with 100 mL of 1.0 M NaOH in an insulated beaker at constant pressure, a temperature increase of 5.7 $\hat{\ } \circ C$ was measured for the beaker and its contents (expt.1) Because the enthalpy of neutralization of a strong acid with a strong base is a constant (-57.0 kJ mol^{-1}), this experiment could be used to measure the calorimeter constant. In a second experiment (Expt.2), 100 mL of 2.0 M acetic acid (K_a=2.0xx10^-5 $)wasmixedwith100mLof1.0MNOH(underidenticalconditionsof(Expt.1$

^@C$wasmeasured. (Considerheat \cap acityofallsolutionsas4.2J$g^-1 K_-1 and $densityofallsolutionsas1.0gm$L^-1`)

The ph of the solution after Expt. 2 is

A. 2.8

B. 4.7

C. 5

D. 7

Answer: B

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658. The $K_{sp} Ag_2CrO_4$ is 1.1×10^{-12} at 298K. The solubility (in mol/L) of Ag_2CrO_4 in a $0.1 M AgNO_3$ solution

A. 1.1×10^{-11}

B. 1.1×10^{-10}

C. 1.1×10^{-12}

D. 1.1×10^{-9}

Answer: B

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659. Passing $H_2 Sgas \int oamixtureof$Cu^(2+), Mn^(2+), Ni^(2+) and Hg^(2+)` ions, in acidified aqueous solution precipitates

A. CuS and HgS

B. MnS and CuS

C. MnS and NIS

D. NIS and HgS

Answer: A

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660. In 1 L saturated solution of $AgCl\left[K_{sp}AgCl1.6\times10^{10}\right]0.1$ mole of $CuCl\left[K_{sp}(CuCl)1.010^{6}\right]$ is added. The resultant concentration of Ag in the solution is 1.610^{x}.

A. 3

B. 5

C. 7

D. 9

Answer: C

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