QAD Series

Physical Chemistry - I

1. **Charle's law is applicable under:**
   a) isobaric process b) isochoric process
   c) isothermal process d) adiabatic process
2. **Volume of 0.5 mole of a gas at 1 atm pressure and 273°C is:**
   a) 22.4 litres b) 11.2 litres c) 44.8 litres d) 5.6 litres
3. **A balloon filled with methane (CH_4) is pricked with a sharp point and quickly plunged into a tank of hydrogen at the same pressure. After sometimes, the balloon will have:**
   a) enlarged b) collapsed
   c) remained unchanged in size
   d) ethylene (C_2H_4) inside it
4. **The ratio of rate of diffusion of helium and methane under identical conditions of pressure and temperature is:**
   a) 4 b) 2 c) 1 d) 0.5
5. **A drop of liquid acquires spherical shape because of**
   a) its tendency to maximise its surface area
   b) its tendency of acquiring minimum surface area
   c) its viscous nature d) none of these
6. **Which of the following liquid is most volatile?**
   a) HF(l) b) NH_3(l) c) C_2H_5OH(l) d) H_2O (l)
7. **The crystal system of a compound with unit cell dimensions a = 0.387, b = 0.387 and c = 0.504 nm and $\alpha = \beta = 90°$ and $\gamma = 120°$ is:**
   a) cubic b) hexagonal c) orthorhomic d) tetrahedral
8. **Equal weights of methane and oxygen are mixed in an empty container at 25°c. The fraction of total pressure exerted by oxygen is:**
   a)1/3 b) 2/3 c) 8/9 d) 9/8
9. **The number of free electrons present on each carbon atom in graphite is:**
   a) 3 b) 2 c) 1 d) 0
10. **Density of a crystal remains unchanged as a result of:**
    a) Frenkel defect b) Schottky defect
    c) Both d) None
11. **A solution of known normality is diluted to two times. Which of the following changes during dilution?**
    a) Equivalent of solute
    b) Moles of solute
    c) Mili equivalent or millimole of solute
    d) Normality of solution
12. **The equivalent weight of an element is 4. Its chloride has a vapour density 59.25. Then molecular formula of its sulphate will be:**
    a) MSO_4 b) M_2SO_4 c) $M_2(SO_4)_3$ d) None
13. **11.2 litre of NH_3 at STP has electrons:**
    a) 3.01×10^{23} b) 3.01×10^{22} c) 3.01×10^{25} d) 3.01×10^{24}
14. **In a hydrocarbon, the mass ratio of hydrogen to carbon is 1:3. The empirical formula of the hydrocarbon is:**
    a) CH_4 b) CH_3 c) CH_2 d) CH
15. **The largest number of molecules is in:**
    a) 36 g of water b) 28 g of CO_2
    c) 46 g of CH_3OH d) 58 g of N_2O_5
16. **Which one of the following has maximum number of atoms of oxygen?**
    a) 2 g of carbondioxide b) 2 g of carbonmonoxide
    c) 2 g of water d) 2 g of sulphurdioxide
17. **1.520 g of the hydroxide of a metal on ignition gave 0.995 g of oxide. The equivalent weight of metal is:**
    a) 1.520 b) 0.995 c) 19.00 d) 9.00
18. **0.5 mole of H_2SO_4 is mixed with 0.2 mole of $Ca(OH)_2$. The maximum number of mole of $CaSO_4$ formed is:**
    a) 0.2 b) 0.5 c) 0.4 d) 1.5
19. **Which of the following depends on temperature?**
    a) Molarity b) Mole fraction c) % by weight d) Molality
20. **The hardness of water is usually expressed in:**
    a) ppm b) g/litre c) mol/litre d) none
21. **Specific heat and equivalent weight of metal is 0.053 and 41.66 respectively. Atomic weight of the metal is:**
    a) 120 b) 41.66 c) 83.32 d) 125
22. **The percentage of copper and oxygen in samples of CuO obtained by different methods were found to be same. This illustrates the law of:**
    a) constant proportion b) conservation of mass
    c) multiple proportion d) reciprocal proportion
23. **The solution of sulphuric acid having specific gravity 1.71 contains 80% by weight H_2SO_4. The normality is about:**
    a) 18.0 b) 27.9 c) 1.0 d) 10.0
24. **The indicator having pH range 4.2 -6.3 is:**
    a) Methyl orange b) Methyl red
    c) Litmus d) Phenolphthalein
25. **0.62 g of $Na_2CO_3.H_2O$ is added to 100 ml of 0.1 N sulphuric acid. The resulting solution will be:**
    a) acidic b) basic
    c) neutral d) can't be predicted
26. **Phenolphthalein does not act as indicator for the titration between:**
    a) KOH and H_2SO_4 b) $Ba(OH)_2$ and HCl
    c) NaOH and acetic acid d) Oxalic acid and $KMnO_4$
27. **Starch can be used as an indicator for the detection of traces of :**
    a) glucose in aqueous solution b) proteins in blood
    c) iodine in aqueous solution d) urea in blood
28. **The equivalent weight of phosphoric acid in the reaction, $NaOH + H_3PO_4 \rightarrow NaH_2PO_4 + H_2O$ is**
    a) 25 b) 49 c) 59 d) 98
29. **An element (Eq.wt. 13.16) forms an acid oxide which reacts with KOH solution to form a compound isomorphous with K_2SO_4. The atomic weight of the element is:**
    a) 13.16 b) 26.32 c) 39.48 d) 78.96
30. **0.16 g of dibasic acid required 25 ml of decinormal NaOH solution for complete neutralisation. The molecular weight of the acid will be:**
    a) 32 b) 64 c) 128 d) 256
31. **In order to prepare one litre normal solution of $KMnO_4$, how many grams of $KMnO_4$ are required if the solution is used in acidic medium for oxidation?**
    a) 158 g b) 31.6 g c) 790 g d) 62 g
32. **0.45 gm of acid of molecular weight 90 was neutralised by 20 ml of 0.5 N caustic potash. The basicity of the acid is:**
    a) 1 b) 2 c) 3 d) 4
33. **Number of moles of $KMnO_4$ required to oxidise one mole of $Fe(C_2O_4)$ in acidic medium is:**
    a) 0.2 b) 0.4 c) 0.6 d) 1.67
34. **75 ml of N/5 H_2SO_4, 10 ml of N/2 HCl and 30 ml of N/10 HNO_3 are mixed together. The strength of the resulting acid mixture is:**
    a) 0.2 N b) 0.3 N c) 0.4 N d) 0.1 N
35. **On reduction with hydrogen 3.6g of an oxide of metal leaves 3.2g of metallic residue. If the atomic mass of metal is 64, the formula of metal oxide is**
    a) M_2O_3 b) M_2O c) MO d) MO_2

36. **The compound AB contains elements A and B in the ratio of 1:35.5 by mass. The mass of B that will be required to react with 2 g of A is**

a) 7.1 g b) 3.55 g

c) 71 g d) 35.5 g

37. **Which of the following represents 1 gm-molecule of the substance?**

a) 6.02×10^{24} molecules of NH_3

b) 4 g of helium

c) 20 g of calcium

d) 127 g of iodine

38. **The number of neutrons in 1.8 g of water will approximately be**

a) 4.216×10^{23} b) 8.432×10^{23}

c) 2.108×10^{23} d) 4.816×10^{23}

39. **20ml of a gaseous hydrocarbon requires 60ml of oxygen for complete combustion. The hydrocarbon is**

a) C_2H_6 b) C_3H_8 c) CH_4 d) C_2H_4

40. **Which has minimum number of atoms of oxygen?**

a) 10 mL $H_2O_{(l)}$

b) 0.1 mole of V_2O_5

c) 12 gm $O_{3(g)}$

d) $12.044 \times 10_{22}$ molecules of CO_2

41. **A 6.85 g sample of the hydrate $Sr(OH)_2.\ XH_2O$ is dried in an oven to give 3.13 g of anhydrous $Sr(OH)_2$. What is the value of X? (Atomic weights : Sr = 87.60, O = 15.0, H = 1.0)**

a) 8 b) 12 c) 10 d) 6

42. **A gaseous compound is composed of 85.7 % by mass carbon and 14.3 % by mass hydrogen. It's density is 2.28 g /litre at 300 K and 1.0 atm pressure. Determine the molecular formula of the compound:**

a) C_2H_2 b) C_2H_4 c) C_4H_8 d) C_4H_{10}

43. **Phosphoric acid (H_3PO_4) prepared in a two step process.**

1) $P_4 + 5O_2 \rightarrow P_4O_{10}$ 2) $P_4O_{10} + 6H_2O \rightarrow 4H_3PO_4$

We allow 62 g of phosphorus to react with excess oxygen which from P_4O_{10} in 85 % yield. In the step (2) reaction 90 % yield of H_3PO_4 is obtained. Produced mass of H_3PO_4 is:

a) 37.485 g b) 149.949 g c) 125.47 g d) 564.48 g

44. **The density of a 56.0 % by weight aqueous solution of 1-propanol ($CH_3CH_2CH_2OH$) is 0.8975 g/cm3. What is the mole fraction of the compound?**

a) 0.292 b) 0.227 c) 0.241 d) 0.276

45. **What is the molarity of SO_4^{2-} ion in aqueous solution that contain 34.2 ppm of $Al_2(SO_4)_3$? (Assume complete dissociation and density of solution 1 g/mL)**

a) 3×10^{-4} M b) 2×10^{-4} M

c) 10^{-4} M d)None of these

46. **50 mL of 20.8 % (w/V) $BaCl_{2(aq)}$ and 100 mL of 9.8 % (w/V) $H_2SO_{4(aq)}$ solutions are mixed. Molarity of Cl- ions in the resulting solution is: (At. wt. of Ba = 137)**

a) 0.333 M b) 0.666 M c) 0.1 M d) 1.33 M

47. **Calculate the mass of anhydrous HCl in 10 mL of concentrated HCl (density = 1.2 g/mL) solution having 37 % HCl by weight.**

a) 4.44 g b) 4.44 mg c) 4.44×10^{-3} g d) 0.444µg

48. **What volume of HCl solution of density 1.2 g/cm3 and containing 36.5 % by weight HCl, must be allowed to react with zinc (Zn) in order to liberate 4.0 g of hydrogen?**

a) 333.33 mL **b) 500 mL**

a) 1st order rate equation b) zero order rate equation

c) 2nd order rate equation d) 3rd order rate equation

49. **In the reaction of A +2B → C + 2D, the initial rate, $-d[A]/dt$ at t = 0 was found to be 2.6×10^{-2} $Msec^{-1}$. What is the value of $-d[B]/dt$ at t = 0 in Ms^{-1}?**

a) 2.6×10^{-2} b) 5.2×10^{-2} c) 1.0×10^{-1} d) 6.5×10^{-3}

50. **Activation energy is**

a) $E_T - E_R$ b) $E_P - E_R$

c) threshold energy d) $E_T - E_P$

51. **Which will lead to a change in a rate constant K of a reaction?**

a) A change in the pressure

b) change in temperature

c) change in the volume of reaction vessel

d) All of the above

52. **Collision theory satisfactorily explains for:**

a) first order reactions b) zero order reaction

c) biomolecular reaction d) any order reaction

53. **For a reaction, the rate of reaction was found to increase about 1.8 times when the temperature was increased by 10°C. The increase in rate is due to:**

a) increase in number of active molecules

b) increase in activation energy of reactant

c) decrease in activation energy of reactants

d) increase in the number of collisions between reacting molecules

54. **The inversion of cane sugar into glucose and fructose is:**

a) I order b) II order c) III order d) zero order

55. **A reaction was found to be second order with respect to the concentration of carbon monoxide. If the concentration of carbon monoxide is doubled, with everything else kept the same, the rate of reaction will:**

a) remain unchanged b) triple

c) increase by a factor of 4 d) double

56. **If 60% of a first order reaction was completed in 60 minute, 50% of the same reaction would be completed in a approximately: ($ln\ 2.5 = 0.916$)**

a) 45 minutes b) 60 minutes

c) 40 minutes d) 50 minutes

57. **The rate of disappearance of SO_2 in the reaction;**

$2SO_2 + O_2 \rightarrow 2SO_3$ is 1.28×10^{-3} g/sec. Then the rate of formation of SO_3 is:

a) 0.64×10^{-3} g/sec b) 0.80×10^{-3} g/sec

c) 1.28×10^{-1} g/sec d) 1.60×10^{-3} g/sec

58. **A first order reaction has a half life period of 69.3 second. At 0.10 $mollitre^{-1}$ reatant concentration, rate will be:**

a) 10^{-4} $Msec^{-1}$ b) $10^{-3}Msec^{-1}$

c) $10^{-1}Msec^{-1}$ d) $6.93 \times 10^{-1}Msec^{-1}$

59. **For a reaction aA → bB, when [A] = 2.2 mM, the rate was found to be 2.4mMs^{-1}. On reducing concentration of [A] to half, the rate changes to 0.6 mMs^{-1}. The order of reaction with respect to A is:**

a) 1.5 b) 2.0 c) 2.5 d) 3.0

60. **Radioactive decays follows -----order kinetics:**

a) zero b) I c) II d) III

61. **In the respect of the equation $K = Ae^{-Ea/RT}$ in a chemical kinetics, which one of the following statements is correct?**

a) K is equilibrium constant b) A is adsorption factor

c) Ea is energy of activation d) R is Rydberg constant