

Chapter**1****BASIC CONCEPTS****MULTIPLE CHOICE QUESTIONS**

- Which of the following compounds has the highest % age of oxygen by weight?** (LHR 05)
(a) $\text{CH}_3\text{-OH}$ (b) $\text{C}_2\text{H}_5\text{-OH}$ (c) HCOOH (d) H_2O
- Formula mass of MgSO_4 is g/mole:** (GRW 06)
(a) 150 (b) 120 (c) 130 (d) 140
- Electrometer is also called:** (LHR 07)
(a) Voltmeter (b) Avometer (c) Ion collector (d) Galvanometer
- In combustion analysis H_2O vapors are absorbed by:** (LHR 07, 14, FSD 08)
(a) 50% KOH (b) $\text{Mg}(\text{ClO}_4)_2$ (c) NaOH (d) MgCl_2
- Height of peak in mass spectrum shows:** (LHR 08)
(a) Number of isotopes (b) Mass number
(c) Relative abundance (d) Number of protons
- The volume occupied by 1.4 g of N_2 at S.T.P is:** (SGD 09, 11, LHR 10, GRW 08)
(a) 2.24 dm^3 (b) 22.4 dm^3 (c) 1.12 dm^3 (d) 112 dm^3
- Molecular mass of CaCO_3 is:** (LHR 09)
(a) 100 (b) 90 (c) 120 (d) 106
- Percentage of oxygen in water is:** (LHR 09)
(a) 80% (b) 88.89% (c) 8.8% (d) 9.8%
- A limiting reactant is one which:** (MTN 10, GRW 09)
(a) Is taken in lesser quantity in grams as compared to other reactants
(b) Is taken a lesser quantity in volume as compared to other Reactants
(c) Give maximum amount of product (d) Gives minimum amount of product
- Tin has isotopes:** (LHR 11)
(a) 7 (b) 9 (c) 11 (d) 5
- Empirical formula of glucose is:** (GRW 11)
(a) CHO (b) $\text{C}_2\text{H}_4\text{O}_2$ (c) CH_2O (d) $\text{C}_6\text{H}_{12}\text{O}_6$
- The mass of CO_2 containing 8 grams of oxygen (O_2) in grams is:** (GRW 11)
(a) 32 (b) 22 (c) 16 (d) 11
- 1 amu is equal to:** (LHR 11)
(a) $1.661 \times 10^{27} \text{ kg}$ (b) $1.661 \times 10^{-26} \text{ kg}$ (c) $1.661 \times 10^{-24} \text{ kg}$ (d) $1.661 \times 10^{-24} \text{ g}$
- Cadmium has isotopes:** (LHR 10)
(a) 9 (b) 16 (c) 17 (d) 18
- An ordinary microscope can measure size of object up to:** (FSD 07)
(a) 100nm (b) 200 nm (c) 400 nm (d) 500 nm
- How many times a hemoglobin molecule is heavier than hydrogen atom?** (FSD 10)
(a) 38000 times (b) 58000 times (c) 68000 times (d) 88000 times

- 17. Isotopes are sister atoms of same element with similar chemical properties but different:**
- (a) Atomic number (b) Atomic volume (RWP 09)
 (c) Atomic weight (d) Atomic structure
- 18. The volume occupied by 28 g of N₂ at STP is:** (RWP 10)
 (a) 22.414 dm³ (b) 2.2414 dm³ (c) 224.14 dm³ (d) 1.12 dm³
- 19. One mole of SO₂ contains.** (SGD 09)
 (a) 6.02 × 10²³ atom of oxygen (b) 18.1 × 10²³ molecules of SO₂
 (c) 6.02 × 10²³ atoms of sulphur (d) 4 grams atom of SO₂
- 20. The pressure of vapors maintained in ionization chamber of mass spectrometer during isotopic analysis is:** (SGD 10)
 (a) 10³ torr (b) Around 10⁻⁵ torr (c) Around 10⁻⁷ torr (d) 10⁻⁹ torr
- 21. 18.02 g of H₂O sample has:** (MTN 07)
 (a) 1 mole of Hydrogen atoms (b) ½ mole of oxygen atom
 (c) 6.922 × 10²³ moles of H₂O (d) 6.022 × 10²³ Molecules of H₂O
- 22. The percentage of Nitrogen in NH₃ is:** (MTN 07)
 (a) $\frac{14}{34} \times 100$ (b) $\frac{14}{17} \times 100$ (c) $\frac{3}{17} \times 100$ (d) $\frac{28}{34} \times 100$
- 23. NH₃ burns in O₂ according to the following reaction:** (MTN 07)

$$4\text{NH}_3(\text{g}) + 3\text{O}_2(\text{g}) \rightleftharpoons 2\text{N}_2(\text{g}) + 6\text{H}_2\text{O}(\text{g})$$
 (a) Its show that 1 mole of NH₃ will produce ½ moles of N₂
 (b) 1 mole of NH₃ will produces 6 mole of N₂
 (c) For the complete reaction 2 moles of NH₃ and 20 g of O₂ are required
 (d) Fr the complete reaction, 2 moles of NH₃ and 40 g of O₂ are required
- 24. Molecular formula is equal to:** (MTN 09)
 (a) n × empirical formula (b) n × compound formula
 (c) n × atomic formula (d) n × structural formula
- 25. The number of atoms present in 0.5 moles of Na is:** (MTN 09)
 (a) 1.0 × 10²³ (b) 6.02 × 10²³ (c) 2.04 × 10²³ (d) 3.01 × 10²³
- 26. The atomicity of NH₃ is:** (MTN, DGK 08, BWP 11)
 (a) One (b) Two (c) Three (d) Four
- 27. Water absorber used in combustion analysis is:** (MTN 09)
 (a) 50% KOH (b) 50% NaOH (c) Lime water (d) Mg (ClO₄)₂
- 28. The number of isotopes of oxygen is:** (BWP 08, 09)
 (a) One (b) Two (c) Four (d) Three
- 29. A limiting reactant is that one which:** (BWP 10)
 (a) Gives least number of moles of product (b) Gives greatest number of moles of product
 (c) Is left behind after completion of reaction (d) Is most costly substances as compared to others
- 30. Atoms of which one of the following element have independent existence:** (BWP 10)
 (a) Flourine (b) krypton (c) Oxygen (d) Nitrogen
- 31. Dempster's mass spectrometer was designed for the identification of isotopes of the elements which were available in:** (DGK 08)
 (a) Gaseous state (b) Liquid state (c) Solid state (d) Plasma state
- 32. One of the substances is used to absorb CO₂ gas in combustion analysis which is that substance:**
 (a) 50% KOH (b) Al₂O₃ (c) Mg(ClO₄)₂ (d) SiO₂ (DGK 10)

33. Number of molecules in one dm^3 of H_2O is close to: **(LHR 13, DGK 10)**
 (a) 6.022×10^{23} (b) $18 \times 6.022 \times 10^{23}$ (c) $55.5 \times 6.022 \times 10^{23}$ (d) $\frac{18}{24} \times 10^{23}$
34. The volume occupied by 32 g of O_2 at S.T.P is: **(DGK 11)**
 (a) 22.414 dm^3 (b) 2.241 dm^3 (c) 224.414 dm^3 (d) 0.224 dm^3
35. Silver has isotopes: **(LHR 10)**
 (a) 9 (b) 16 (c) 17 (d) 18
36. The number of molecules in one gram atom of CO_2 is: **(GRW 10)**
 (a) 6.02×10^{23} (b) 6.02×10^{22} (c) 6.02×10^{27} (d) 6.02×10^{24}
37. Mass of electron is: **(LHR 11)**
 (a) $9.1095 \times 10^{31} \text{ kg}$ (b) $9.1095 \times 10^{-31} \text{ kg}$ (c) $9.1095 \times 10^{-27} \text{ kg}$ (d) $9.1095 \times 10^{-31} \text{ g}$
38. The number of moles of CO_2 which contain 8.0 gram of oxygen is: **(LHR, GRW 12, 14)**
 (a) 0.25 (b) 0.50 (c) 1.0 (d) 1.50
39. How many isotopes are present in palladium? **(LHR 13)**
 (a) Four (b) Five (c) Six (d) Seven
40. The chemical analysis in which all the elements present in a compound are identified: **(FSD 10)**
 (a) Quantitative analysis (b) Qualitative analysis
 (c) Gravimetric analysis (d) none of these
41. Which of the following element can exist in monoatomic form **(MTN 11)**
 (a) Oxygen (b) Chlorine (c) Nitrogen (d) Helium

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
d	b	c	b	c	c	a	b	d	c	c	d	d	a	d
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
c	c	a	c	c	d	b	a	a	d	d	d	d	a	b
31	32	33	34	35	36	37	38	39	40	41				
c	a	c	a	b	a	b	a	c	b	d				

EXPERIMENTAL TECHNIQUES IN CHEMISTRY

MULTIPLE CHOICE QUESTIONS

- In paper chromatography, the point to which the solvent rises to maximum extent is called:** (GRW 07)
 - Eluent
 - Chromatogram
 - Solvent front
 - Base line
- Which one of the following substances is used as decolorizing agent:** (GRW 08, 09, LHR 14)
 - Animal charcoal
 - Conc. H_2SO_4
 - CaCl_2
 - Silica gel
- The iodine present in water can be separated by which one of the following techniques:** (GRW 08)
 - Sublimation
 - Chromatography
 - Filtration
 - Solvent extraction
- Chromatography in which the stationary phase is liquid is called:** (LHR 07)
 - Adsorption chromatography
 - Partition chromatography
 - Column chromatography
 - None of these
- Rate of filtration can be increased using:** (LHR 08, 11)
 - Desiccator
 - Chromatographic tank
 - Cold finger
 - Suction flask
- A component having small value of K (distribution coefficient) mostly remains in:** (LHR 08)
 - Stationary phase
 - Mobile phase
 - Chromatographic tank
 - None of these
- Direct conversion of solid into vapors is called:** (GRW 09)
 - Crystallization
 - Sublimation
 - Distribution
 - Vaporization
- Which of the following is purified by sublimation:** (LHR 09)
 - Naphthalene
 - Benzoic acid
 - Ammonium chloride
 - All of these
- Substance that does not show the process of sublimation is:** (GRW 11)
 - $\text{K}_2\text{Cr}_2\text{O}_7$
 - Iodine
 - Naphthalene
 - NH_4Cl
- Solvent extraction is an equilibrium process and is controlled by:** (FSD 07, 09, SGD 09, 11, RWP 08, 11, LHR 10, GRW 14)
 - Distribution law
 - The amount of solvent used
 - Law of mass action
 - The amount of solute
- Which is not used as drying agent in vacuum desiccator is:** (LHR 14)
 - P_2O_5
 - CaCl_2
 - MgCl_2
 - Silica gel
- Which chemical do not undergo sublimation?** (MTN 07, FSD 08)
 - KMnO_4
 - Naphthalene
 - NH_4Cl
 - Iodine
- Iodine dissolves in water in the presence of KI due to formation of which one of the following species?** (BWP 11, FSD 10, LHR 13)
 - I_2
 - I^-
 - I_3^-
 - I_4
- The most common solvent used in solvent extraction is:** (FSD 11)
 - Acetone
 - Ethanol
 - Rectified spirit
 - Diethyl ether
- Which of the following substance shows the property of sublimation?** (SGD 10, BWP 08)
 - Sodium chloride
 - Ammonium chloride
 - Copper chloride
 - Acetic acid

16. **In paper chromatography, the mobile phase is usually:** (RWP 08)
 (a) Liquid ammonia (b) Water
 (c) Organic liquid (d) None of these
17. **The comparative rate at which the solutes move in paper chromatography depends on:** (RWP 09, MTN 08, LHR 12, GRW 12, 14)
 (a) The size of paper (b) R_f values of solutes
 (c) Temperature of the experiment (d) Size of the chromatographic tank used
18. **When hot saturated solution is cooled very slowly we get:** (RWP 10, DGK 11)
 (a) Medium size crystals (b) Large size crystals
 (c) Premature crystallization of the substance (d) No crystals
19. **Chromatography is the process which involves the distribution of a solute between:** (MTN 07)
 (a) Two mobile phases (b) A stationary phase and a mobile phase
 (c) Two stationary and two mobile phases (d) Two stationary phases
20. **In CCl_4 solvent, I_2 shows:** (MTN 07)
 (a) Blue colour (b) Brown colour
 (c) Pink colour (d) Purple colour
21. **The drying Agents used in vacuum desiccator are:** (MTN 08)
 (a) CaCl_2 (b) Silica gel
 (c) Both a and b (d) None
22. **The ratio of the solute in organic phase to that in aqueous phase is called:** (MTN 08, 10, BWP 08)
 (a) Rate constant (b) Equilibrium constant
 (c) Distribution coefficient (d) Arrhenius constant
23. **When an organic compound which is volatile or thermally unstable it is separated by:** (MTN 09)
 (a) Crystallization (b) Sublimation
 (c) Solvent extraction (d) Chromatography
24. **Iodine can be purified by process of:** (MTN 09)
 (a) Evaporation (b) Saponification
 (c) Sublimation (d) Crystallization
25. **Insoluble particles can be separated from a liquid by:** (MTN 11)
 (a) Sublimation (b) Solvent extraction
 (c) Filtration (d) Crystallization
26. **Repeated extraction using small portion of solvent are more:** (DGK 08)
 (a) Accurate (b) Efficient
 (c) Slow (d) Rapid
27. **The chromatography in which stationary phase is liquid is called:** (DGK 08)
 (a) Partition chromatography (b) Column chromatography
 (c) Adsorption chromatography (d) All of these
28. **In chromatography the stationary phase:** (DGK 10, FSD 08)
 (a) Is a solid (b) Is a liquid
 (c) May be liquid or gas (d) May be solid or liquid
29. **The drying agents used in vacuum desiccator are:** (LHR 12)
 (a) AgCl (b) NH_4Cl
 (c) CaCl_2 (d) AlCl_3
30. **Gooch crucible is made of:** (LHR 14)
 (a) Clay (b) Asbestos
 (c) Porcelain (d) Iron
31. **Solvent extraction is a process:** (LHR 14)
 (a) Exothermic (b) Endothermic
 (c) Equilibrium (d) Non-equilibrium
32. **Purity of a substance is checked by:**
 (a) Crystallization (b) Sublimation
 (c) Solvent extraction (d) Chromatography

MULTIPLE CHOICE QUESTIONS

- The ideal gas constant R , when expressed in $\text{dm}^3 \text{ atm. mol}^{-1} \cdot \text{K}^{-1}$ units have a value of: (GRW 05)
(a) 0.0821 (b) 1.0821 (c) 82.21 (d) 82.1
- Calorie is equivalent to: (GRW 05)
(a) 0.4184 J (b) 41.84 J (c) 4.184 J (d) 10.418 J
- The density of a gas can be determined by formula: (GRW 06, FSD 11)
(a) $d = \frac{PM}{RT}$ (b) $d = \frac{RT}{PM}$ (c) $d = \frac{PMR}{T}$ (d) $d = \frac{PMT}{R}$
- Which gas has highest diffusion rate? (LHR 06)
(a) SO_2 (b) Cl_2 (c) NH_3 (d) CO_2
- Mathematically Boyle's law is shown as: (LHR 07)
(a) $PT = K$ (b) $VT = K$ (c) $\frac{P}{T} = K$ (d) $PV = K$
- Absolute zero is equal to: (GRW 07)
(a) 273°C (b) -273°C (c) 0°C (d) 273 K
- If the values of 'a' and 'b' in Van der Waal's equation are close to zero for a gas, then the gas is: (LHR 08)
(a) Ideal (b) Non-ideal (c) highly polar (d) Liquefied easily
- The constant factor in Charles's law is: (GRW 08)
(a) Volume (b) temperature (c) Pressure (d) all of these
- Which gas will diffuse more rapidly: (GRW 09)
(a) CO_2 (b) NH_3 (c) HCl (d) SO_2
- Normal human body temperature is: (LHR 11)
(a) 37°C (b) 98.6°C (c) 37°F (d) 273 K
- Partial pressure of oxygen in human lungs in torr is: (MTN 07, DGK 08, GRW 11, 08, LHR 12)
(a) 161 (b) 116 (c) 159 (d) 760
- The molar volume of CO_2 is maximum at: (LHR, SGD 10, RWP 09)
(a) S.T.P (b) 127°C and 1 atm (c) 0°C and 2 atm (d) 273 K
- The order of rate of diffusion of gases NH_3 , SO_2 , Cl_2 and CO_2 is: (MTN 08, FSD 09)
(a) $\text{NH}_3 > \text{SO}_2 > \text{Cl}_2 > \text{CO}_2$ (b) $\text{NH}_3 > \text{CO}_2 > \text{SO}_2 > \text{Cl}_2$
(c) $\text{Cl}_2 > \text{SO}_2 > \text{CO}_2 > \text{NH}_3$ (d) $\text{NH}_3 > \text{CO}_2 > \text{Cl}_2 > \text{SO}_2$
- Plasma is conductor of electricity: (MTN 08, FSD 09)
(a) Bad (b) Poor (c) Good (d) None
- To calculate the pressure and volume of a real gas under the non-ideal conditions, alternate kinetic equation has been developed. This is known as: (FSD 10)
(a) General gas equation (b) Arrhenius equation
(c) Clausius Clapeyron equation (d) van der Waal's equation
- If absolute temperature of a gas is doubled and pressure is reduced to one half, the volume of the gas will: (SGD 09, RWP 10, MTN, BWP, DGK 11)
(a) Remain unchanged (b) Increase four times
(c) Reduce to $\frac{1}{4}$ (d) Be doubled
- Pressure remaining constant, at which temperature the volume of a gas will become twice of what it is at 0°C . (RWP 08)
(a) 546°C (b) 200°C (c) 546 K (d) 273 K
- One torr is equal to: (RWP 08)
(a) One atmosphere (b) One Pascal (c) One mm of Hg (d) 76 cm of Hg

19. **S.I unit of pressure is:** (RWP 09)
 (a) Torr (b) mm Hg (c) Nm^{-2} (d) Pound inch⁻²
20. **The spreading of fragrance of scent in air is due to:** (SWL 15, RWP 11)
 (a) Effusion (b) Diffusion (c) Osmosis (d) Density.
21. **The value of R (in $\text{Nm K}^{-1} \text{mol}^{-1}$) is:** (MTN 08)
 (a) 8.214 (b) 8.314 (c) 0.0321 (d) 62.4
22. **Which of the following will have the same number of moles at S.T.P?** (MTN 08)
 (a) 280 cm³ of CO₂ and 280 cm³ of N₂O (b) 11.2 dm³ of O₂ and 32 g of O₂
 (c) 44 g CO₂ and 11.2 dm³ of CO (d) 28.0g N₂ and 5.6 g O₂ of oxygen
23. **The absolute zero is:** (MTN 09)
 (a) Attainable (b) May be attainable
 (c) Un attainable in gaseous state (d) My not be attainable
24. **Standard temperature:** (MTN 09)
 (a) 0°C (b) 75°C (c) 273°C (d) 100°C
25. **The colour of NO₂ gas is:** (BWP 08)
 (a) Yellow (b) Green (c) Brown (d) Blue
26. **Pilots feel uncomfortable breathing in unpressurized cabins:** (BWP 08)
 (a) Due to high pressure of CO₂ (b) Due to low pressure of O₂
 (c) Due to fatigue (d) Due to low pressure of CO₂
27. **Plasmas are found in everything from sun to:** (DGK 08)
 (a) Atoms (b) Molecules (c) Electrons (d) Quarks
28. **Which gas will diffuse more rapidly among the following?** (DGK 10)
 (a) N₂ (b) H₂ (c) CO (d) NH₃
29. **Which gas diffuses most rapidly?** (LHR 06)
 (a) HCl (b) NH₃ (c) SO₂ (d) CO₂

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a	c	a	c	d	b	a	c	b	a	c	b	b	c	d
16	17	18	19	20	21	22	23	24	25	26	27	28	29	
b	c	c	c	b	b	a	c	a	c	b	d	B	b	

MULTIPLE CHOICE QUESTIONS

- Which one is the example of cubic crystals?**
(a) Graphite (b) Sugar (c) Borax (d) Diamond
- The boiling point of the halogens:**
(a) Increase down the group (b) Decrease down the group
(c) Remains constant (d) can't be predicted
- Vapor pressure of a liquid in a closed container depends upon:**
(a) Surface area of container (b) Temperature
(c) Amount of liquid (d) All of these
- A crystal system in which all the axes and angles are unequal is called:**
(a) Tetragonal system (b) Monoclinic system
(c) Triclinic system (d) Cubic system
- At Murree hills water boils at:**
(a) 98°C (b) 100°C (c) 0°C (d) 50°C
- Coordination number of Na⁺ ion in NaCl is:**
(a) One (b) Two (c) Four (d) Six
- Water may boil at 120°C when external pressure is:** (LHR 14)
(a) 369 torr (b) 700 torr (c) 760 torr (d) 1489 torr
- Crystals formed due to London forces of interaction are:**
(a) Ionic (b) Covalent (c) Molecular (d) Metallic
- Forces which are preset between ions and water molecules are**
(a) Dipole-induced dipole forces (b) Dipole-dipole forces
(c) Ion dipole forces (d) London dispersion forces
- How many allotropic forms are present in carbon?**
(a) Two (b) Three (c) Four (d) Five
- Transition temperature of tin is**
(a) 95.5°C (b) 13.2°C (c) 0°C (d) 128.5°C
- The crystal of diamond is:**
(a) Ionic (b) Covalent (c) Molecular (d) Metallic
- Liquid hydrocarbon is:**
(a) Methane (b) Propane (c) Ethane (d) Hexane
- The example of hexagonal system is:** (LHR 11)
(a) Sulphur (b) NaCl (c) Graphite (d) Diamond
- Hydrogen bonding is strongest in:**
(a) HI (b) HBr (c) HCl (d) HF
- Allotropy is the property of:** (GRW 11)
(a) Element (b) Compound (c) Mixture (d) Ions
- Ice occupies more space than liquid water.** (LHR 10)
(a) 9% (b) 10% (c) 11% (d) 12%
- Structure of ice is:**
(a) Tetrahedral (b) Octahedral (c) Cubic (d) Triclinic
- In orthorhombic crystal, the unit cell dimensions are:**
(a) $a = b \neq c$ $\alpha = \beta = \gamma = 90^\circ$ (b) $a \neq b \neq c$ $\alpha = \beta = \gamma = 90^\circ$
(c) $a \neq b \neq c$ $\alpha = \beta = \gamma \neq 90^\circ$ (d) $a \neq b \neq c$ $\alpha = \beta = \gamma \neq 90^\circ$
- London dispersion forces are significant for:**
(a) Polar molecules (b) Ionic solids (c) Metals (d) Non polar molecules

- 21. Which substance shows anisotropic behavior in electrical conductivity?**
 (a) Diamond (b) Graphite (c) KCl (d) Ice
- 22. The boiling points of higher alkanes are greater than those of lower alkanes due to the reasons that:**
 (a) Higher alkanes have greater number of atoms
 (b) The polarizability of higher alkanes is greater
 (c) Higher alkanes have zigzag structures
 (d) Higher alkanes have greater hydrogen bonding
- 23. Water has maximum density at:**
 (a) 4°C (b) 0°C (c) 100°C (d) 10°C
- 24. K_2SO_4 and K_2CrO_4 are isomorphous solids and exist in:**
 (a) Cubic form (b) Orthorhombic form (c) Trigonal form (d) Tetragonal
- 25. The transition temperature of KNO_3 is:**
 (a) 13.2°C (b) 95.5°C (c) 128 °C (d) 32.02°C
- 26. The distillation of liquid under reduced pressure is called:**
 (a) Destructive distillation (b) Vacuum distillation
 (c) Fractional distillation (d) Simple distillation
- 27. The structure of sodium chloride is:**
 (a) Body centered cube (b) Face centered cube
 (c) Simple cube (d) None
- 28. The forces which are present between the ions and the water molecules are known as:**
 (a) Dipole induced forces (b) Ion-dipole forces
 (c) Dipole-dipole forces (d) London dispersion forces
- 29. LiF is a crystalline substance and has:**
 (a) Ionic crystals (b) Metallic crystals
 (c) Covalent crystals (d) Molecular crystals
- 30. Which of the following liquid has highest boiling point?**
 (a) HCl (b) HBr (c) H_2O (d) Br_2
- 31. The number of Na^+ ions which surround each Cl^- ion in the NaCl crystal is:**
 (a) 4 (b) 6 (c) 8 (d) 12
- 32. Liquids evaporate at every temperature. When the temperature becomes constant for a liquid then:**
 (a) Rate of evaporation is greater than the rate of condensation.
 (b) The rate of condensation is greater than the rate of evaporation.
 (c) The rate of condensation and evaporation becomes equal
 (d) Depends upon the nature of the liquid
- 33. Ionic solid don't conduct the electrical current because:**
 (a) Ions do not have translatory motion (b) Free electrons are less
 (c) The coordination number of the ion is very high
 (d) Strong covalent bonds are present in their structure
- 34. Amorphous means:**
 (a) Ordered (b) Arranged (c) Shaped (d) Shapeless
- 35. Polarizability is measure of extent of distortion:**
 (a) Qualitative (b) Quantitative (c) Systematic (d) None of these
- 36. Heat change for one mole of a solid during converting into liquid is called:**
 (a) Molar heat of vaporization (b) Molar heat of sublimation
 (c) Molar heat of fusion (d) Enthalpy change
- 37. Which of the following does not form a molecular crystal?**
 (a) Ice (b) Graphite (c) Iodine (d) Sugar
- 38. Evaporation causes:**
 (a) Cooling (b) Heating (c) Boiling (d) irritation
- 39. Diamond and graphite are example of:**
 (a) Isomorphism (b) Polymorphism (c) Isomerism (d) Allotropy
- 40. Dipole-induced dipole forces are also called:**
 (a) London dispersion forces (b) Debye forces
 (c) Huckel forces (d) Electrostatic forces
- 41. The size of diameter of double helix of DNA is:**
 (a) 18-20 Å (b) 20-30 Å (c) 1-10 Å (d) 25-30 Å

42. Which statement is incorrect about tetragonal crystal system?
 (a) $a = b \neq c$ (b) $a \neq b = c$ (c) $\alpha = \beta = \gamma = 90^\circ$ (d) None of these
43. Crystal system shown by diamond is:
 (a) Cubic (b) Tetragonal (c) Monoclinic (d) Hexagonal
44. The strongest acid among halogen acids is:
 (a) HF (b) HCl (c) HBr (d) HI
45. The number of Cl^- ions per unit cell of NaCl is:
 (a) 8 (b) 6 (c) 4 (d) 2
46. How much more space is occupied by water on freezing:
 (a) 9% (b) 8% (c) 7% (d) 6%
47. Boiling point of H_2O at Mount Everest would be:
 (a) 98°C (b) 100°C (c) 101°C (d) 69°C
48. Allotropy is the property of:
 (a) Compound (b) Element (c) Atoms (d) Mixture
49. Hydrogen bonding is maximum for:
 (a) Ethanol (b) Water (c) Benzene (d) Diethyl ether
50. The existence of an element in more than one crystalline forms:
 (a) Allotropy (b) Isotropy (c) Isomorphism (d) Polymorphism **(LHR 12, 13)**
51. Dry ice (Solid CO_2) is an example of solid:
 (a) Covalent (b) Molecular (c) Ionic (d) Metallic **(LHR 14)**
52. Glycerine decomposes at its:
 (a) Melting point (b) Boiling point (c) Freezing point (d) Critical point **(LHR 14)**
53. Which one is the following is a pseudo solid:
 (a) CaF_2 (b) NaCl (c) Borax (d) Glass **(LHR, GRW 14)**

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
d	a	b	c	a	d	d	c	c	a	b	b	d	c	d
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
a	a	c	b	d	b	b	a	b	c	b	b	b	a	c
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
b	c	a	d	b	c	b	a	d	b	a	b	a	d	c
46	47	48	49	50	51	52	53							
a	d	b	b	a	b	b	d							

MULTIPLE CHOICE QUESTIONS

- Maximum number of electrons in a subshell is given by:** (LHR 05, 14)
(a) $2\ell + 1$ (b) $2\ell - 1$ (c) $2(2\ell + 1)$ (d) $2(2\ell - 1)$
- An orbital can accommodate maximum electrons:** (LHR 14, GRW 06)
(a) 10 (b) 14 (c) 6 (d) 2
- How many times the mass of neutron is greater than that of electron?** (GRW 07)
(a) 1480 (b) 2000 (c) 200 (d) 1840
- Lyman Series is obtained when electron in an atom jumps from higher energy level to:** (GRW 07)
(a) Ground level (b) 2nd level (c) 3rd level (d) 4th level
- When 6d orbital is complete, the entering electron goes into:** (LHR 07, SGD 09, RWP 10, MTN, DGK 11)
(a) 7f (b) 7s (c) 7p (d) 7d
- Lyman series occur in:** (SGD 10, LHR 07)
(a) Visible region (b) U.V. region (c) I.R. region (d) None of these
- $\frac{e}{m}$ value for positive rays is maximum for:** (LHR 08 13, GRW 09, MTN 07)
(a) Hydrogen (b) Helium (c) Oxygen (d) Nitrogen
- According to Bohr's atomic model, radius of second orbit of hydrogen atom is:** (LHR 08)
(a) 0.529 Å (b) 2.116 Å (c) 4.0 Å (d) 5.0 Å
- Lines of Paschen series are produced when electrons jump from higher orbits to ----- orbit.**
(a) 1st (b) 2nd (c) 3rd (d) 4th (GRW 08)
- The electronic configuration of an atom is $1s^2, 2s^2, 2p^4$. The number of unpaired electrons in this atom is:** (GRW 08)
(a) 0 (b) 2 (c) 4 (d) 6
- Negative charge on cathode rays we established by:** (GRW 09)
(a) William Crook (b) J. Perrin (c) R.A Millikan (d) Hittrof
- An orbital which is spherical and symmetrical is:** (LHR 09)
(a) s-orbital (b) p-orbital (c) d-orbital (d) f-orbital
- Angstrom is the unit of:** (LHR 09)
(a) time (b) length (c) mass (d) frequency
- Mass of electron is:** (LHR 11)
(a) 9.1095×10^{31} kg (b) 9.1095×10^{-31} kg
(c) 9.1095×10^{-27} kg (d) 9.1095×10^{-31} g
- Neutron was discovered by:** (LHR 11)
(a) Chadwick (b) C.D. Anderson (c) Rutherford (d) Goldstein
- Bombardment of α -particles on Beryllium (Be) atom, emits neutron and this process is called:**
(a) Natural radioactivity (b) Artificial radioactivity (GRW 11)
(c) Pauli's exclusion principle (d) Hund's rule
- Balmer series in hydrogen spectrum lies in the region:** (FSD 07, GRW 11)
(a) Ultraviolet (b) Visible (c) Infrared (d) Microwave
- The value of Planck's constant is:** (LHR 10)
(a) 6.62×10^{-34} J.s (b) 6.62×10^{-27} J.s (c) 6.62×10^{-21} J.s (d) 6.62×10^{-31} J.s
- Properties of waves are:** (FSD 09)
(a) Wave length (b) Wave number (c) Frequency (d) All
- Which equation correctly represents the Heisenberg's uncertainty principle?** (FSD 10)
(a) $\Delta x \Delta p = \frac{h}{4\pi}$ (b) $\Delta x \Delta p > \frac{h}{4\pi}$ (c) $\Delta x \Delta p \geq \frac{h}{4\pi}$ (d) $\Delta x \Delta p \leq \frac{h}{4\pi}$

21. ${}_{29}^{65}\text{Cu} + {}_0^1\text{n} \longrightarrow {}_{29}^{66}\text{Cu} + \text{"x"}$ What is "x" (LHR 14, BWP 11, FSD 10)
 (a) Electrons (b) Protons (c) Beta rays (d) Gamma ray
22. The number of neutrons present in ${}_{19}^{39}\text{K}$ is: (MTN 07, DGK 10, FSD 11)
 (a) 39 (b) 18 (c) 20 (d) 19
23. When 4s orbital is complete, the electron goes into: (SGD 10)
 (a) 4p (b) 3d (c) 4d (d) 4f
24. The limiting line of Balmer series lies in the region: (SGD 11)
 (a) Visible (b) U.V. (c) Near I.R. (d) Far I.R.
25. Which of the following orbitals is dumb bell shaped? (RWP 08)
 (a) s-orbital (b) p-orbital (c) d-orbital (d) f-orbital
26. Free neutron decays into a proton with the emission of an electron and a _____: (RWP 08)
 (a) Positron (b) Neutrino (c) Beta Particle (d) Helium nucleus
27. The mass of an oxygen atom is: (RWP 10)
 (a) 2.657×10^{-23} g (b) 2.657×10^{23} g (c) 16 g (d) 32 g
28. The electrons occupying an orbital are distinguished by: (MTN 07)
 (a) Magnetic quantum number (b) Principal quantum number
 (c) Azimuthal quantum number (d) Spin quantum number
29. The mass of proton is (in kg): (MTN 08)
 (a) $+1.6 \times 10^{-19}$ (b) -1.6×10^{-19} (c) 1.672×10^{-27} (d) 9.1×10^{-31}
30. Bohr's model of atom is contradicted by: (MTN 08)
 (a) Photo electric effect (b) Pauli's exclusion principle
 (c) Heisenberg's uncertainty principle (d) Aufbau principle
31. K-series X-Rays have wavelength: (MTN 09)
 (a) Longer (b) Smaller (c) Same (d) Different
32. What is the value of $(n + l)$ for the 3s sub-shell? (MTN 09)
 (a) 2 (b) 1 (c) 5 (d) 3
33. Cathode rays consist of: (MTN 09)
 (a) Electrons (b) Protons (c) Neutrons (d) Nucleons
34. The d-subshell consists of: (MTN 09)
 (a) 5-orbitals (b) 6-orbitals (c) 7-orbitals (d) 10-orbitals
35. Orbitals having same energy are called: (MTN 10, BWP 09)
 (a) Hybrid orbitals (b) Valence orbitals (c) d-orbitals (d) Degenerate orbitals
36. Positive rays were discovered by: (MTN 11)
 (a) J.J. Thomson (b) Rutherford (c) William Crooks (d) E. Goldstein
37. Mass of one mole of electron is: (MTN 11)
 (a) 0.55 mg (b) 0.184 mg (c) 1.673 mg (d) 1.008 mg
38. For the P sub shell the azimuthal quantum number "l" is: (BWP 08)
 (a) 2 (b) 3 (c) zero (d) 1
39. If an electron is free from the attraction of nucleus then its energy is: (BWP 08)
 (a) Negative (b) Positive (c) Zero (d) None of these
40. In discharge tube experiment, the pressure of gas was maintained at: (BWP 10)
 (a) 760 torr (b) 0.1 torr (c) 0.01 torr (d) 10 torr
41. Splitting of spectral lines when atoms are subjected to strong magnetic field is called: (BWP 10, 11)
 (a) Zeeman effect (b) Stark effect
 (c) Compton effect (d) Photoelectric effect
42. Which one of the following series lies in ultraviolet region: (DGK 08)
 (a) Lyman (b) Balmer (c) Paschen (d) Brackett
43. The shape of 'P' orbitals is: (DGK 08)
 (a) Double dumb-bell (b) Spherical (c) Dumb-bell (d) Complicated
44. Value of Rydberg's constant is: (DGK 10)
 (a) $1.7904 \times 10^7 \text{ m}^{-1}$ (b) $1.9768 \times 10^7 \text{ m}^{-1}$
 (c) $1.09678 \times 10^7 \text{ m}^{-1}$ (d) $1.6 \times 10^7 \text{ m}^{-1}$
45. When the Azimuthal quantum number is 3 then 'm' can have (DGK 11)
 (a) 5 values (b) 7 values (c) 2 values (d) 3 values
46. Total number of spectral regions in sunlight spectrum is: (LHR 10)
 (a) 4 (b) 6 (c) 7 (d) 8

MULTIPLE CHOICE QUESTIONS

- Which of the following molecules has a coordinate covalent bond?** (LHR 05)
(a) HCl (b) NaCl (c) NH_4Cl (d) AlCl_3
- The angle formed in sp hybridization is:** (GRW 06)
(a) 120° (b) 180° (c) 109.5° (d) 107.5°
- Ionic compounds are mostly obtained by the combination of group:** (GRW 07)
(a) 3 and 5 (b) 2 and 5 (c) 4 and 8 (d) 1 and 7
- Dipole moment of CO_2 is:** (GRW 07)
(a) 1.84D (b) Zero D (c) 0.95 D (d) 2.2 D
- In sp^2 hybridization, the orbitals are oriented at an angle of:** (LHR 07)
(a) 109.5° (b) 120° (c) 180° (d) 0°
- Which of the following species has unpaired electron in anti bonding molecular orbitals?** (MTN 08, 10, BWP, LHR 08)
(a) H_2 (b) He_2 (c) O_2^{+2} (d) N_2^{2-}
- A molecular orbital can contain maximum electrons equal to:** (LHR 08)
(a) One (b) Two (c) Three (d) Four
- Carbon dioxide and methane have dipole moment value:** (GRW 08)
(a) Zero and 1.85. D (b) 1.70 D and 1.80 D (c) Both have zero (d) None of these
- Nobel gases have maximum stability and least reactive because:** (GRW 07)
(a) They are very safe (b) Their valence shells are complete
(c) They are gases (d) They are present in zero group
- Which species has unpaired electron in anti-bonding molecular orbitals?** (GRW 09)
(a) O_2^{+2} (b) N_2^{2-} (c) B_2 (d) F_2
- Octet rule is not followed in the formation of:** (FSD 11, GRW 09, 12)
(a) NF_3 (b) CF_4 (c) CCl_4 (d) PCl_5
- The most stable elements are:** (LHR 09)
(a) Halogens (b) Lithium family (c) Noble gases (d) None of these
- The hybridization of carbon in C_2H_4 is:** (GRW 09, LHR 14)
(a) sp (b) sp^2 (c) sp^3 (d) not hybridized
- Positive ions are called:** (LHR 09)
(a) Cations (b) Anions (c) Molecules (d) Hydrated ions
- Total number of bonds in C_2H_4 molecule is:** (LHR 11)
(a) Six (b) Four (c) Five (d) Eight
- The S.I unit of dipole moment is:** (LHR 10, 11)
(a) Joule (b) Debye (c) Coulomb meter (d) Nm^{-2}
- Ionic, covalent and co-ordinate covalent bond are present in:** (GRW 11)
(a) SO_2 (b) NH_4Cl (c) C_2H_2 (d) H_2O
- The highest electronegative element in the periodic table is:** (FSD, GRW 11)
(a) Oxygen (b) Nitrogen (c) Chlorine (d) Fluorine
- Bond angle between H-S-H bonds is:** (LHR 10)
(a) 105.5° (b) 107.5° (c) 92° (d) 95°
- S.I Unit of dipole moment is:** (LHR 10)
(a) pm (b) Debye (c) mC (d) All
- The amount of energy released by absorbing electron in the valence shell is:** (MTN 08, 09, GRW 10)
(a) Ionization energy (b) Electron affinity (c) Electro-negativity (d) Atomization energy
- The number of electrons shared in SF_6 :** (GRW 10)
(a) 4 (b) 12 (c) 6 (d) 8

23. Which of hydrogen halides has highest % of ionic character? (FSD 07, 09, RWP 09, 11, LHR 13)
 (a) HCl (b) HBr (c) HF (d) HI
24. The geometry of BeCl_2 is: (FSD 07)
 (a) Linear (b) Plane triangular (c) Tetrahedral (d) None of these
25. Orbitals having same energy are called: (FSD 08)
 (a) Hybrid orbitals (b) Degenerate orbitals (c) Valence orbitals (d) Molecular orbitals
26. The four equivalent sp^3 hybrid orbitals in space are at angles of: (FSD 08)
 (a) 120° (b) 107.5° (c) 109.5° (d) 104.5°
27. Which has unpaired electrons in anti-bonding molecular orbitals? (FSD 08, SGD 11)
 (a) N_2^{2-} (b) O_2^{2+} (c) B_2 (d) F_2
28. The geometry of ethane is: (FSD 09, LHR 13)
 (a) Tetrahedral (b) Trigonal planar (c) Linear (d) V-shaped
29. The paramagnetic property of oxygen is well-explained on the basis of: (SGD 09)
 (a) VSEPR theory (b) VB theory (c) MO theory (d) None of these
30. The bond order of N_2 according to MO theory is: (SGD 09)
 (a) Zero (b) 1 (c) 2 (d) 3
31. Which of the following compound has a co-ordinate covalent bond? (DGK, SGD 10)
 (a) NH_4Cl (b) NaCl (c) HCl (d) AlCl_3
32. The carbon atom in C_2H_4 is: (SGD 10)
 (a) sp^3 hybridized (b) sp^2 hybridized (c) sp hybridized (d) dsp^2 hybridized
33. The molecule which can not form co-ordinate covalent bond with H^+ ion is: (SGD 11)
 (a) NH_3 (b) H_2O (c) PH_3 (d) CH_4
34. Which of the following species has configuration of Neon? (RWP 08)
 (a) Na^+ (b) Ca^{2+} (c) Cl^- (d) None of these
35. The hybridization of carbon in CH_4 is: (RWP 08)
 (a) sp (b) sp^2 (c) sp^3 (d) dsp^3
36. M.O.T was proposed by: (DGK 11, RWP 10)
 (a) Moseley (b) Werner (c) Kossel (d) Mullikan
37. The number of bonds in Nitrogen molecule is: (RWP 10)
 (a) One sigma and one Pi (b) One sigma and two Pi
 (c) Three sigma only (d) Two sigma and one Pi
38. The geometry of ethane is: (RWP 11)
 (a) Tetrahedral (b) Trigonal planner (c) Linear (d) V-shaped
39. In Al_2O_3 the ratio between the ions is: (MTN 07)
 (a) 1:2 (b) 2:1 (c) 2:3 (d) 3:2
40. VSEPR theory was proposed by: (MTN 07)
 (a) Nyholm and Gillespie (b) Kossel (c) Lewis (d) Sidgewick
41. O_2 molecule is paramagnetic because: (MTN 07)
 (a) Bonding electrons are equal to the anti-bonding electrons
 (b) Bonding electrons are more than anti-bonding electrons
 (c) Bonding electrons are less than anti-bonding electron
 (d) It contains unpaired electrons
42. NH_3 has a net dipole moment, but BF_3 has zero dipole movement because: (MTN 07)
 (a) B is less electronegative than N (b) F is more electronegative than N
 (c) BF_3 is pyramidal while NH_3 is planar (d) NH_3 is pyramidal while BF_3 is trigonal planar
43. The number of bonds in oxygen molecule is: (MTN 08)
 (a) One sigma and one Pi-bond (b) Two sigma bonds
 (c) Two pi-bonds (d) None of these
44. Which of the following molecule has zero dipole moment? (MTN 09, SWL 15)
 (a) NH_3 (b) CHCl_3 (c) H_2O (d) BF_3
45. When two atoms form a bond, energy is: (MTN 09)
 (a) Released (b) Absorbed (c) Not changed (d) None of these
46. Maximum electronegativity is of: (MTN 09)
 (a) N (b) F (c) O (d) Cl
47. The bond energy of hydrogen molecule is KJ/mole: (BWP 08)
 (a) 436 (b) 440 (c) 420 (d) 460

48. The value of dipole moment of CS₂ is: (BWP 09)
 (a) 0.12D (b) Zero (c) 1.61 D (d) 0.95 D
49. The nature of bond in diamond is: (BWP 10)
 (a) Electrovalent (b) Covalent (c) Metallic (d) Co-ordinate covalent
50. Octet rule is not followed in formation of: (BWP 10)
 (a) NF₃ (b) CF₄ (c) CCl₄ (d) PCl₅
51. The shielding effect is responsible for: (BWP 11)
 (a) The decrease in nuclear attractive influence over the valence electrons
 (b) The increase in nuclear attractive influence over the valence electrons
 (c) The decrease repulsion between nucleus and inner electrons
 (d) The increase in attraction between nucleus and inner electrons.
52. The elements having low ionization energy are: (DGK 08)
 (a) Non-metal (b) Metals (c) Semi-metal (d) Metalloids
53. Which of the following is not isoelectronic with rest of the three? (DGK 08)
 (a) K⁺ (b) Na⁺ (c) Cl⁻ (d) S⁻²
54. Which of the hydrogen halides has the highest percentage of acid character: (DGK 09)
 (a) HCl (b) HBr (c) HF (d) HI
55. The four equivalent sp³ hybrid orbitals in space are at an angel of: (DGK 09)
 (a) 120° (b) 107.5° (c) 104.5° (d) 109.5°
56. Total number of sigma bonds in Ethyne (CH≡CH) are: (DGK 10)
 (a) Five (b) Three (c) Two (d) Four
57. Bond formed by mutual sharing of electrons is called: (LHR 12)
 (a) Ionic bond (b) Covalent bond (c) Co-ordinate covalent bond (d) All of these
58. Formation of chemical bond takes place when: (LHR 13)
 (a) Energy is absorbed (b) Forces of repulsion overcome forces of attraction
 (c) Forces of attraction are equal to forces of repulsion
 (d) Forces of attraction overcome forces of repulsion

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
c	b	d	b	b	d	b	c	b	b	d	c	b	a	a
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
c	b	d	c	c	b	b	c	a	b	c	a	a	C	d
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
a	b	d	a	c	d	b	a	c	a	d	d	a	d	a
46	47	48	49	50	51	52	53	54	55	56	57	58		
b	a	b	b	d	a	b	b	d	d	b	b	d		

Chapter**7****THERMOCHEMISTRY****MULTIPLE CHOICE QUESTIONS**

- Spontaneous reactions are:** (LHR 05)
(a) Reversible (b) Irreversible (c) Non irreversible (d) None of these
- The standard heat changes occur at:** (BWP 08, GRW 06)
(a) 25°C and 2 atm (b) 298 K and 1 atm
(c) 25°C and 1 mm hg (d) 273 K and 1 atm
- $H^+ + OH^- \rightarrow H_2O$ the change in enthalpy for reaction is called:** (LHR 06)
(a) Heat of reaction (b) heat of formation
(c) Heat of neutralization (d) Heat of combustion
- The net change in energy in a chemical reaction is same whether it takes place directly or indirectly. It is called:** (RWP 11, GRW 07, BWP 10)
(a) Henry's law (b) Charlie's law (c) Hess's law (d) Graham's law
- The enthalpy change when one mole of substance is completely burnt in excess of oxygen is called:** (LHR 07)
(a) Enthalpy of atomization (b) Enthalpy of neutralization
(c) Enthalpy of Combustion (d) Enthalpy of formation
- Enthalpy change for the reaction: $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ is called enthalpy of:** (LHR 08)
(a) Formation (b) Combustion (c) Neutralization (d) Atomization
- Standard enthalpies are measured at:** (FSD 11, LHR 09)
(a) 273 K (b) 298K (c) 373 K (d) All of these
- The exothermic process is:** (DGK 10, GRW, LHR 11)
(a) Evaporation (b) Sublimation (c) Respiration (d) Boiling
- A state function which describes together the internal energy and the product of pressure and volume is called:** (GRW 11)
(a) Enthalpy (b) Internal energy (c) Work (d) Free energy
- The total heat content of system is called:** (LHR 10)
(a) Entropy (b) Enthalpy (c) Temperature (d) Internal energy
- Whenever a reaction is exothermic, then it means that:** (GRW 10)
(a) The heat is transferred from surroundings to the system
(b) The heat content of the reactant is greater than product
(c) The heat content of the reactants is less than those of products
(d) The heat is transferred from system to the surroundings.
- At constant volume q_v is equal to:** (MTN 07, FSD 08)
(a) ΔH (b) ΔE (c) ΔP (d) ΔV
- The value of ΔH being very small, the term $\Delta (PV)$ can be neglected, for the process involving:** (FSD 10)
(a) Liquid and gas (b) Liquid and solids
(c) Solids and gases (d) None of these
- In a Bomb calorimeter, the reaction are carried out at constant:** (SGD 10)
(a) Pressure (b) Work (c) Volume (d) None of these
- Whenever a reaction is endothermic, than it means that:** (MTN 07, DGK 09)
(a) Heat is transferred from surrounding to the system
(b) Heat is transferred from system to the surrounding
(c) Heat content of the products is greater than those of the reactant
(d) Heat content of the reactants is greater than those of the products
- The number of fundamental ways for transferring energy into or out of system is:** (MTN 08)
(a) One (b) Two (c) Three (d) Four
- Work is product of force and:** (MTN 09)
(a) Volume (b) Time (c) Displacement (d) Pressure

CHEMICAL EQUILIBRIUM

MULTIPLE CHOICE QUESTIONS

- The value of pH and pOH of pure water at 25°C is approximately:** (LHR 05)
(a) 14 (b) 7 (c) 1×10^{-14} (d) 1×10^{14}
- Equilibrium constant for gaseous equilibrium is represented by:** (DGK 10)
(a) K_a (b) K_c (c) K_x (d) K_p
- Conjugate acid of a very strong base is relatively:** (GRW 06)
(a) Very strong acid (b) Weak acid (c) Very weak acid (d) strong acid
- Molarity of pure water is:** (LHR 06, 12)
(a) 1 (b) 18 (c) 55.5 (d) 6
- The suppression of ionization of weak acid or a weak base by adding one of its own ions is known as:** (GRW 07)
(a) Buffer action (b) Common ion effect (c) Buffer capacity (d) Ionization effect
- By adding NH_4Cl to NH_4OH solution, the ionization of NH_4OH :** (LHR 08)
(a) Increases (b) Decreases (c) Remain same (d) Increases 100 times
- pH of tomato is:**
(a) 1.2 (b) 4.2 (c) 7.2 (d) 9.2
- When K_c value is small, the equilibrium position is:** (MTN 09, DGK 11, GRW 08)
(a) Towards left (b) Towards right (c) Remains unchanged (d) None of these
- A basic buffer solution can be prepared by mixing:** (GRW 08)
(a) A strong acid and salt with weak base (b) Weak base and its salt with strong acid
(c) Strong base and its salt with weak acid (d) Weak acid and its salt with strong base
- The pOH of solution is 4. The H^+ ions concentration of solution is:** (MTN 07, 08, GRW 09)
(a) 4.0 moles/dm³ (b) 10^{-10} moles/dm³ (c) 0.4 moles/dm³ (d) 4×10^4 moles/dm³
- The concentrations of reactants and products at equilibrium are:** (LHR 09)
(a) Equal (b) Maximum (c) Minimum (d) Constant
- The term pH was introduced by:** (GRW 11, LHR 11, 12, 13)
(a) Henderson (b) Sorenson (c) Goldstein (d) Thomson
- The relationship between K_p and K_c is given by:** (LHR 11)
(a) $K_c = K_p$ (b) $K_c = K_p \text{ Error!}$ (c) $K_p = K_c (RT)^{\Delta n}$ (d) $K_p = K_c (RT)^{-\Delta n}$
- The solubility of KClO_3 in water is suppressed by adding:** (GRW 11)
(a) NaClO_3 (b) NaCl (c) KMNO_4 (d) KCl
- Law of mass action was derived by Guldberg and wage in:** (LHR 10)
(a) 1909 (b) 1906 (c) 1846 (d) 1864
- Ionization of hydrogen sulphide gas is suppressed by:** (GRW 10)
(a) KCl (b) NaCl (c) HCl (d) NH_4Cl
- The pH of human blood is:** (MTN 07, 08, GRW 10)
(a) 7.0 (b) 4.0 (c) 6.5 (d) 7.4
- The ionic product of water will increase if:** (GRW 10, LHR 13)
(a) H^+ ions are added (b) OH^- ion are added
(c) Temperature is increased (d) H^+ and OH^- ions are added in equal amount.
- When HCl is added to H_2S aqueous solution, its ionization:** (MTN 09, LHR 14)
(a) Increases (b) Remains constant (c) Decreases (d) First decreases then increases
- Which of the following factor affects on equilibrium constant?** (MTN 08)
(a) Change in temperature (b) Change in concentration
(c) Change in Pressure (d) Change in volume
- Which one of the following salt dissolves in water to form a solution with pH greater than 7?**
(a) NaCl (b) CuSO_4 (c) Na_2CO_3 (d) NH_4Cl (MTN 09)

MULTIPLE CHOICE QUESTIONS

- Depression in the freezing point is directly proportional to:** (LHR 05)
(a) Molarity of solution (b) Molality of solution (c) Molality of solvent (d) None
- Molarity of solution is expressed in:** (GRW 07)
(a) Moles/kg (b) $\text{g}\cdot\text{dm}^{-3}$ (c) $\text{dm}^3\cdot\text{mole}^{-1}$ (d) $\text{mole}\cdot\text{dm}^{-3}$
- The no. of moles of solute dissolved per dm^3 of solution is called:** (LHR 07)
(a) Molarity (b) Molality (c) Normality (d) Mole fraction
- Benzene – ether can form:** (LHR 07)
(a) Ideal solution (b) Non-ideal solution (c) Buffer solution (d) None of these
- In a mixture of 28 grams of N_2 and 96 grams of O_2 the mole fraction of N_2 :** (LHR 08)
(a) 1.1 (b) 0.51 (c) 0.25 (d) 0.11
- Which salt dissolves in water to form a solution with a pH greater than 7.** (GRW 08)
(a) NaCl (b) CuSO_4 (c) Na_2CO_3 (d) NH_4Cl
- The number of moles of solute per kilogram of solvent is called:** (GRW 09)
(a) Molality (b) Molarity (c) Mole-fraction (d) Normality
- 0.1 molar of solute dissolved in 100g of the solvent will be:** (LHR 09, GRW 10)
(a) 0.1 molar (b) 1.0 molal (c) 0.5 molal (d) none of these
- Raoult's law is represented by:** (LHR 09)
(a) $P = P^\circ X_1$ (b) $\Delta P = P^\circ X_2$ (c) $\frac{\Delta P}{P^\circ} = X_2$ (d) all of these
- The amount of NaOH required to prepared 250 cm^3 of 1M solution in grams is:** (GRW 11)
(a) 10 (b) 15 (c) 20 (d) 25
- 10g NaOH dissolved per 250 cm^3 of solution has molality:** (LHR 10)
(a) 0.5 M (b) 1.0 M (c) 1.5 M (d) 2.0 M
- The azeotropic mixture of solution showing positive deviation can be distilled at _____ boiling point.** (FSD 07)
(a) Maximum (b) Minimum (c) No sharp (d) None of these
- The hydration energy of Br^- ion is _____ than F^- ion:** (FSD 07)
(a) Equal to (b) Smaller than (c) Greater than (d) None of these
- The molal boiling point elevation depends upon.** (FSD 08)
(a) Nature of solvent (b) Vapour pressure of solution (c) Nature of solute (d) pH of solution
- Chemical used to protect a car by preventing the liquid in the radiator from freezing is:** (FSD 09)
(a) Phenol (b) Ethylene glycol (c) KNO_3 (d) Methanol
- Which is a Colligative property?** (FSD 10)
(a) Change in vapour pressure of a solution (b) Change in free energy of a solution
(c) Heat of vapourization of solvent in the solution (d) Lowering of vapour pressure of a solution
- The concentration of solute in the solution when it is in equilibrium with the solid substance at a particular temperature is called its:** (SGD 10)
(a) Solubility (b) Molarity (c) Molality (d) Mole fraction
- Molar concentration is called:** (RWP 08)
(a) Active mass (b) Weight (c) Mass (d) None of these
- An aqueous solution of potassium acetate (CH_3OOK) is:** (RWP 08)
(a) Acidic (b) Basic (c) Neutral (d) Amphoteric
- 2g of NaOH is dissolved in 500 cm^3 of solution. The molarity of the solution is:** (RWP 09)
(a) 2.0 M (b) 1.0 M (c) 0.2 (d) 0.1 M
- Which one of the following gives acidic solution when dissolved in H_2O ?** (MTN 07, RWP 11)
(a) NaCl (b) Na_2SO_4 (c) NH_4Cl (d) $\text{CH}_3\text{COONH}_4$

22. In a mixture of 7g of N₂ and 8g of O₂ the mole fraction of O₂ is: (MTN 07)
 (a) 1 (b) 0.2 (c) 0.5 (d) 0.2
23. Cheese and butter are the example of solution of: (MTN 08)
 (a) Liquid in liquid (b) Solid in solid (c) Liquid in solid (d) Solid in liquid
24. A solution containing 5.3 g of Na₂CO₃ dissolved per dm³ is: (MTN 09)
 (a) 1.0 M (b) 0.1M (c) 0.5 M (d) 0.05 M
25. Water of crystallization of CuSO₄ is: (MTN 09)
 (a) five (b) ten (c) two (d) six
26. If we dissolve Na₂SO₄ in water then the solution is: (BWP 08)
 (a) Acidic (b) Basic (c) Neutral (d) All of these
27. Solution containing relatively lower concentrations of solutes are called: (BWP 09)
 (a) Dilute solutions (b) Concentrated solutions
 (c) Saturated solutions (d) Ideal solutions
28. The critical solution temperature of phenol-water system is: (DGK 08)
 (a) 35.6°C (b) 49.5°C (c) 57.8°C (d) 65.9°C
29. Which one of the following is an ideal solution: (DGK 10)
 (a) C₂H₅OH and H₂O (b) C₆H₆ and CCl₄ (c) CHCl₃ and (CH₃)₂ CO
 (d) H₂O and HCl
30. The mass of Glucose required to prepare 1 dm³ of 20% glucose solution is: (DGK 11)
 (a) 18g (b) 180g (c) 36g (d) 200g

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
b	d	a	a	c	c	a	b	d	a	b	d	b	a	b
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
d	a	a	b	d	c	c	c	d	a	c	a	d	b	d

Chapter

10

ELECTROCHEMISTRY

MULTIPLE CHOICE QUESTIONS

- Reduction always takes place:** (LHR 05, 12)
 (a) At anode (b) At cathode
 (c) At both electrodes (d) does not occur at electrodes
- The electrolyte KOH is used in cell:** (GRW 06)
 (a) Lead accumulator (b) Ni – Cd cell
 (c) Alkaline battery (d) Silver oxide battery
- In the reaction $2\text{Fe} + 3\text{Cl}_2 \rightarrow 2\text{FeCl}_3$:** (BWP 10, GRW 09, LHR 06)
 (a) Fe is reduced (b) Fe is oxidized
 (c) Cl_2 is oxidized (d) None of these happens
- Oxidation state of hydrogen in CaH_2 is:** (GRW 07)
 (a) +1 (b) -1 (c) +2 (d) zero
- Cu metal can be purified in electrolytic cell by making the impure Cu as:** (GRW 07)
 (a) Anode (b) Cathode (c) Anode and Cathode (d) Depends upon nature of solution
- Loss of electrons is called:** (LHR 07)
 (a) Oxidation (b) Reduction (c) Hydration (d) Dehydration
- Fuel cells convert chemical energy into:** (GRW 07)
 (a) Heat energy (b) Light energy (c) Electrical energy (d) Mechanical energy
- Electrolysis is used for:** (LHR 08)
 (a) Electroplating (b) Manufacture of sodium metal (c) Manufacture of Al (d) All of these
- Nelson's cell and Down's cell are example of:** (FSD 09, GRW 08)
 (a) Electrochemical cell (b) Galvanic cell (c) Electrolytic cell (d) None of these
- The oxidation number of Cr in $\text{K}_2\text{Cr}_2\text{O}_7$ is:** (GRW 09, 10, LHR 10,12,13)
 (a) +14 (b) +12 (c) +6 (d) +13
- The electrolyte used in fuel cell is:** (LHR 09, DGK, GRW 10)
 (a) Aqueous NaCl (b) Molten NaCl (c) KOH (d) NaNO_3
- Which one is not an electrolyte:** (LHR 11)
 (a) Aqueous NaCl (b) Aqueous CuSO_4 (c) Cu metal (d) H_2SO_4
- Oxidation state of Mn in MnO_4^{2-} is:** (LHR 10)
 (a) +4 (b) +6 (c) +5 (d) -6
- In H_2O_2 the oxidation state of oxygen is:** (SGD 09, GRW 11)
 (a) +1 (b) -1 (c) +2 (d) -2
- Electrode potential of S.H.E arbitrarily taken in volts is:** (GRW 11)
 (a) 0.00 (b) 1.00 (c) 0.01 (d) 0.50
- Oxidation number of chromium in $\text{K}_2\text{Cr}_2\text{O}_7$ is:** (RWP 09, LHR 10)
 (a) 2 (b) 4 (c) 6 (d) 12
- E.M.f of Zn-Cu cell is:** (LHR 10)
 (a) 0.0V (b) 0.5 V (c) 1.0V (d) 1.10V
- The oxidation number of Mn in KMnO_4 is:** (FSD 07)
 (a) 3 (b) 5 (c) 7 (d) 9
- The oxidation potential of (S.H.E) is:** (FSD 08)
 (a) 0.02V (b) 0.1V (c) 0.00V (d) 0.20V
- The highest reduction potential in the electrochemical series is of F_2 and its value is:** (FSD 10)
 (a) +3.87V (b) -3.87V (c) +2.87 V (d) -2.87V
- Percentage of H_2SO_4 used in lead accumulator is:** (FSD 11)
 (a) 40% (b) 25% (c) 30% (d) 50%

22. Cathode in NICAD cell is: (MTN 09, FSD 11, LHR 14)
 (a) Ag₂O (b) NiO₂
 (c) Cd (d) Zn
23. According to classical concept, oxidation involves: (SGD 10)
 (a) Addition of oxygen (b) Removal of hydrogen
 (c) Increase in oxidation state (d) All of above
24. In Na₂O₂, the oxidation state of oxygen is: (SGD 11)
 (a) -2 (b) +2 (c) -1 (d) +1
25. The extraction of Na-metal by electrolysis of fused NaCl is carried out in: (RWP 08)
 (a) Down's cell (b) Fuel cell (c) Nelson's cell (d) Voltaic cell
26. When one metal is deposited on the surface of the other by the process of electrical current, it is called: (RWP 09, 11)
 (a) Electrolysis (b) Electrolytic refining (c) Electroplating (d) Electrolytic
27. Sulphur has the highest state in: (BWP, RWP 10)
 (a) SO₂ (b) SO₃ (c) H₂S (d) H₂SO₃
28. The cell in which electrical energy is converted into chemical energy is called: (MTN 07)
 (a) Galvanic cell (b) Electrolytic cell (c) Fuel cell (d) Daniel cell
29. In rusting of iron shown by the reaction $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$, Iron is: (MTN 07)
 (a) Precipitated (b) Reduced (c) Hydrolyzed (d) Oxidized
30. Electrochemical series is the arrangement of the electrodes in: (MTN 07)
 (a) Increasing order of reduction potentials (b) Decreasing order of reduction potentials
 (c) Increasing order of oxidation reduction potential (d) there is not fixed arrangement
31. When aqueous NaCl is electrolyzed, which of the following get discharged at cathode: (MTN 08)
 (a) H⁺ (b) Na⁺ (c) OH (d) Cl⁻
32. The oxidation number of chromium in Cr₂O₃ is: (MTN 08)
 (a) +3 (b) +4 (c) +6 (d) +12
33. Gain of electrons is called: (MTN 09)
 (a) Oxidation (b) Reduction (c) Dissociation (d) Electrolysis
34. A decrease in oxidation number is called: (MTN 09)
 (a) Oxidation (b) Reduction (c) Neutralization (d) e.m.f
35. Electrolysis is the process in which a chemical reaction takes place at the expense of: (MTN 10)
 (a) Chemical energy (b) Electrical energy (c) Heat energy (d) Solar energy
36. Those cells which cannot be recharged are called: (BWP 09)
 (a) Primary cell (b) Secondary cell (c) Tertiary cell (d) None of these
37. Fuel cell converts chemical energy into: (BWP 11)
 (a) Heat energy (b) Electrical energy (c) Magnetic energy (d) Sound energy
38. Which one of the following cells is used for the extraction of Na metal: (DGK 08)
 (a) Nelson's cell (b) Galvanic cell (c) Down's cell (d) All of these cells
39. Oxidation state of carbon in glucose (C₆H₁₂O₆) is: (DGK 11)
 (a) Zero (b) One (c) Two (d) Four
40. The oxidation number of nitrogen in HNO₃ is: (DGK 11)
 (a) +3 (b) -3 (c) -5 (d) +5
41. The best reducing agent is: (DGK 11)
 (a) F⁻¹ (b) Cl⁻¹ (c) Br⁻¹ (d) I⁻¹
42. Galvanic cells which cannot be re-charged are called: (GRW12)
 (a) Diffused cells (b) Secondary cells (c) Tertiary cells (d) Primary cells
43. Oxidation number of oxygen in OF₂ is: (LHR 14)
 (a) Zero (b) -1/2 (c) +2 (d) -1

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
b	c	b	b	a	a	c	d	c	c	c	c	b	b	a
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
c	d	c	c	c	c	b	d	c	a	c	b	b	d	a
31	32	33	34	35	36	37	38	39	40	41	42	43		
a	a	b	b	b	a	b	c	a	d	d	d	c		

MULTIPLE CHOICE QUESTIONS

- Larger the surface area of the reactant molecules:**
 - Lower will be the rate of reaction
 - Higher will be the rate of reaction
 - The rate of reaction remains unaffected
 - The rate may increase or decrease
- In zero order reaction, the rate is independent of:**
 - Temperature of reaction
 - Concentration of reactants
 - Concentration of product
 - None of these
- The order of reaction of $\text{O}_3 + \text{NO} \longrightarrow \text{NO}_2 + \text{O}_2$ is:**
 - One
 - Two
 - Three
 - Zero
- Decomposition of nitrogen pentaoxide has order of reaction:**
 - Zero
 - First
 - Second
 - Third
- A substance which retards the rate of reaction is called:**
 - Inhibitor
 - Activator
 - Oxidant
 - Auto-Catalyst
- The minimum amount of energy required for an effective collision is called:**
 - Activation energy
 - Internal energy
 - Translational energy
 - None
- The catalyst used for the reaction $\text{HCOOH} \longrightarrow \text{H}_2 + \text{CO}_2$ is:**
 - Copper
 - Alumina
 - Silica
 - Iron
- Sugar solution hydrolyses to glucose and fructose in the presence of enzyme:**
 - Urease
 - Invertase
 - Zymase
 - None
- When a reaction proceeds in sequence of steps, the overall rate is determined by:**
 - Faster step
 - Slowest step
 - Molecularity of all steps
 - Order of different step
- A substance which makes the catalyst more effective is called:** (LHR 10, 11)
 - Inhibitor
 - Retarder
 - Promoter
 - Auto Catalyst
- If 75% of any given amount of radioactive element disintegrates in 60 minutes the half life of radioactive element is:** (LHR 10)
 - 20 minutes
 - 30 minutes
 - 40 minutes
 - 25 minutes
- with increase of 10°C temperature, the rate of reaction becomes double. This increase in rate of reaction is due to:**
 - Decrease in the activation energy of reaction
 - Decrease in number of collision between the molecules
 - Increase in activation energy of reactants
 - Increase in number of effective collision
- The unit of rate constant for zero order reaction is:**
 - dm^3S^{-1}
 - $\text{mole dm}^{-3}\text{s}^{-1}$
 - $\text{dm}^3 \text{mol}^{-1}\text{s}^{-1}$
 - mole S^{-1}
- If the rate equation of reaction $2\text{A} + \text{B} \rightarrow \text{Product}$ Rate = $k[\text{A}]^2[\text{B}]$ and A is present in large excess, then order of reaction is:**
 - 1
 - 2
 - 3
 - None of these
- The half life period of ${}^{14}_6\text{C}$ is 5760 years. 100mg of sample of ${}^{14}_6\text{C}$ will reduce to 25mg in:**
 - 11520 years
 - 2880 years
 - 57600 years
 - 5760 years
- The energy of activated complex is:**
 - Greater than the reactants and products
 - Less than the reactants and products
 - Equal to the products
 - Equal to the reactants
- Indicate the enzyme which catalyses the following:**
 $\text{C}_6\text{H}_{12}\text{O}_6 \longrightarrow 2\text{C}_2\text{H}_5\text{OH} + 2\text{CO}_2$
 - Diastase
 - Zymase
 - Urease
 - Invertase

- 18. The rate of chemical reaction depends upon the nature of reactants because?**
 (a) Some of the reactants have high boiling point (b) Some of the reactants are colored
 (c) Energy of activation differs from one reaction to another
 (d) Some of the reactants are solid at room temperature
- 19. Which of following is an example of homogenous catalysis?**
 (a) Formation of ghee from oil (b) Formation of SO_3 in contact process
 (c) Hydrolysis of ester (d) Formation of NH_3 in Haber process
- 20. In zero order reaction the rate is independent of:**
 (a) Temperature of reaction (b) Concentration of products
 (c) Concentration of reactants (d) None of these
- 21. Hydrolysis of Tertiary butyl bromide has order of reaction:**
 (a) First order (b) Pseudo first order (c) Second order (d) Third order
- 22. A substance which decreases the efficiency of a catalyst is called:**
 (a) Promoter (b) Activator (c) Poison (d) Auto catalyst
- 23. Photo chemical reactions are:**
 (a) First order (b) Third order (c) Second order (d) Zero order
- 24. The rate of chemical reaction is independent of:**
 (a) Molecularity (b) Temperature
 (c) Nature of reactants (d) Concentration of reaction
- 25. The unit of rate constant for zero order reaction:**
 (a) $\text{mol dm}^{-3} \text{s}^{-1}$ (b) $\text{mol}^{-1} \text{dm}^3 \text{s}^{-1}$ (c) $\text{dm}^3 \text{s}^{-1}$ (d) mol s^{-1}
- 26. The energy of activation for a reaction by using catalyst is:**
 (a) Increased (b) Decreased (c) Not changed (d) Moderate
- 27. Specific rate constant is equal to rate of reaction when concentrations of reactants are: (LHR 14)**
 (a) Zero (b) Four (c) Three (d) Unity
- 28. The equation $K = Ae^{-E_a/RT}$ is called:**
 (a) Rate law (b) Rate equation (c) Arrhenius equation (d) General gas equation

ANSWER KEY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
b	b	b	b	a	a	a	b	b	c	b	d	b	a	a
16	17	18	19	20	21	22	23	24	25	26	27	28		
a	b	c	c	c	b	c	d	a	a	b	d	c		