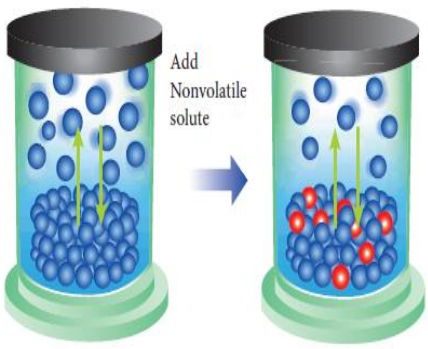
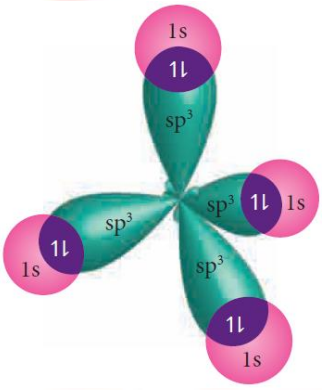
XI - Chemistry

Volume - I & II

UNITWISE

EVALUATION AND ADDITIONAL QUESTIONS





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VOLUME - I

1. Basic concepts of chemistry and chemical calculations

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. Define relative atomic masses (Volume I – Page NO : 4)
2. What do you understand by the term mole? (6)
3. Define Gram equivalent mass (8)
4. What is oxidation number? (20)
5. Distinguish between oxidation and reduction (Creative)
6. Calculate the molar masses of the following i) Urea [$CO(NH_2)_2$] ii) Acetone [CH_2COCH_3] iii) Boric acid [H_3BO_3] iv) Sulphuric Acid [H_2SO_4] (Creative)
7. What is the difference between molecular mass and molar mass? Calculate the molecular mass and molar mass of carbon monoxide. (Creative)
8. What is the empirical formula of the following? I) Fructose [$C_6H_{12}O_6$] ii) Caffeine [$C_8H_{10}N_4O_2$] (Creative)
9. Hydrogen peroxide is an oxidizing agent. It oxidizes ferrous ion to ferric ion and reduced itself to water. Write a balanced equation (creative)

Answer the following question in detail: (5 Marks)

1. Balance the following equations by oxidation number method
   i) $K_2Cr_2O_7 + KI + H_2SO_4 \rightarrow K_2SO_4 + Cr_2(SO_4)_3 + I_2 + H_2O$
   ii) $KMnO_4 + Na_2SO_3 \rightarrow MnO_2 + Na_2SO_4 + KOH$
   iii) $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO_2 + H_2O$
   iv) $KMnO_4 + H_2C_2O_4 + H_2SO_4 \rightarrow K_2SO_4 + MnSO_4 + CO_2 + H_2O$
   v) $FeSO_4 + KMnO_4 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + MnSO_4 + K_2SO_4 + H_2O$
   vi) $As_2S_3 + HNO_3 + H_2O \rightarrow H_3AsO_4 + H_2SO_4 + NO$
2. Balance the following equations by ion electron method
   i) $KMnO_4 + SnCl_2 + HCl \rightarrow MnCl_2 + SnCl_4 + H_2O + HCl$

ii) $C_2O_4^{2-} + C_2O_7^{2-} \rightarrow Cr^{3+} + CO_2$ (in acid medium)

iii) $Na_2S_2O_3 + I_2 \rightarrow Na_2S_4O_6 + NaI$ (in acid medium)

iv) $Zn + NO^{3-} \rightarrow Zn^{2+} + NO$

v) $FeSO_4 + KMnO_4 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + MnSO_4 + K_2SO_4 + H_2O$

ADDITIONAL QUESTIONS:

1. Define Matter (2)
2. Define Element and Compound (3)
3. Define relative molecular mass (4)
4. What are Gastric acid and antacids? (6)
5. Define Avogadro number (7)
6. What is Molar Mass? (8)
7. Define Molar volume (8)
8. How will you find out the equivalent mass of an acid? Give example (9)
9. How will you find out the equivalent mass of an base? Give example (9)
10. How will you find out the equivalent mass of an oxidizing agent? Give example (9)
11. How will you find out the equivalent mass of an reducing agent? Give example (9)
12. Define Stoichiometry (13)
13. What do you understand by stoichiometry calculations? (14)
14. What are limiting agent and excess agent? (17)
15. Define redox reaction. Give an example (19)
16. Write note on Combination reaction (22)
17. Write note on decomposition reaction (22)
18. Write note on displacement reaction (23)
19. What are disproportionate reactions (or) Auto redox reaction? (23)
20. Write note on competitive electron transfer reaction (23)

Note : Learn * Empirical and molecular formula calculations

*Calculations based on stoichiometry

2. Quantum Mechanical Model of Atom

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. Which quantum number reveal information about the shape, energy, orientation and size of orbitals? (creative)
2. How many orbitals are possible for n = 4? (46)
3. How many radial nodes and angular nodes for 2s, 4p, 5d and 4f orbitals exhibit? (creative)
4. The stabilization of a half filled d orbital is more pronounced than that of the p orbital. Why? (creative)
5. State and explain Pauli's exclusion principle (52)
6. Define orbital (46) What are the n and l values for $3p_x$ and $4d_{x2-y2}$ electrons? (creative)
7. Determine the values of all the four quantum numbers of the 8 th electron in Oxygen atom and 15 th electron in Cl atom. (creative)
8. Give the electronic configuration of Mn^{2+} and Cr^{3+} (creative)
9. An atom of an element contains 35 electrons and 45 electrons. Deduce i) the number of protons ii) the electronic configuration for the element iii) All the four quantum numbers for the last electron (creative)

Answer the following question in detail: (5 Marks)

1. Explain briefly the time independent Schrodinger wave equation. (43)
2. Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de Broglie wave length associated with the electron revolving around the nucleus (41)
3. Describe the Aufbau principle (52)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. What did Rutherford's alpha ray scattering experiment ? (39)

2. What are the defects of Rutherford's model? (39)
3. Write note on Thomson's plum pudding model of an atom (39)
4. What is Zeeman effect? (40)
5. What is Stark effect? (40)
6. Write note on limitations of Bohr's model of an atom (40)
7. How is angular momentum quantized ? (41)
8. Write note on Davison and Germer experiment (42)
9. State Heisenberg's uncertainty principle (42)
10. What are quantum numbers? (44)
11. Define Principal quantum number (45)
12. Define Azimuthal quantum number (45)
13. Define Magnetic quantum number, spin quantum number (46)
14. State Hund's rule (53)
15. State (n+l) rule (51)
16. What is meant by nodal surface or radial node? (48)
17. Discuss the filling of electron in chromium and copper atoms (55)
18. Discuss the shapes of s orbitals using angular distribution function (48,49)
19. What is the symmetrical distribution of electron? (55)
20. Define exchange energy (56)
21. Calculate the total number of angular nodes and radial nodes present in 3d and 4f orbitals (50)
22. How many unpaired electrons are present in the ground state of Fe^{3+}, Mn^{2+} and argon? (53)
23. Explain the meaning of the symbol $4f^2$. Write all the four quantum numbers for these electrons (55)
24. Which has the stable electronic configuration? Ni^{2+}, Fe^{3+} (57)

Answer the following question in detail: (5 Marks)

1. Enlist the postulates of Bohr's model of an atom (39)
2. Derive an equation for the wavelength of a matter wave (40,41)

3. List out the important features of quantum mechanical model of atom by Schrodinger Equation (44)
4. Explain the shapes of p orbitals (49)
5. Discuss the shapes of d orbitals (50)
6. Discuss the shapes of f orbitals (51)

3. Periodic Classification of Elements

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. What is modern periodic law? (73)
2. What are isoelectronic ions? Give examples.(creative)
3. What is effective nuclear charge? (80)
4. Magnesium loses electrons successively to form Mg+, Mg2+ and Mg3+ ions. Which step will have the highest ionization energy and why? (Creative)
5. Define electro negativity (87)
6. How would you explain the fact that the second ionization potential is always higher than first ionization potential? (84)
7. The electronic configuration of atom is one of the important factor which affects the value of ionization potential and electronic gain enthalpy. Explain (Creative)
8. Justify that the fifth period of the periodic table should have 18 elements on the basis of quantum numbers. (Creative)
9. Give the general electronic configuration of lanthanides and actinides. (78)
10. Why halogens act as oxidizing agents? (creative)
11. Mention anomalous properties of second period elements (89)
12. Write note on diagonal relationship of second and third period elements (90)
13. Why the first ionization enthalpy of sodium is lower than that of magnesium while its second ionization enthalpy is higher than that of magnesium? (creative)
14. What is screening effect? (81)
15. Briefly give the basis for Pauling's scale of electro negativity (87)

Answer the following question in detail: (5 Marks)

1. Explain the Pauling method for the determination of ionic radius (83)
2. Explain the periodic trend of ionization potential (85)
3. State the trends in the variation of electro negativity in group and periods (87,88)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. What is Triads? (69)
2. Write note on Chancourtois report? (70)
3. State the law of octaves (70)
4. What is periodic law? (70)
5. What is the basic difference in approach between Mendeleev's periodic table and modern periodic table? (Creative)
6. What are atomic and ionic radius? (79, 83)
7. What is covalent radius? (79)
8. Why is covalent radius shorter than the actual atomic radius? (79)
9. What is metallic radius? (80)
10. State Slater rule (80)
11. Define Ionization enthalpy or ionization energy (84)
12. Ionization energy of beryllium is higher than that of Boron. Give reason (85)
13. Give appropriate reason for ionization potential of N is greater than that of O (85)
14. Define electron affinity (86)
15. Electron affinity of Be and N have zero. Give reason (86)
16. Give appropriate reason for high electron affinity of Noble gases and halogens in the periodic table (86)
17. Oxygen and fluorine have lower electron affinity than sulphur and chlorine. Why ? (86)
18. What is valence or oxidation states? (88)

Answer the following question in detail: (5 Marks)

1. Explain the electronic configuration of atom is one of the important factor which affects the value of ionization potential and electron gain enthalpy (creative)

4. Hydrogen

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. Why hydrogen is not placed with the halogen in the periodic table? (Creative)
2. An ice cube at 0° C is placed in some liquid water at 0° C, the ice cube sinks- why? (114)
3. Discuss three type of covalent hydrides (113)
4. Predict which of the following hydrides is a gas on a solid a) HCl b) NaH. Give your reason (creative)
5. Write chemical equation for the following reactions I) Reation Of Hydrogen With Tungsten (VI) Oxide On Heating II) Hydrogen Gas And Chlorine Gas (Creative)
6. Do you think that heavy water can be used for drinking purposes? (creative)
7. What is water gas shift reaction? (103)
8. Justify the position of hydrogen in the periodic table (101)
9. What are isotopes? Write the names of isotopes of hydrogen (101)
10. Mention the uses of heavy water (111)
11. Explain the exchange reactions of deuterium (105)
12. How will you convert para hydrogen into ortho hydrogen? (102)
13. Mention the uses of deutrium (111)
14. How is hydrogen obtained by electrolysis? (103)
15. Why interstitial hydrides have a lower density than the parent metal? (113)
16. How do you expect the metallic hydrides to be useful for hydrogen storage? (113)
17. Arrange NH_3, H_2O and HF in the order of increasing magnitude of hydrogen bonding and explain the basis for your arrangement. (creative)

18. NH_3 has exceptionally high melting point and boiling point as compared to those of the hydrides of the remaining element of group 15. Explain (Creative)

Answer the following question in detail: (5 Marks)

1. Compare the structure of H_2O and H_2O_2 (106, 114,115,112)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. What are the similarities of Hydrogen and alkali metals? (101)
2. What are ortho and para hydrogen? (102)
3. How is water gas or syngas produced? (103)
4. What are soft water and hard water? (108, 109)
5. How will you remove temporary hardness of water? (109)
6. How is hardness removed by Clark's method? (109)
7. Heavy water a monobasic acid. Give reason (111)
8. Hard water produces less foam with detergents. Why ? (110)
9. How is hydrogen peroxide prepared? (111)
10. Mention the uses of hydrogen peroxide (112)
11. Explain the structure of hydrogen peroxide (112)
12. What are covalent hydrides? (113)
13. What are inter and intra molecular hydrogen bonding? (114)

Answer the following question in detail: (5 Marks)

1. Explain the uses of Hydrogen (105)
2. Explain the removal of permanent hardness of water (109)
3. Hydrogen peroxide can function as an oxidizing agent as well as reducing agent. Substantiate this statement with suitable examples. (112)

5. Alkali and Alkaline Earth Metals

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. Why sodium hydroxide is much more water soluble than chloride? (creative)
2. Explain what to meant by efflorescence (creative)
3. Write the chemical equations for the reactions involved in Solvay process of preparation of sodium carbonate (133)
4. Substantiate lithium fluoride has the lowest solubility among group one metal fluorides (Creative)
5. Mention the uses of plaster of Paris (148)
6. Beryllium halides are covalent where as magnesium halides are ionic. Why? (143)
7. Explain the important features of group 2 elements (creative)
8. Why alkaline earth metals are harder than alkali metals? (creative)
9. How is plaster of Paris prepared? (147)
10. Give the uses of gypsum (146)
11. Describe briefly the biological importance of calcium and magnesium (148)
12. Which would you expect to have a higher melting point, magnesium oxide or magnesium fluoride? Explain reason (creative)

Answer the following question in detail: (5 Marks)

1. Discuss briefly the similarities between lithium and magnesium (129)
2. Discuss briefly the similarities between beryllium and aluminium (140)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. Why does lithium exhibit anomalous properties? (129)
2. When does the blue colored ammonia solution changes to bronze color? (130)
3. List down the uses of washing soda (133)

4. Give the uses of sodium bicarbonate. (135)
5. Mention the uses of sodium hydroxide (134)
6. What are the uses of Beryllium? (141)
7. What are the uses of magnesium? (141)
8. Mention the uses of calcium (141)
9. Mention the uses of strontium? (141)
10. What are the uses of barium? (142
11. What is slaking of lime? (144)
12. How is bleaching powder prepared? (145
13. What is retrograde solubility? (146)
14. What is dead burnt plaster? (147)

Answer the following question in detail: (5 Marks)

1. Explain the uses of alkali metals (131)
2. Compare the properties of lithium with other elements of group 2 (129)
3. How is sodium hydroxide prepared commercially from brine solution? (134)

6. Gaseous State

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. State Boyle's law (160)
2. A ballon filled with air at room temperature and cooled to a much lower temperature can be used as a model for Charle's law (162)
3. Name two items that can serve as a model for Gay Lusaac law and explain (creative)
4. Give the mathematical expression that relates gas volume and moles (165)
5. What are ideal gases? In what way real gases differ from ideal gases? (165)
6. Can Vander Walls gas with a=0 be liquefied? Explain (creative)
7. Suppose there is a tiny sticky area on the wall of a container of gas. Molecules hitting this area stick there permanently. Is the pressure greater or less than on the ordinary area of walls? (creative)

8. Explain the following observations (creative)
   a) Aerated water bottles are kept under water during summer
   b) Liquid ammonia bottle is cooled before opening the seal
   c) The tyre of an automobile is inflated to slightly lesser pressure in summer than in winter
   d) The size of a weather balloon becomes larger and larger as it ascends up into larger altitude
9. Give suitable explanation for the following facts about gases (creative)
   i) Gases don't settle at the bottom of a container
   ii) Gases diffuse through all the space available to them
10. Suggest why there is no hydrogen in our atmosphere. Why does the moon have no atmosphere? (creative)
11. Explain whether a gas approaches ideal behavior or deviates from ideal behavior if (creative)
   a) It is compressed to a smaller volume at constant temperature
   b) The temperature is raised while keeping the volume constant
   c) More gas is introduced into the same volume and at the same temperature
12. Which of the following gases would you expect to deviate from ideal behavior under conditions of low temperature F_2, Cl_2, Br_2? Explain (creative)
13. Distinguish between diffusion and effusion (168)
14. Aerosol cans carry clear warning of heating of the can. Why? (creative)
15. When the driver of an automobile applies brake, the passengers are pushed toward the front of the car but a helium balloon is pushed toward back of the car. Why? (creative)
16. Would it be easier to drink water with a straw on the top of Mount Everest? (creative)
17. Why do astronauts have to wear protective suits when they are on the surface of moon? (Creative)
18. When ammonia combines with HCl, NH_4Cl is formed as white dense fumes. Why do more fumes appear near HCl? (creative)

Answer the following question in detail: (5 Marks)

1. Write the Vanderwaals equation for a real gas. Explain the correction term for pressure and volume (171)
2. Derive the values of critical constants in terms of Vanderwaals constants (174)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. Mention the differences between gas and vapour (159)
2. What is the consequence of Boyle's law? (161)
3. What is Charles law? (162)
4. What is isobars? (163)
5. Define absolute zero or Kelvin scale (164)
6. State Avogadro's hypothesis (165)
7. What is Gay Lusaac law? (164)
8. Write note on Dalton's law of partial pressure (166)
9. Mention the application of Dalton's law (167)
10. Write note on Graham's law of diffusion (167)
11. What is compressibility factor? (169)
12. What is Boyle temperature or Boyle point? (171)
13. Write note on critical temperature, critical pressure, critical volume (173)
14. What is Joule Thomson effect? (175)
15. What is inversion temperature? (175)
16. What are the different methods used for liquefaction of gases? (175)

Answer the following question in detail: (5 Marks)

1. Explain Andrew's isotherm (172)

7. Thermodynamics

EVALUATION :

Answer the following question briefly: (2 or 3 Marks)

1. State the first law of thermodynamics (195)
2. Define Hess's law of constant heat summation (207)
3. Explain intensive properties with two examples (189)
4. Define isothermal process (190)

5. Define adiabatic process (190)
6. Define isobaric process (190)
7. Define isochoric process (190)
8. Define entropy. Give its unit (210)
9. State Gibbs free energy (214)
10. Define enthalpy of combustion (200)
11. Define molar heat of capacity. Give its unit (201)
12. Define the calorific value of food. Give its unit (206)
13. Define enthalpy of neutralization (206)
14. Define lattice energy (208)
15. What are state and path functions? Give two examples (190,191)
16. Give Kelvin statement of second law of thermodynamics (210)
17. State the third law of thermodynamics (218)

Answer the following question in detail: (5 Marks)

1. Explain the characteristics of internal energy (191)
2. Calculate the work involved in expansion and compression process (193,194)
3. Derive the relationship between ΔH and ΔU for an ideal gas. Explain each term involved in the equation (197)
4. Explain how heat absorbed at constant volume is measured using bomb calorimeter with a neat diagram (202)
5. How is ΔH measured using coffee cup calorimeter? (204)
6. Write down the Born Haber cycle for the formation of sodium chloride (209)
7. Write down the Born Haber cycle for the formation of calcium chloride (Creative)
8. List the characteristics of Gibbs free energy (215)
9. Enthalpy of neutralization is always a constant when a strong acid is neutralized by a strong base. Account for the statement (206)
10. State various statements of second law of thermodynamics (210,211)
11. What are spontaneous reactions? What are the conditions for the spontaneity of a process? (213,215)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. What are system, surrounding, boundary? (188)
2. What are the types of systems depending on the nature of the boundary? (188)
3. Explain extensive properties with two examples (189)
4. What are reversible, irreversible process? (189)
5. What is cyclic process? (190)
6. What is internal energy? (191)
7. State zeroth law of thermodynamics (194)
8. What are the various statements of first law of thermodynamics? (195)
9. Define enthalpy (197)
10. Define standard heat of formation (198)
11. What is specific heat capacity? (201)
12. What are heat capacity at constant volume and constant pressure? (201)
13. What are the applications of bomb calorimeter? (204)
14. Define heat of solution (206)
15. Define molar heat of fusion (206)
16. Define molar heat of vaporization (206)
17. Define molar heat of sublimation (206)
18. Define heat of transition (207)
19. What are the applications of Hess law? (207)
20. State Clausius statement of second law of thermodynamics (211)
21. What are the criteria for spontaneity of reactions? (212)
22. What is standard entropy change? (212)
23. What is standard entropy of formation? (212)
24. Define entropy of fusion (213)
25. Define entropy of vaporization (213)
26. Define entropy of transition (213)

27. Derive the relationship between standard free energy change and equilibrium constant (217)
28. Define reaction quotient (217)

Answer the following question in detail: (5 Marks)

1. Explain the different cases of various process in the mathematical statement of the first law of thermodynamics (196)
2. What are the conventions of thermo chemical equations? (198, 199)
3. Derive the relationship between C_p and C_v (201)

VOLUME - II

8. Physical and Chemical Equilibrium

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. Chemical equilibrium is dynamic in nature. Why? (5)
2. What is equilibrium constant? (6)
3. What is reaction quotient ? (11)
4. State Le Chatelier's principle (16)
5. State law of mass action and mention its unit (5)
6. How will you predict the feasibility of a reaction using Q value? (11)
7. How does a catalyst and inert gas affect the chemical equilibrium? (18,19)
8. Deduce Van't Hoff equation (20)

Answer the following questions in detail : (5 Marks)

1. Derive the relationship between K_p and K_c (6)
2. Derive the K_P and K_c value for Synthesis of ammonia (14)

ADDITIONAL QUESTIONS :

Answer the following question briefly: (2 or 3 Marks)

1. What is solid-liquid equilibrium? (3)
2. What is liquid – vapour equilibrium? (3)
3. What is solid – vapour equilibrium? (3)
4. What is homogeneous equilibrium? (5)
5. What is heterogeneous equilibrium? (5)
6. If ng = 0, +ve, -ve mention the relationship between Kp and Kc (7)
7. How equilibrium constant help to find the direction of chemical equilibrium? (10)
8. How does concentration affect the chemical equilibrium? (16)
9. How does pressure affect the chemical equilibrium? (17)
10. How does temperature affect the chemical equilibrium? (18)

Answer the following questions in detail : (5 Marks)

1. Derive the K_P and K_c value for formation of HI (12)
2. Derive the K_P and K_c value for Dissociation of PCl_5 (13)

09. Solutions

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. Define Molality and Normality (32)
2. What is relative lowering of vapour pressure? (49)
3. State Henry's law (38)
4. State Raoult's law (43)
5. What is molal depression constant? Does it depend on nature of the solute? (54)
6. Define osmosis (55)
7. What is isotonic solution? (56)
8. How does the pressure affect the solubility? (38)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. Define Molarity and Formality (32)
2. Define Mole fraction and Mass percentage (33)
3. Define volume percentage and mass by volume percentage (34)
4. Define parts per million (34)
5. What are the advantages of using standard solutions? (35)
6. What are standard and working solutions? (35)
7. Define solubility (36)
8. What are the factors influencing the solubility? (36)
9. What is the nature of solute and solvent? (36)
10. How does temperature affect the solubility? (36)
11. What are the limitations of Henry's law? (40)
12. Define vapour pressure (41)
13. How will you compare Raoult's law with Henry's law? (45)
14. What are the conditions for ideal solutions? (46)
15. What are the conditions for Non ideal solutions? (46)
16. What are colligative properties? (49)
17. What is Ebullioscopic constant? (52)
18. What is osmotic pressure? (55)
19. Define reverse Osmosis (57)
20. What is abnormal molar mass? (58)
21. What is Van't Hoff factor? (58)

Answer the following questions in detail: (5 Marks)

1. Explain the positive deviation of non ideal solutions (46)
2. Explain the negative deviation of non ideal solutions (47)
3. Explain the factors responsible for deviation from Raoult's law (48)

4. Determination of Molar mass weights from relative lowering of vapour pressure (50)
5. Determination of molar mass of solute from depression in freezing point (54)
6. Determination of molar mass from osmotic pressure (56)
7. Explain the application of reverse osmosis in water purification (57)

10. Chemical Bonding

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. What are sigma, Pi bond? (87)
2. In CH_4 NH_3, H_2O the central atom undergoes sp^3 hybridisation – yet their bond angles are different. Why?
3. Explain the hybridization in BF_3 (91)
4. What do you understand by Linear combination of atomic orbitals in MO theory?
5. What is dipole moment? (79)
6. CO_2 has zero dipole moment even though two polar bonds. Why? (80)
7. Which bond is stronger sigma or pi ? why?
8. Define bond enthalpy (77)
9. Hydrogen is diatomic where as inert gases are monoatomic – explain on the basis of MO theory
10. What is polar covalent bond? Give an example (79)
11. CO_2 and H_2O both are triatomic molecule but their dipole moment values are different. Why?
12. State Fajan's rule (81)

Answer the following questions in detail : (5 Marks)

1. Explain the molecular formation of O_2 by MOT (100)
2. Explain the molecular formation of CO by MOT (101)
3. Explain the molecular formation of N_2 by MOT (100)
4. Draw the Lewis structures for the following species NO_3^-, SO_4^{2-}, HNO_3, O_3 (Creative)
5. Explain the bond formation of $BeCl_2$ and $MgCl_2$ (Creative)

6. Explain the resonance structure of CO_3^{2-} (78)
7. Explain the covalent character in ionic bond (Creative)
8. Explain the hybridization in ethylene molecule (95)
9. Explain the hybridization in acetylene molecule (96)
10. Explain VSEPR theory. Applying this theory to predict the shapes of IF_7 and SF_6 (Creative)
11. Explain Lewis dot structure for CO_2 (73)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. State Octet rule (69)
2. What is covalent bond? (61)
3. How will you find formal charge of an atom? (72)
4. What are the molecules not obey the octet rule ? (73)
5. What is ionic or electrovalent bond? (74)
6. What is coordinate covalent bond ? (75)
7. What is bond order ? (76)
8. What is resonance? (78)
9. How will you find ionic character? (80)
10. What is polarization? (80)
11. What are the important principles of VSEPR theory? (81)
12. What is hybridization? (89)
13. Draw the hybridization in $BeCl_2$ (90)
14. Draw the hybridization in CH_4 (92)
15. Draw the hybridization in PCl_5 (93)
16. Draw the hybridization in SF_6 (94)
17. What is metallic bonding? (102)

Answer the following questions in detail: (5 Marks)

1. Explain the types of exception from octet rule (73)
2. Explain the salient features of VB theory (82-84)

3. Explain the formation of H_2, Fe, HF, O_2 molecule by overlapping of orbitals (87-89)
4. Explain the salient features of MO Theory (99)
5. Explain the molecular formation of NO by MOT (101)
6. Explain the molecular formation of the following by MOT

   i) H_2 ii) Li_2 iii) B_2 iv) C_2 (99)

Note: * Study Lewis dot structure of SO_3, NH_3, CH_4, N_2O_5, HNO_2, H_3PO_4, SO_3,

* Study the shapes of various molecules by VSEPR theory (81)

11. Fundamentals of Organic Chemistry

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. What are homologous series? (112)
2. What is mean by a functional group? (111)
3. Write the molecular and possible structural formula of the first four members of homologous series of carboxylic acids (Creative)
4. Write the molecular formula of the first six members of homologous series of nitro alkanes (Creative)
5. How will you test the presence of nitrogen in a compound? (138)
6. Give the principle involved in the estimation of halogen in an organic compound by carius method. (144)
7. Give a brief description of the principles of Fractional distillation, Column chromatography (149, 151)
8. What is optical isomerism? Give an example (137)

Answer the following questions in detail : (5 Marks)

1. Explain the characteristics of organic compounds (111)
2. Explain the classification of organic compounds (112)
3. Explain paper chromatography (152)

4. Explain the types of isomerism (132)
5. Briefly explain geometrical isomerism in alkene by considering 2 – butane as an example. (135)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. What are the types of Tautomerism? (134)
2. What are enantiomers? (137)
3. What are the conditions for optical isomerism? (137)
4. What are the techniques used to separate and purify organic compounds? (148)
5. Define sublimation (148)
6. What is crystallization? Mention the steps. (138)
7. What is distillation? (149)
8. How will you separate the liquid by fractional distillation? (149)
9. How will you separate the mixture of solids and liquids? (150)
10. What is Azeotropic distillation? (150)
11. What is differential extraction? (150)
12. Define chromatography (151)
13. What are the various methods of chromatography? (151)
14. Define adsorption chromatography (151)
15. What is partition chromatography? (152)

Answer the following questions in detail : (5 Marks)

1. How will you detect carbon and hydrogen? (137)
2. How will you test the presence of Sulphur in a compound? (139)
3. Explain the estimation method of carbon and hydrogen (140)
4. Explain the estimation method of Sulphur (141)
5. How will you estimate Halogens by Carius method? (142)
6. How will you estimate phosphorus in the organic compound? (143)
7. Explain the estimation method of Nitrogen by Dumas method (144)

8. Explain the method of column chromatography (151)
9. Explain the method of Thin layer chromatography (152)

12. Basic concepts of Organic reactions

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. What are Nucleophiles and electrophiles? Give suitable examples each (164)
2. Give examples for the following types of organic reactions i) β elimination ii) electrophilic substitution (Creative)

Answer the following questions in detail : (5 Marks)

1. Explain Inductive effect in the organic compounds (166)
2. Explain Electromeric effect (167)
3. Explain resonance or mesomeric effect and its types (168)
4. Explain hyper conjugation effect (170)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. What are homolytic and heterolytic cleavages? (162)
2. What is the hybridization of carbon in carbocation? (163)
3. What are three types of electron movement? (165)
4. What are the different types of organic reactions? (171)
5. What is displacement reaction? (171)
6. What are addition reactions? (172)
7. What is elimination reaction? (173)
8. What are oxidation and reduction reactions? (173)

Answer the following questions in detail : (5 Marks)

1. Mention the following substitution reactions i) Nucleophilic ii) Electrophilic iii) Free radical (171)
2. Mention the following addition reaction i) Electrophilic ii) Nucleophilic iii) Free radical (172)

13. Hydrocarbons

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. What happens when ethylene is passed through cold dilute alkaline potassium permanganate? (198)
2. How will you prepare propane from a sodium salt of fatty acid? (184)
3. How will you distinguish 1 – butyne and 2- butyne? (202,203)
4. How is propyne prepared from an alkenedihalide? (201)
5. Suggest a simple chemical test to distinguish propane and propene (194)
6. What happens when isobutylene is treated with acidified potassium permanganate? (198)
7. Write the chemical equations for combustion of propane (188)
8. State Markovnikoff's rule and give an equation. (194)

Answer the following questions in detail : (5 Marks)

1. Explain the conformation of n-butane (186)
2. Describe the mechanism of nitration of benzene (211,212,213)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. How is hydrocarbons classified? (179)
2. What is Sabatier Sendersen reaction? (184)
3. What is decarboxylation? (184)
4. Write note on Kolbe's electrolytic method of preparation of alkanes (184)
5. Write note on Wurtz reaction (184)

6. What is Corey-House mechanism? (185)
7. How are alkanes prepared by Grignard reagents? (185)
8. What is aromatization? (189)
9. What is isomerisation? (190)
10. How are alkenes prepared from alkynes by Lindlar's catalyst? (192)
11. Explain Anti Markovnikoff's rule or Kharasch addition with mechanism (196)
12. What is ozonolysis? (198)
13. What is polymerization? (199)
14. How is hydrogen halides added with alkyne? (202)
15. Write note on Friedel craft's reaction (210)
16. What is Friedel craft's acylation? (212)
17. Write note on nitration reaction (211)
18. What is Birch reduction? (215)
19. How will you prepare gammaxane or lindane ? (215)
20. How does Huckel rule help to decide the aromatic character of a compound? (205)
21. How will you convert ethyl chloride into i) ethane ii) n – butane (185)

Answer the following questions in detail : (5 Marks)

1. Explain halogenations with mechanism (188)
2. Explain the evidence of structure of benzene (207)
3. Suggest the route for the preparation of the following from benzene (Creative)
   - i) 3- chloro nitrobenzene
   - ii) 4 – chlorotoluene
   - iii) Bromo benzene
   - iv) m – dinitro benzene

14. Haloalkanes and Haloarenes

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. Why chlorination of methane is not possible in dark? (Creative)

2. Write note on Finkelstein reaction or How will you prepare n propyl Iodide from n propyl bromide ? (231)
3. How does chlorobenzene react with sodium in the presence of ether? What is the name of the reaction? Or Write note on Wurtz Fittig reaction (244)
4. Give reasons for polarity of C-X bond in haloalkane (Creative)
5. Why is it necessary to avoid even traces of moisture during the use of Grignard reagent? (Creative)
6. What happens when acetyl chloride is treated with excess of CH_3MgI? (Creative)
7. What happens when chloroform reacts with oxygen in the presence of sunlight? (248)
8. Mention any three methods of preparation of haloalkanes from alcohols (230,231)
9. Discuss the aromatic nucleophilic substitutions reaction of chlorobenzene (Creative)
10. What are Freons? Discuss their uses (250)
11. What is Dow's process? (243)
12. What is Darzen's halogenation? (231)
13. Write note on Raschig process or commercial preparation of chloro benzene (242)
14. How is DDT prepared? (250)
15. How will you prepare chloroform? (247)
16. How will you prepare biphenyl ? or Write Fittig reaction or How does chlorobenzene react with sodium in the presence of ether? (244)
17. How will you prepare chloropicrin? (248)
18. How will you prepare Fereon – 12? (249)

Answer the following questions in detail : (5 Marks)

1. Compare S_N1 and S_N2 reaction mechanisms (Creative)
2. Explain unimolecular nucleophilic substitution reaction (S_N1) (236)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. How are organic halogen compounds classified? (226)
2. Write note on Swartz reaction (231)
3. What is Hunsdiccker reaction? (231)
4. What is ammonolysis? (233)
5. How does haloalkanes reacts with silver nitrite? (234)
6. What is Williamson ether synthesis? (234)
7. What is E2 mechanism? (237)
8. How is Grignard reagent prepared? (239)
9. Write note on sandmeyer reaction (242)
10. What is Balz - Schiemann reaction? (242)
11. What are the uses of chloro benzene? (244)
12. How will you prepare gem dihalides? (245)
13. Which reaction is used to distinguish gem dihalides and Vic-Dihalides? (246)
14. What is dehalogenation? (246)
15. What is dehydrogenation? (246)
16. How is phosgene prepared from chloroform? (248)
17. What is carbylamine reaction? (248)
18. What are the uses of DDT? (251)

Answer the following questions in detail : (5 Marks)

1. Explain bimolecular Nucleophilic substitution reaction (S_N2) (235)
2. Explain E1 mechanism (237)
3. Explain the synthetic uses of Grignard reagents. (239)
4. Discuss the atromatic nucleophilic substitution reaction of chlorobenzene (243)

15. Environmental Chemistry

EVALUATION :

Answer the following questions briefly: (2 or 3 Marks)

1. Dissolved oxygen in water is responsible for aquatic life. What processes are responsible for the reduction in dissolved oxygen in water? (Creative)
2. What would happen, if the greenhouse gases were totally missing in the earth's atmosphere? (Creative)
3. What is smog? (266)
4. Which is considered to be earth's protective umbrella? Why? (Creative)
5. What are degradable and non degradable pollutants? (260)
6. From where does ozone come in the photo chemical smog? (Creative)
7. A person was using water supplied by corporation. Due to shortage of water he started using underground water. He felt laxative effect. What could be the cause? (Creative)
8. What is Green Chemistry? (277)
9. What is global warming? (263)
10. How does classical smog differ from photochemical smog? (Creative)
11. What are particulate pollutants? (265)
12. What is acid rain? (264)
13. Differentiate BOD and COD (271)
14. Differentiate viable and non viable particulate pollutants (Creative)
15. Explain how oxygen deficiency is caused by carbon monoxide in our blood? Give its effect (Creative)
16. Mention the standards prescribed by BIS for qualities of drinking water. (272)

Answer the following question in detail: (5 Marks)

1. Explain the strategies to control environmental pollution (274)

ADDITIONAL QUESTIONS :

Answer the following questions briefly: (2 or 3 Marks)

1. What is environmental pollution? (260)
2. What is greenhouse effect? (263)
3. What are harmful effects of acid rain? (264)
4. What is classical smog or London smog? (266)
5. What are the effects of classical smog? (267)
6. What is photochemical smog or Los Angel Smog? (267)
7. What are the effects of photochemical smog? (268)
8. What is depletion of ozone layer or ozone hole? (268)
9. What are freons? (269)
10. What are the environmental impact of ozone depletion? (269)
11. Define Eutrophication (271)
12. What are the harmful effects of chemical water pollutants? (271)
13. What are the total dissolved solids? (273)
14. What is artificial fertilizers? (271)

----ALL THE BEST----

Time + Effort=Success

Note:

- ✓ I hope this material will be useful for practice the evaluation and additional questions except sums with the help of teachers.
- ✓ It will be better to give importance to the evaluation part questions then can study additional questions.
- ✓ The question setter only can decide as 2, 3 marks or mixed together as 5 marks. The above mentioned questions are some suggestions
- ✓ But the Annual exam questions will be based on creative and higher order thinking (HOT) manner not as direct questions
- ✓ If any mistakes or your suggestions, please send your valuable thoughts to that email to help the students

DEDICATED TO : ALL THE TEACHERS AND STUDENTS

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"THANK GOD AND THANK YOU ALL"
"ALL THE BEST"