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ACTC **ADVANCED CHEMISTRY TUITION CENTRE, 41/1-PWD ROAD, NAGERCOIL-9940847892**

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2023-24 +2 CHEMISTRY CLASS STARTS FROM 26/1/2023 THURSDAY

+1 CHEMISTRY QUESTION BANK 2022-23

(WITH TEXT BOOK PAGE NUMBER)

Question Bank from

- *GOVT PUBLIC EXAM PREVIOUS YEAR QUESTION PAPER - MARCH 2019*(M19), *JULY 2019* (J19), *SEP2020* (S20), *MAY 2022 (M22), JULY 2022(J22)*
- *GOVT MODEL QUESTION PAPER 2018-19 (GM19). Text book inside*

MAY BE 2023 QUESTION PAPER ASK

35-45% Important Questions & book back , 25-35% Creative questions, 2-5% Govt model question paper (GMQ) 2018-19 , 10-15% Govt public question paper MARCH 2019(M19), JUNE 2019(J19), SEP 2020 (S20) MAY 2022(M22), JULY 2022(J22)

+1 CHEMISTRY GOVT PUBLIC PREVIOUS QUESTION PAPER ANALYSIS

	MARCH 2019					JULY 2019					SEP 2020					MAY 2022				
	1M	2M	3M	5M		1M	2M	3M	5M		1M	2M	3M	5M		1M	2M	3M	5M	
LN1	1		1	1(2) 1(2)	8	1		1	1(2)	6	1	1		1(5)	8	-	1	1		5
2	1	1		1(3)	6	1	1C		1(3) 1(2)	8	1	1C	1	1(2)	8	1	1		1(3) 1(2)	8
3	1	1	1	1(3)	9	1		1	1(2)	6	1		1	1(3)	7	-		1	1(5)	8
4	1		1	1(2)	6	1	1		1(3)	6	1	1	1	1(3)	9	1	1			3
5	1		1	1(3)	7	1	1	1	1(2)	8	1			1(3)	4	2			1(3) 1(2)	7
6	1	1		1(2)	5	1	1	1	1(3)	9	1			1(2) 1(2)	5	2		1		5
7	1	1		1(3) 1(3)	9	1		1	1(2)	6	1	1	1	1(3) 1(2)	11	1	2		1(5)	10
8	1		1	1(2)	6	1	1		1(3)	6	1	1		1(2)	5	1	1	1C		6
9	1		1	1(3)	7	1		1	1(2) 1(3)	9	1		1	1(2)	6	1	1	1	1(5)	11
10	1	1	1	1(2)	8	1	1		1(3) 1(2)	8	1	1	1	1(3)	9	1		1	2(5)	14
11	1	2 C	1C	1(2) 1(3)	11	1	1	1	1(2) 1(2)	10	1	1	1	1(2) 1(5)	13	1		1	1(5)	9
12	1			1(3) 1(3)	7	1		1C	1(3)	7	-	1			2	2		1		5
13	1	1		1(2) 1(3)	8	1	1	1	1(3)	9	1		1	1(3) 1(2)	9	1	1	1	1(5)	11
14	1		1	1(3) 1(2)	9	1			1(3) 1(2)	6	2	1		1(5)	9	1	1C		1(5)	8
15	1	1			3	1	1		1(2)	3	1		1	1(3)	7	REDUCED SYLLABUS				
	15	9	9	50M	110	15	9	9	50M	110	15	9	9	50M	110	15	9	9	50M	110

+1 CHEMISTRY

Inorganic UNIT 1,2,3,4,5	Physical Unit 6, 7,8,9,10	Organic Unit 11, 12, 13, 14,15
Part I Choose 5x1=5	Part I Choose 5x1=5	Part I Choose 5x1=5
Part II 3x2=6	3x2=6	3x2=6
Part III 3x3=9	3x3=9	3x3=9
Part IV 3x5=15	3x5=15	4x5=20
35	**35**	**40**

M19 – MARCH 2019, J19-JULY 2019, S20- SEPTEMBER 2020, **MAY 2022 (M22), JULY 2022 (J22)**

2M- 2 marks; 2MC- 2 marks Compulsory; 3M- 3 marks; 3MC- 3 marks Compulsory; 5M- 5 marks; GM2M- Govt model question paper 2 marks; & PTA Questions

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IMPORTANT QUESTION - QUESTION BANK-2023 +1

CHEMISTRY

LESSON 1 Basic Concepts of Chemistry and Chemical Calculations.

1. Define matter. Explain classification of matter. (2)
2. Define relative atomic mass. (4) calculate relative atomic mass of hydrogen.
3. Define average atomic mass. Find average atomic mass of chlorine. (4)
4. Define relative molecular mass. Find relative molecular mass of H_2, $C_6H_{12}O_6$, Ethanol….. (4,5)
5. What do you understand by term mole. (6) **(J19)**
6. What is Avogadro number. (7)
7. Define molar mass. Give an example. (8)
8. Define molar volume. Give an example. (8)
9. Define Gram equivalent mass. (8) **M22 2M**
10. Calculate equivalent mass of acid.(H_2SO_4**(M19 3M)**, HCl, H_3PO_4**(S20)**)(9)
11. Define basicity. Find the basicity of ortho-phosphoric acid. (9) **S20 2M**
12. Calculate equivalent mass of base.(KOH, NaOH)(9)
13. Calculate equivalent mass of Oxidising or reducing agent ($KMnO_4$)(9)
14. Define empirical formula & molecular formula.(10) Determination of Empirical formula, molecular formula **PROBLEMS & book back** (11)
15. What are the steps involving in the calculation of molecular formula from empirical formula? (10)
16. An acid found in tamarinds on analysis shows the following percentage composition: 32% Carbon, 4% Hydrogen, 64% oxygen. Find the empirical formula of the compound. (11)
17. An organic compound present in vinegar has 40% carbon, 6.6% of Hydrogen and 53.4 % of Oxygen. Find the empirical formula of the compound. **(MQ19)**
18. A compound having the empirical formula C_6H_6O has the vapour density 47. Find its Molecular formula. **(M19 5Mi)** (BB34)
19. Calculate the empirical and molecular formula of a compound containing 76.6% carbon, 6.38% of hydrogen and rest oxygen. Its vapour density is 47. (BB34) **S20 5M, J22 3M**
20. Define stoichiometry. (13) & Calculations based on stoichiometry problems. (15)
21. Define Limiting reagent **J22 2M** & excess reagents. (17) problems (18)
22. One the formation of SF_6 by the direct combination of S and F_2, which is the limiting reagent? Prove it.
23. Define redox reactions. (19)
24. Distinguish between oxidation and reduction.(19)
25. What do you understand by the term oxidation number. (20) rules of oxidation number. (20) Oxidation number **problem** (21)
26. Calculate oxidation state of carbon in (i) CH_4 (ii) CCl_4 **(MQ19)**
27. Calculate oxidation number of oxygen in H_2O_2. (21) **(M19 5Mi)**
28. Calculate the oxidation number of underlined elements. I)$\underline{C}O_2$ ii) $H_2\underline{S}O_4$ **(21) M22 3M**
29. Redox reactions in terms of oxidation numbers. (22)

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30. What is combination reaction? Give example. (22)
31. What is decomposition reaction? Give two examples. (22)
32. What is displacement reactions? Give its types. Explain with example.(23)
33. What is disproportionation reactions? Give example. (24)
34. What are competitive electron transfer reaction? Give example. (25)
35. Balance the following equation using oxidation number method. (25)
$FeSO_4 + KMnO_4 + H_2SO_4 \rightarrow Fe_2(SO_4)_3 + MnSO_4 + K_2SO_4 + H_2O$
36. Balance the following equation by oxidation number method. (26)
$MnO_4^- + Fe^{2+} \rightarrow Mn^{2+} + Fe^{3+}$ (Acidic medium)

PREOBLEM- Mole, molecular mass, equivalent mass, empirical formula, balance equation & study all book back question & answer

Lesson 2 Quantum Mechanical Model of Atom

1. Write note on Thomson model of an atom. (39)
2. Write note on Rutherford model of an atom. (39)
3. Write note on Bohr atom model & limitation. (39)
4. Derive De –Broglie equation.(40) **(M19 5Mii)**
5. A macroscopic particle of mass one Kg is moving at a velocity 10 cms^{-1}. calculate its de Broglie wavelength. (41 model) **(MQ19)**
6. Davison and Germer experiment. (42)
7. Heisenberg uncertainty principle. (42) **S20 3M, J22 2M**
8. Calculate the uncertainty in the position of an electron, if the uncertainty in its velocity is 5.7×10^5 ms^{-1}. **(J19)**
9. Explain briefly the time independent Schrodinger wave equation? (43)
10. Explain main features of the quantum mechanical model of atom. (44)
11. Explain different types of quantum numbers.(44) Principal, Azimuthal, Magnetic **J22 5Mi**, Spin.
12. Calculate the maximum number of electrons that can be accommodated in L shell. (44) **M22 2M**
13. Define orbital? what are the n and l values for $3p_x$ and $4dx^2\text{-}y^2$ electron?(44) **(BBQ32 64)(J15)**
14. Calculate the orbital angular momentum for d and f orbital. (45) **(J15)**
15. How many orbitals are possible for n=4? **(46) M22 5Mi**
16. Shapes of orbitals s, p, d, f. (49)
17. Calculate the total number of angular nodes and radial nodes present in 3d and 4f orbitals.(50) **S20 5Mi**
18. State and explain Pauli's exclusion principle.(52) **(M19 2M)**
19. i) Describe the Aufbau principle. (52)
    (ii) Write the electronic configuration of Fe^{2+} ion.
    (iii) How many radial nodes exist in 2s and 4f orbitals **(MQ19)**
20. State Hund's rule (53)
21. Give the electronic configuration of Mn^{2+} ,Cr^{3+}, Ni^{2+} and Fe^{3+}.(53) **J22 5Mii**
22. Write the electronic configuration and orbital diagram for nitrogen. (54) **M22 5Mii**

23. Give the electronic configuration of Copper and Chromium (55)
24. In degenerate orbitals, why do the completely filled and half-filled configurations are more stable than the partially filled configuration? **(55) (S20 2M COMPULSORY)**
25. What is exchange energy? How it is related with stability of atoms? Explain with suitable examples. (56)

PROBLEM- De-Broglie, Heisenberg uncertainty principle & study all book back question & answer.

Lesson 3 PERIODIC CLASSIFICATION OF ELEMENTS

1. State Johann Dobereiner's law of triads. (69) **M19 5Mi**
2. Write a note about Chancourtois classification. (70)
3. State the Newland's law of octaves. (70)
4. State Lothar Meyer law. (70)
5. State Mendeleev's periodic law. (70)
6. Explain about the relationship between the atomic number of an element and frequency of the X-ray emitted from the elements.(72)
7. Define modern periodic law.(73)
8. Nomenclature of elements with atomic number greater than 100. (75)
9. Variation of electronic configuration along the periods. (76)
10. Variation of electronic configuration along in the Groups.(76) s, p, d, f **(J22 5Mi)** block elements.
11. Give the general electronic configuration of Lanthanides and actinides. **(78) (J19)**
12. Define atomic radius (79)
13. Covalent radius (79) calculation (79)
14. What are isoelectronic ions? Give examples. (bb)
15. Explain the Pauling's method of determination of ionic radius. (83) **(MQ19, S20 3M, M22 5M**
16. what is effective nuclear charge?(79)
17. Effective nuclear charge calculation (81)
18. Define ionisation energy & variation of group , period.(84)
19. Define ionization energy. The first ionization energy of Nitrogen is greater than that of Oxygen-give appropriate reason.(84) **(MQ19) (J19)**
20. Compare the ionisation energy of beryllium and boron. (85) **J22 3M**
21. Define electron affinity **(M22 3M)** & variation of group, period. (86)
22. Explain why the electron affinity of Be and N is almost zero. (86) **(S20 5Mii)**
23. Define electronegativity. State the trends in the variation of electronegativity in group and periods. **J22 5Mii (87)**
24. Define – valency. (88) **(M19 2M)**
25. Explain diagonal relationship. (90) **(M19 3M)** **& study all book back question & answer**

Lesson 4 HYDROGEN

1. Hydrogen Position in periodic table. (101)
2. What are isotopes? Write the names of isotopes of hydrogen.(101)

3. Write note on ortho hydrogen and para hydrogen. (102)
4. How do you convert parahydrogen into ortho hydrogen?(102) **(S20 3MARK**
5. What is the difference between Ortho hydrogen and para hydrogen. (103)
6. Preparation of hydrogen i) from water ii) Lab preparation **S20 5Mi** iii) industrial production. (103)
7. What is water gas shift reaction. (103)
8. Preparation of Deuterium from heavy water. (104)
9. Preparation of Tritium. (104) **(M19 3MARK**
10. Chemical properties of Hydrogen. I)O_2 ii) X_2 iii) Li, Na, Ca iv) ethyne (104)
11. Explain the exchange reactions of deuterium. (105) **(MQ19, S20 2M)**
12. Properties of Tritium. (105)
13. Explain uses of hydrogen. (105)
14. Chemical properties of water i) Na, Ba, Fe ii) Cl_2, F_2 (108)
15. Water is an amphoteric oxide. why? (108)
16. What it temporary hardness of water? How is it removed?(109)
17. What is permanent hardness of water? How it will be removed?(109)
18. Chemical properties of heavy water. I) NaOH, HCl, NH_4Cl ii) H_3PO_2 iii)Al_4C_3, CaC_2, Mg_3N_2, Ca_3P_2(111)
19. Do you think that heavy water can be used for drinking purpose? (BB)
20. Uses of heavy water. (111)
21. Preparation of hydrogen peroxide from BaO_2, Na_2O_2, 2-ethylanthraquinone (111)
22. Complete the following equation. $Na_2O_2 + ? \rightarrow Na_2SO_4 + H_2O_2$ (111) **M19 5Mii**
23. Hydrogen peroxide can function as an oxidizing agent as well as reducing agent. Substantiate this statement with suitable examples. BB (112)
24. What are the uses of hydrogen peroxide. (112)
25. Compare the Structures of water (106) and hydrogen peroxide. (112)
26. Mention the three types of covalent hydrides. (113) **M22 2M**
27. Write note on Ionic hydrides, Covalent hydrides and Metallic hydrides. (113)
28. Give an example for ionic hydride an covalent hydride. (113) **J22 2M**
29. Explain types of hydrogen bonding. (114)
30. How do you expect the metallic hydrides to be useful for hydrogen storage? (117)
31. Explain hydrogen -future fuel. (117)

& study all book back question & answer

Lesson 5 ALKALI AND ALKALINE EARTH METALS

1. General characteristics of alkali metals. **Or** 1s block elements.(126)
2. Distinctive (anomalous) behavior of Lithium. (129)
3. Discuss the Similarities between Lithium and Magnesium. (129) **J22 5M**
4. Among the alkali metal halides, which is covalent? Explain with reason.(130)**(J19)**
5. Why blue colour appears during the dissolution of alkali metals in liquid ammonia?(130) **J19 5Mi**
6. Uses of alkali metals. (131)

7. Except LiF, all other halides are soluble in water. Why? (132)
8. Write the chemical equations for the reactions involved in **Solvay process** of preparation of sodium carbonate (washing soda). (132)
9. What is soda ash? Write equations. (133)
10. Uses of washing soda? (133)
11. Explain preparation, uses of cooking salt. (133,134)
12. Explain preparation, uses of sodium hydroxide. (134)
13. What are the uses of sodium bicarbonate. (134)
14. Explain biological importance of sodium and magnesium. (135)
15. General characteristics of alkaline earth metals. Or 2s block elements(136)
16. Distinctive (anomalous) behavior of Beryllium. (139)
    (What are the reasons for the anomalous properties of Beryllium? (139)**M22 5Mi)**
17. Explain the properties of Beryllium that are difference from other elements of the group. 139 **M22 5Mii**
18. Give any three similarities between beryllium and aluminum. **(140) (MQ19, J19)**
19. Among the alkaline earth metals BeO is insoluble in water but other oxides are soluble. Why? 142 **(M19 5Mi)**

ANSWER:

(i) **BeO is insoluble in water**
BeO is covalent in nature, While other alkaline earth metal oxides are ionic in nature

20. Uses of alkaline earth metals Mg **(S20 5Mii),** Ca, Sr, Ba, Ra. (141)
21. Explain preparation, properties and uses of Quick lime. (144)
22. Explain preparation, properties and uses of calcium hydroxide. (144)
23. How is bleaching powder prepared? 145 **S20 5Mi**
24. Explain why $Ca(OH)_2$ is used in white washing. (145) **M19 3M**
25. Explain properties and uses of Gypsum. (145)
26. Plaster of Paris preparation and uses. (147) **(MQ19)**
27. Explain biological importance of magnesium and calcium. **(148)**
28. Write the balanced equation for each of the following chemical reactions.
    (i) Reaction of metallic Lithium with Nitrogen gas **(MQ19) BB 154**
    (ii) Heating solid sodium bicarbonate.
    (iii) Rubidium with oxygen gas.
    (iv) Solid potassium hydroxide with CO_2
    (v) Heating calcium carbonate.
    (vi) Heating calcium with oxygen. **& study all book back question & answer**

Lesson 6 GASEOUS STATE

1. What are difference between gas and vapour. (159)
2. Boyle's experiment. (160)
3. State Boyle's law. (160)
4. All passenger aeroplane cabins have to be artificially pressurized? (161)

5. State Charles law.(162)
6. Find the missing parameters (164) **(MQ19)**

P=1 atm		P=1 atm	P= 1 atm
V_1=0.3dm^3		$V_{2\,=\,?}$	V_3=0.15dm^3
$T_{1\,=\,200K}$		T_2=300K	T_3=? K

7. State Gay Lusaac' law. (164)
8. State Avogadro's law. (165)
9. Derive ideal gas equation. (165) **J19**
10. What are ideal gases? (165) **(M19 2M)**
11. State Dalton's law of partial pressures. (166) **M22 3M**
12. State Grahams law of diffusion. (168) (state Diffusion law). **M19 5Mii**
13. Distinguish between diffusion and effusion. (168) **MQ19, J22 3M**
14. Define compressibility factor. **(169)**
15. Write the mathematical formula for compressibility factor Z. (169) **S20 5Miii**
16. Define Boyle temperature or Boyle point. (171)
17. Compressibility factor for real gases. (171)
18. Write the Vander Waals equation for a real gas. Explain the correction term for pressure and volume. (171)
19. Define critical temperature, critical pressure, critical volume.(173)
20. Derive critical constants in terms of Vander Waals constants. (174)
21. Define Joule-Thomson effect. (175)
22. Define inversion temperature. (175)
23. What are the methods used for liquefaction of gases. (175) **S20 5Mii**

Study lesson EXAMPLE problem and Evaluation & study all book back question & answer

Lesson 7 THERMODYNAMICS

1. Write note on system. (187)
2. Define Surrounding & Boundary.(188)
3. What are the types of system. (188)
4. What is isolated system? Give example. (188)
5. Explain closed system with an example. (188)
6. What is open system? Give example. (188)
7. Distinguish between extensive and intensive property? (189) **(S20 3M)**
8. What is reversible process? Give an ex (189)
9. What is an irreversible process? Give an example. (189)
10. Define adiabatic process? (190)
11. Define isothermal process. (190)
12. Define isobaric process. (190)
13. Define isochoric process. (190)
14. Define cyclic process. (190)
15. What is state function? Give two examples. (190) **(MQ19)**
16. What is path function? Give two examples. (190) **J22 2M**

17. What is meant by internal energy? (191)
18. List the characteristics of internal energy. (191) **M22 5M**
19. Calculate the work involved in expansion and compression process. (193)
20. Explain sign convention of heat and work. (194) **(M22 2M)**
21. Define Zeroth law of thermodynamics (or) Law of thermal equilibrium.(195) **(S20 2M)**
22. State first law of thermodynamics. (195)
23. Derive the various mathematical statements of the first law.(196)
24. Explain the relation between enthalpy (H) and internal energy (U). (197) (Derive the relation between enthalpy ΔH and internal energy ΔU for an ideal gas. **(S20 5Mi**
25. Define standard heat of formation.(198)
26. Explain thermochemical Equations. (198)
27. Define heat of combustion. (200)
28. Calculate ΔH_f^0 for the reaction $CO_2(g) + H_2(g) \rightarrow CO(g) + H_2O(g)$, given that ΔH_f^0 for $CO_2(g)$, $CO(g) and H_2O(g) are$ -393.5, -111.31 and $-242 kJmol^{-1}$ respectively. (200)**(MQ19)**
29. Define molar heat capacity. Give its Unit.(201) **(J19) 3mark**
30. Relationship between Cp and Cv (201)
31. Explain Bomb calorimeter. (203)
32. Explain coffee cup calorimeter. (204)
33. What are the applications of the heat of combustion. (205)
34. Define heat of solution. Give an example. (206)
35. Define heat of neutralization. Give an example. (206)
36. Define molar heat of fusion. Give an example (206)
37. Define heat of vaporization. Give an example (207)
38. Define heat of sublimation. Give an example. (207)
39. Define heat of transition. Give an example. (207)
40. State Hess's law. (207)
41. Define lattice energy. (208)
42. Explain Born-Haber cycle. (208)
43. Explain various statement of second law thermodynamics. (210)
44. Define entropy. (210) **J22 5Mi**
45. If an automobile engine burns petrol at a temperature of 816°C (1089K) and if the surrounding temperature is 21°C (294K). Calculate its maximum possible efficiency. (211) **J22 2M COM**
46. Write note on standard entropy change (212)
47. Define standard entropy of formation. (212)
48. Write note on Entropy change accompanying change of phase. (212)
49. $C_{(s)} + O_{2(s)} \rightarrow CO_{2(g)}$ Calculate the standard entropy change for the above reaction, given the standard entropies of $CO_{2(g)}$, $C_{(s)}$, $O_{2(g)}$ are 213.6, 5.740 and 205 JK^{-1} respectively. (212) **(M19 5Mi)**
50. Calculate the entropy change during the melting of one mole of ice into water at 0°C. Enthalpy of fusion of ice is 6008 J mol^{-1}. (213) **(M19 5Mi, S20 5Mii)**

51.Define Gibbs free energy & character (214) **J22 5Mii**
52. What are the Condition (Criteria) for spontaneity of a process. (215) **M22 2M**
53.State the third law of Thermodynamics. (218) **(M19 2M)**
& study all book back question & answer

LESSON 8 CHEMICAL EQUILIBRIUM

1. Why the chemical equilibrium is referred to as Dynamic equilibrium. (5)
2. Explain Homogeneous equilibrium and Heterogeneous equilibrium give an example. (5) **S20 2M**
3. State law of mass action and mention its unit. (5)
4. Define equilibrium constant. Give any one application of equilibrium constant. **(MQ19)**
5. Derive the relation between kp and kc for a general homogeneous gaseous reaction. (6) **J195Mi**
6. What is equilibrium constant? (6)
7. If $\Delta n_g = 0$, +ve, -ve mention the relationship between Kp and Kc (7)
8. Write a balanced chemical equation for a equilibrium reaction for which the equilibrium constant is given by expression $K_C = \frac{[NH_3]^4[O_2]^5}{[NO]^4[H_2O]^6}$ (BB) **M22 2M**
9. Write Kp, Kc and Δng (i)$H_{2(g)}+I_{2(g)} \rightleftharpoons 2HI_{(g)}$ (ii) $N_{2(g)} + O_{2(g)} \rightleftharpoons 2NO_{(g)}$.
10. Write the Balanced chemical equation for the Kc = $\frac{[CaO_{(s)}][CO_{2(g)}]}{[CaCO_{3(s)}]}$ (8) **M19 5Mii**
11. What is reaction quotient? (11)**S20 5Mii, (MQ19)**
12. Application of equilibrium constant. (10)
13. How equilibrium constant help to find the direction of chemical equilibrium? (10)
14. How will you predict the feasibility of a reaction using Q value? (Q compare Kc.) (11)
15. Derive the K_P and Kc value for formation of HI (12)
16. Derive the K_P and Kc value for Dissociation of PCl_5 (13)
17. Derive the K_P and Kc value for synthesis of ammonia (14) **J22 5M**
18. One mole of H_2 and one mole of I_2 are allowed to attain equilibrium mixture contains 0.4mole of HI. Calculate the equilibrium constant. (13)
19. The equilibrium concentrations of NH_3, N_2 and H_2 are 1.8 x 10^{-2}M and 3x10^{-2}M respectively. Calculate the equilibrium constant for the formation of NH_3 from N_2 andH_2.(14) **M22 3M C**
20. State Le- Chatelier Principle(16) **(GMQ19, M19 3MARK**
21. Effect of concentration. (16)
22. Effect of Pressure. (17)
23. Effect of Temperature. (18)
24. Effect of catalyst.(18)
25. What is the effect of added inert gas on the reaction at equilibrium? (19) **J19 2MARK**
26. Deduce the Van't Hoff equation. (20)
27. At particular temperature K_C=4x10^{-2} for the reaction $H_2S_{(g)} \rightleftharpoons H_{2(g)} + ½ S_{2(g)}$ .Calculate the K_C for each of the following reactions. **(27 BBQ$_{45}$) J22 3M**
    (i) $2H_2S_{(g)} \rightleftharpoons 2H_{2(g)} + ½ S_{2(g)}$ (ii) $3H_2S_{(g)} \rightleftharpoons 3H_{2(g)}+3/2S_{2(g)}$

9. Solutions

1. Define solution, solute, solvent. (31)
2. Explain the different type of solutions based on the physical state of the solute and solvent. (31)
3. Define Molality and Molarity (32)
4. Define Normality and Formality (32)
5. Define Mole fraction and Mass percentage (33)
6. Calculate the mole fraction of methanol and water when 0.5mole of methanol is mixed with 1.5moles of water. (33) **S20 3MARK**
7. Define Molarity. If 5.6 g of KOH is present in 250 ml of the solution, calculate the molarity of the solution. (34) **(MQ19)**
8. Define volume percentage and mass by volume percentage (34)
9. Define parts per million (34)
10. 50g of tap water contains 20mg of dissolved solids. what is the TDS value in ppm?(34) **J22 2M**
11. What are the advantages of using standard solutions? (35)
12. What are standard and working solutions? (35)
13. Define solubility (36)
14. What are the factors influencing the solubility? (36)
15. What is the nature of solute and solvent? (36)
16. How does temperature affect the solubility? (36)
17. Draw and explain the graph obtained by plotting solubility versus temperature for calcium chloride. (37) **J19 5Mii**
18. How does the pressure affect the solubility? (38)
19. State Henry's law (38)
20. NH_3 and HCl do not obey Henry's law. Why?(38) **M19 5Mi**
21. What are the limitations of Henry's law? (40)
22. Define vapour pressure (41)
23. State Raoult's law (43)
24. How will you compare Raoult's law with Henry's law? (45)
25. What are conditions when a solution tends to behave like an ideal solution? (46) **J22 3M**
26. What are the conditions for Non ideal solutions? (46)
27. Explain the positive deviation of non-ideal solutions (46)
28. Explain the negative deviation of non ideal solutions (47)
29. Explain the factors responsible for deviation from Raoult's law (48)
30. What are colligative properties? (49)
31. What is relative lowering of vapour pressure? (49)
32. Determination of Molar mass weights from relative lowering of vapour pressure (50) Or Write the formula to calculate the molar mass of a solute from relative lowering of vapour pressure values. (50) **(M22 3M)**
33. Determination of molar mass of solute from elevation of boiling point (52) **M22 5M**
34. What is Ebullioscopic constant? (52)
35. Determination of molar mass of solute from depression in freezing point (54)

36. What is Cryoscopic constant? (54)
37. Define osmosis (55)
38. What is osmotic pressure? (55)
39. What is isotonic solution? (56) **M19 3MARK, M22 2M**
40. Determination of molar mass from osmotic pressure (56)
41. Explain the application of reverse osmosis in water purification (57)
42. Define reverse Osmosis (57)
43. What is abnormal molar mass? (58)
44. What is Van't Hoff factor 'I'? (58) **S20 5Mi**
45. Calculate the mass of non-volatile solute (molar mass 80 $gmol^{-1}$) which should be dissolved in 92 g of toluene is reduced to its Vapour pressure to 90%. BBQ20 63(**MQ19**)

10. Chemical Bonding

1. State Octet rule (69)
2. What is covalent bond? (61)
3. Draw the Lewis dot structures for sulphur trioxide. (71) (**MQ19**) Study Lewis dot structure of NH_3, CH_4, N_2O_5, HNO_2, H_3PO_4, NO_3^-, SO_4^{2-}, HNO_3, O_3.
4. How will you find formal charge of an atom? (72)
5. What are the molecules not obeying the octet rule? (73)
6. What is ionic or electrovalent bond? (74)
7. Explain the ionic bond formation in KCl, MgO and CaF_2. (75)
8. What is coordinate covalent bond? (75)
9. What is bond order? (76)
10. Define bond length? (76) **M22 5Mi**
11. What is bond length? Name the techniques through which the length of a bond can be determined. (76) **M19 2M**
12. Define bond angle. **(77) M22 5Mii**
13. Define bond enthalpy (77) **M22 5Miii**
14. What is resonance? (78)
15. Explain the resonance structure of CO_3^{2-} (78)
16. What is dipole moment? (79)
17. What is polar covalent bond? Give an example (79)
18. CO_2 has zero dipole moment even though two polar bonds. Why? (80)
19. How will you find ionic character? (80)
20. What is polarization? (80)
21. Linear form of carbon dioxide molecule has two polar bonds. Yet the molecule has zero dipole moment. Why? (80) **J19 2M**
22. How will you determine the ionic character in covalent bond using electronegativity values? (80) **M22 5M**
23. State Fajan's rule (81) **MQ19, J22 3M**
24. What are the important principles of VSEPR theory? (81)
25. Write the shape and molecular geometry for BF_3. (82) **S20 2M**

26. Predict the shape of $ClF_3 and NH_3$ using VSEPR theory. (83)**(MQ19)**

27. Write the structure of the following compounds. (84) **M19 5Mii**

a) NH_3 (B) BF_3 **(S20 2M)**

28. Mention the shape of following molecule base on VSEPR theory. (82-84) **J22 5M**

(i)BF_3 (ii)BrF_3 (iii)PCl_5 (iv)SF_6 (v)IF_7

29. Both C_2H_2 and CO_2 have the same structure. Explain why?. **M19 3MARK**

ANS:

C_2H_2 and CO_2 have same structure In Both of these compounds carbon undergoes **'SP'** hybridization. So C_2H_2 and CO_2 have same shape. Linear structure only. ---------- (1)		3

30. Explain the salient features of VB theory (86)

31. What is sigma, Pi bond? (87)

32. Explain the formation of H_2, F_2, HF **(M22 3M),** O_2 molecule by overlapping of orbitals (87-89)

33. Draw the hybridization in $BeCl_2$ (90)

34. What is hybridization? (89) Mention the type of hybridisation found in CH_4.(92) **S20 3M**

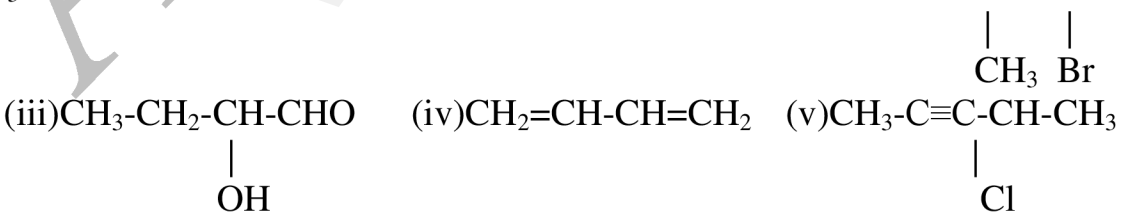
35. Draw the hybridization in BF_3 (91), CH_4(92), PCl_5 (93), SF_6 (94), ethylene molecule(95), acetylene molecule (96)

36. Explain the salient features of Molecular orbital Theory (99) **S20 5Mii**

37. Explain the molecular formation of the following by MOT i) H_2 ii) Li_2 iii) B_2 iv) C_2 **J22 5M** (99) v) N_2 **J20 5Mi** vi) O_2 vii) CO viii) NO (100)

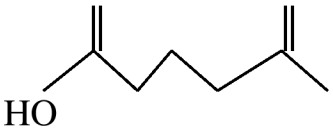
LESSON 11. FUNDAMENTALS OF ORGANIC CHEMISTRY

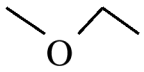
1. Which element exhibits maximum catenation and why? 110 **S20 2M**
2. What are characteristics of organic compounds?(111)
3. Define homologous series. (112)
4. How organic compounds are classified. Based on structure (112)
5. Give an example for each of the following type of organic compounds. (112) **J22 3M COMPUL**
   (i) Non benzenoid aromatic compound.
   (ii) Aromatic heterocyclic compound
   (iii) Carbocyclic compound.
6. How organic compounds are classified. Based on functional groups(112)
7. Give the IUPAC name of the following compounds **M22 5M** (i)CH_3-CH-CH-CH_3(ii)CH_3-O-CH_3



8. Write the IUPAC names for the following compounds. **J19 5Mi**

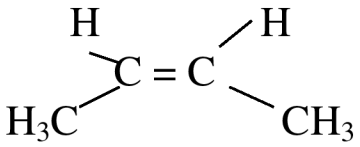
(x) O O (y) $CH_3 - C \equiv C - CH - CH_3$ (z)

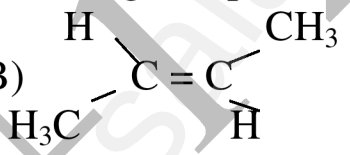




9. Give the structural formula for the following compounds. (124) **(M19 3MARK Compulsory**
   a) m – dinitrobenzene b) p – dichlorobenzene c) 1,3,5 Tri – methyl Benzene
10. Define isomerism. (132)
11. Describe any two types of constitutional isomers. (132) **J22 5M**
12. Define chain isomers. Give an example.(132)
13. Define position isomers. Give an example. (132)
14. Define functional isomers. Give an example. (133)
15. Define metamerism. Give an example. (133)
16. Define tautomerism. Give an example. (134)
17. Define Ring chain isomers. Give an example. (134)
18. Define stereoisomerism. (134)
19. Define geometrical isomerism. Draw 2-butene cis, trans isomerism. (135) **(S20) 3mark comp**

Identify the cis and trans isomer for the following compounds. (135) **M19 5Mi**

a)


(B)


20. Draw Cis – Trans isomers for 2,3- dichloro -2-butene. (135) **(MQ19)**
21. Draw oximes and azo compounds cis, trans isomerism. (136)
22. Define optical isomerism. Give an example. (137) **M22 3M**
23. Explain optical isomerism of Lactic acid.(137)
24. Define enantiomerism.(137)
25. Describe the reactions involved in the detection of nitrogen in an organic compound by Lassaigne method. (138) **M19 2M**
26. Test for sulphur. (139)
27. Test for halogen. (139)
28. Test for phosphorus. (139)
29. Estimation of carbon and hydrogen. (140)
30. Give the principle involved in the estimation of halogen in an organic compound by carius method. (142)
31. Estimation of phosphorus. (143)
32. Which is the suitable method for detection of nitrogen present in food and fertilizers? **(146) M19 2M COMPULSORY**
33. Explain the purification of solid organic compound by crystallization method. (148) **S20 5M**
34. Write note on column chromatography, thin layer chromatography, paper chromatography. (151)
35. Define retention factor. (152)

REVISE ALL Structure IUPAC NAME, problem & study well BOOK BACK QUESTION & ANSWER

LESSON 12 Basic concepts of Organic reactions

1. What are homolytic and heterolytic cleavages? (162)
2. What is the hybridization of carbon in carbocation? (163)
3. What are Nucleophiles and electrophiles? Give an example (164) **(M19 5Mii, M22 3M**
4. Explain Inductive effect in the organic compounds (166) **(J19)**
5. Explain Electromeric effect (167)**(M19)**
6. Explain resonance or mesomeric effect and its types (168).
7. Explain with example the positive Mesomeric effect. (169) **M19 5Mii**
8. The bond length between all the four carbon atoms is same in 1, 3- butadiene. Explain with reason.(168) **J19 3MARK Compulsory**
9. Write no bond resonance structure shown by propene. (169) **(S20 2M)**
10. Explain hyper conjugation effect (170) **(MQ19, J22 3M**

11.ii) Identify the compound (A) and (B). (173) **M19 5Mii**

$$R - C \equiv N \xrightarrow{H_2O/H^+} (A) \xrightarrow{H_2O/H^+} B$$

& study well BOOK BACK QUESTION & ANSWER

13. Hydrocarbons

1. How are hydrocarbons classified? (179)
2. Write the IUPAC name for the following compound. 181 **M19 5Mi**

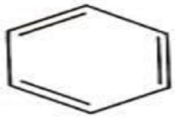
(A) $CH_3 - CH(CH_3) - CH_2 - CH_3$ (B) $H_3C - C(CH_3)_2 - CH_3$

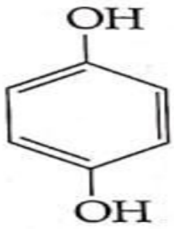
3. Write the structural formula and carbon skeleton for all possible chain isomers of C_4H_{10}, C_5H_{12}, C_6H_{14}. (181,182)
4. What is Sabatier Sendersen reaction? (184)
5. What is meant by Decarboxylation? decarboxylation of sodium acetate. (184)
6. Wurtz reaction. (184)
7. How will you convert ethyl chloride in to i) ethane **(M22 2M)** ii) n – butane (bb) (184)
8. Corey house mechanism. (185)
9. Write note on Kolbe's electrolytic method of preparation of alkanes (184) **J22 2M**
10. How is **Alkane** (methane) prepared from Grignard reagent. (185) **M19 2M**
11. Write note on confirmation of ethane, Butane. (186, 187)
12. Write the chemical equations for combustion of propane.(bb)(188)
13. Define pyrolysis. Give an example. (189)
14. Uses of alkane. (190)
15. Explain Geometrical isomerism of 2-butene. (191) **S20 3M COMPULSORY**
16. How are alkenes prepared from alkynes by Lindlar's catalyst? (192)
17. Suggest a simple chemical test to distinguish propane and propene.(bb)(194)

18. Explain Markownikoff's rule with suitable example.(194)
19. An organic compound (A) C_2H_4 decolourises bromine water.(A) on reaction with chlorine gives (B). (A) reacts with HBr to give (C). Identify (A) , (B) and (C).Explain the reactions. (194) **J22 5M**
20. What happens when isobutylene is treated with acidified potassium permanganate? (bb)(198)
21. What happens when ethylene is passed through cold dilute alkaline potassium permanganate. (197-198) **M22 3M**
22. An organic compound (A) of molecular formula C_2H_6O, on heating with conc. H_2SO_4 gives compound (B). (B) on treating with cold dilute alkaline $KMnO_4$ gives compound (C). Identify (A), (B) and (C) and explain the reactions. (197) **J20 5Mi**
23. Ozonolysis of alkene. (198) **J19 2M**
24. What is polymerization? preparation of polyethene. (199) **J19 3M**
25. Explain the different types of polymerisation in ethyne. 204 **S20 3M**
26. How does Huckel rule help to decide the aromatic character of a compound. (205)
27. Explain the evidence of structure of benzene (207)
28. Write any two different components you gets during fractional distillation of Coal tar at any two different temperatures. (209) **M19 5Mii**
29. Explain preparation of benzene (3methods) (210)
30. Electrophilic substitution reaction of benzene
(Nitration, halogenation, Sulphonation, Methylation, Acetylation) (211-212)
31. How will you get the following products with the given reactants? (210) **M19 5Mi**
(A) Acetylene → Benzene
(B) Phenol → Benzene
(C) Benzene → Toluene
32. How will you prepare the following compounds from benzene? **M22 5M**
(i)Nitrobenzene (ii)Benzene sulphonic acid (iii)BHC
33. The simple Aromatic Hydrocarbon compound (A) reacts with Bromine to give (B). Compound (A) reacts with Raney Ni and gives (C). Identify (A), (B) and (C). (211,215) **M19 5Mii**
34. Wurtz-Fittig reaction.(210)
35. Fridel crafts reaction. (210)
36. Preparation of BHC. & uses. (215)
37. Describe the mechanism of nitration of benzene (211,212,213)
38. Describe the mechanism of Nitration of benzene. (214)
39. Brich reduction(215) **J19 5Mii, S20 5Mii, J22 3M**
40. Complete: 195, 215 **S20 5Mi**

(A) $H_2C = CH_2 + H - Br \xrightarrow{\text{Benzoyl peroxide}}$

(B) $CH_3CHO \xrightarrow{\text{Acid dichromate}}$

(C)  $\xrightarrow{Pt/H_2}$

(D)  $\xrightarrow[H_2SO_4]{K_2Cr_2O_7}$

41. Write short notes on ortho, para directors in aromatic electrophilic substitution reactions.(216)
42. Write short notes on meta directors in aromatic electrophilic substitution reactions.(216)

& study well BOOK exercise questions.

14. Haloalkanes and Haloarenes

1. How are organic halogen compounds classified? (226)
2. IUPAC NAME, common name (228)
3. Nature of C-X bond in haloalkane. (229)
4. How are hydrogen halides prepared using Lucas reagent? (230)
5. Mention any two methods of preparation of haloalkanes from alcohols? (230) **J22 2M**
6. What is Darzen's halogenation? (231)
7. Write note on Finkelstein reaction or (How will you prepare n propyl Iodide from n propyl bromide?) (231)
8. Chlorination of methane. (231)
9. Write note on Swartz reaction (231)
10. Why chlorination of methane is not possible in dark? (231)
12. What is Hunsdiccker reaction? (231)
13. Physical properties. (Boiling point and melting point, solubility, density) 232
14. What is ammonolysis? (233)
15. How does haloalkanes reacts with silver nitrite? (234)
16. What is Williamson ether synthesis? (234) **M19 3M**
17. Explain S_N2 mechanism. (234)
18. Explain S_N1 mechanism. (234)
19. Explain E2 mechanism. (236)
20. Explain E1 mechanism. (236) (Explain the mechanism involved in the elimination reaction of tertiary butyl chloride with alcoholic KOH. **S20 5M)**
21. How is Grignard reagent prepared? ALL USES (239)
22. Starting from CH_3MgI, How will you prepare the following? (239) **J22 5M**
    (i) Acetaldehyde (ii) Acetone (iii) Methane
23. Write note on sandmeyer reaction (242)

24. What is Balz Schiemann reaction? (242)
25. Raschig process.(242)
26. Among the following compounds, o-dichloro benzene and p-dichloro benzene, which has higher melting point? Explain with reason.(243) **J19 5Mii**
27. What is Dow's process? (243)
28. Write note on Wurtz Fittig reaction (244)
29. Write Fittig reaction. (How does chlorobenzene react with sodium in the presence of ether?) (244)
30. Complete the following reactions. (243,244) **M22 2M COMPULSORY**

i) $C_6H_5Cl + 2NH_3 \xrightarrow{250°C\ 50atm}$

ii) $C_6H_5Cl + 2Na + ClC_6H_5 \xrightarrow{Ether}$

31. Discuss the atromatic nucleophilic substitution reaction of chlorobenzene (243)
32. What are the uses of chloro benzene? (244)
33. A simple aromatic hydrocarbon (A) reacts with chlorine to give Compound (B). Compound (B) reacts with ammonia to give Compound (C) which undergoes carbylamine reaction. Identify (A), (B) and (C) and explain the reactions. (242, 243) **J20 5Mii**
34. How will you prepare gem dihalides? (245)
35. Which reaction is used to distinguish gem dihalides and Vic-Dihalides? (246)
36. What is dehalogenation? (246)
37. What is dehydrogenation? (246)
38. How will you prepare chloroform? (247)
39. How is phosgene prepared from chloroform? (248)
40. How will you prepare chloropicrin? (248)
41. What is carbylamine reaction? (248)
42. What happens when chloroform reacts with oxygen in the presence of sunlight? (248)
43. What are Freons? Discuss their uses (250)
44. How is DDT prepared? (250)
45. Give the structure and uses of DDT? (251) **S20 2M**
46. Explain the preparation of the following compounds BB

i) DDT ii) Chloroform iii) Biphenyl iv) Chloropicrin v) Freon-12

47. An organic compound (A) with molecular formula C_2H_5Cl reacts with KOH gives compounds (B) and with alcoholic KOH gives compound (C). Identify (A),(B), and (C). BB
48. Simplest alkene (A) reacts with HCl to form compound (B).Compound (B) reacts with ammonia to form compound (C) of molecular formula C_2H_7N.Compound (C) undergoes carbylamine test. Identify (A), (B), and (C). BB **M22 5M**
49. A hydrocarbon C_3H_6 (A) reacts with HBr to form compound (B). Compound (B) reacts with aqueous potassium hydroxide to give (C) of molecular formula C_3H_6O.what are (A) (B) and (C). Explain the reactions. BB
50. Two isomers (A) and (B) have the same molecular formula $C_2H_4Cl_2$. Compound (A) reacts with aqueous KOH gives compound (C) of molecular formula C_2H_4O. Compound (B) reacts

with aqueous KOH gives compound (D) of molecular formula $C_2H_6O_2$. Identify (A),(B),(C) and (D).

15. Environmental Chemistry

1. What is environmental chemistry? (260)
2. What is environmental pollution? (260)
3. What are biodegradable and non-biodegradable pollutants? (260)
4. What is greenhouse effect? Name the gases that cause green house effect. (263) **S20 3M**
5. What is global warming? (263)
6. What is acid rain? **M22 2M** What are harmful effects of acid rain? (264)
7. What are particulate pollutants? (265)
8. What are the Health effects of particulate pollutants. (265)
9. What is smog? (266)
10. What is classical smog or London smog? (266)
11. What are the effects of classical smog? (267)
12. What is photochemical smog or Los Angel Smog? (267)
13. What are the effects of photochemical smog? (268)
14. What is depletion of ozone layer or ozone hole? (268)
15. What are the environmental impact of ozone depletion? (269)
16. What is meant by water pollution? What are the causes, harmful effects of chemical water pollution. (271)
17. Define Eutrophication (271)
18. What is Biochemical oxygen demand (BOD)? (271)
19. What is chemical oxygen demand (COD)? (271)
20. What are the harmful effects of chemical water pollutants? (271)
21. Mention the standards prescribed by BIS for qualities of drinking water. (272)
22. What are the total dissolved solids (TDS)? (273)
23. What are the sources of soil pollution. (273)
24. Explain the strategies to control environmental pollution (274) **S20 5Mii**
25. What is Green Chemistry? Green chemistry in day-to-day life. (275)

NAME REACTIONS – ORGANIC CHEMISTRY

1. Sabatier sendersens reaction.(184)
2. Kolbe's electrolytic method. (184)
3. Wurtz reaction (184)
4. Corey house reaction. (185)
5. Grignard reagent preparation. (185
6. Aromatization (189)
7. Pyrolysis (189)
8. Markonikoff's rule. (194 & 231)
9. Anti –markonvnikoff's rule or peroxide effect or kharasch addition. (196)
10. Action of bayer reagent(197)
11. Ozonolysis (198)

12. Polymerization (199)
13. Wurtz- fittig reaction (210 & 244)
14. Friedel crafts reaction (210)
15. Friedel crafts reaction acylation (212)
16. BHC (215)
17. Brich reduction(215)
18. Lucas test (230)
19. Dorzens halogenation reaction
20. Finkelstein reaction (231)
21. Swarts reaction (231 & 249)
22. Hunsidiccker reaction (231)
23. Williamson ether synthesis. (234)
24. TEL (238)
25. Sandmeyer reaction.(242)
26. Gattermann reaction (242)
27. Balz schiemann reaction (242)
28. Raschig process. (242)
29. Dow process. (243)
30. Fittig reaction(244)
31. Haloform reaction (247)
32. Carbylamine reaction. (248)
33. Chloropicrin (248)
34. Freons (249)
35. DDT (250)

"NO PAIN, NO GAIN".

Never Dreamed about success, Worked for it.

WISH U ALL THE BEST ACTC

"May God's guidance be with you during the Exam and may you be able to answer each question correctly. My prayers and Blessings are with you".
- ACTC EMS

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