

ACTC PLAN! **ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892** **PREPARE!!** **PRESENTATION!!!**

ACTC CHEMISTRY TUITION CENTRE



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“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

“Everything is chemistry, without chemistry Nothing”

**E.MUTHUSAMY MSc_(Che)., MSc_(Psy)., MEd., MPhil., MA_(Eng)., MA_(T)., MA_(PA)., MA_(Soc)., BLISc., DMLT.
B. SARANYA MUTHUSAMY BE., BEd., **You Tube:** ACTC Chemistry **Whatsapp:** 9940847892**

ACTC ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892**PLAN!****PREPARE!!****PRESENTATION!!!****+2 CHEMISTRY QUESTION BANK 2024-25****CLASS 12 VOLUME 1 & II****(WITH TEXT BOOK PAGE****NUMBER)****Question Bank from**

- **GOVT PUBLIC EXAM PREVIOUS YEAR QUESTION PAPER - MARCH 2020(M20), JULY 2020 (J20), SEP2020(S20), AUG2021(A21), MAY 2022(M22), JULY 2022(J22), MARCH 2023(M23), JULY 2023 (J23), MARCH 2024 (M24), JULY 2024 (J24)**
- **GOVT MODEL QUESTION PAPER 2019-20 (GM).**
- **TAMIL NADU STATE TEACHER PARENTS ASSOCIATION 2019-20 PTA 1-6 Question paper (PTA). Text book inside**

+2 CHEMISTRY GOVT PUBLIC PREVIOUS QUESTION PAPER ANALYSIS

LN	MARCH 2020					JULY 2020 (exam absent M20)					SEPTEMBER 2020 (Arrear)					AUGUST 2021 (Arrear)					
	1M	2M	3M	5M		1M	2M	3M	5M		1M	2M	3M	5M		1M	2M	3M	5M		
1	1 bb			1(5) bb	7	1 bb	1 bb	1 bb		6	1 1bb	1 bb		1(2) bb	6	1 bb				1(5) bb	6
2	1		1C	bb 1(2)	6	1	1C bb		1(3)	6	1		1bb	1(2) bb	6	1	1 bb	1bb			6
3	1	1		1(3) 1(3)	9	1		1 bb	1(3) 1(2)	9	1	1 bb		1(3) bb 1(3) bb	9	1 bb		1bb	1(3) 1(2) bb		9
4	1	1	1		6	-			1(5) bb	5	1	1	1bb		6	-	1			1(3) bb 1(2)	7
5	-	1	1bb	1(2) Ex 1(3)	10	1 1 bb	1 bb	1 bb	1(2)	9	1bb		1	1(5) bb	9	1		1bb	1(2) bb 1(3) bb		9
6	1 bb	1		1(2) bb	5	1		1 bb	1(2)	6	1bb	1		1(3) bb	6	1 bb	1 bb	1bb 1C bb			9
7	1			bb 1(5)	6	-		1 C	1(3) PRO bb	6	1bb	1 pro Ex		1(2) bb	5	1 bb			1(2) bb 1(3) bb		6
8	1	1bb	1	1(2)	8	1 bb	1 bb 1	1 bb	bb 1(2)	10	1bb	1 pro Ex	1bb	1(3)	9	1 bb	1 bb		1(5) Ex PRO		8
9	1 1 bb		1bb	1(3) Ex PRO	8	1 bb			1(5) bb	6			1CP	1(5) bb	8	1 bb	2	1bb			8
10	-	1	1	1(3) bb	8	-	1		1(5)	7	1bb		1	1(2) 1(2)	8	1 1bb	1 bb		1(5) bb		9
11	1 bb 1	1C		1(2) 1(3)	9	2		1	1(5)	10	1bb	1		1(3) 1(2)	8	1 bb		1	1(2) 1(3)		9
12	1 bb	1	1	1(2)	8	1	1	1	1(3) 1(2) bb	11	1		1	1(5) Me bb	9	1 1bb		1	1(5)		10
13	1 bb	1		1(2) bb 1(3)	8	1	1 bb	1 bb		6	1	1		1(3) bb 1(2) bb	8	1	1C		1(5) PRO		8
14	1 bb		1	1(3)	7	2	1 bb		1(3)	7	1	1 bb	1bb		6	1 bb	1 bb	1bb			6
15	1		1	1(2)	6	1			1(3) 1(2)	6	1		1	1(3) bb	7	REDUCED SYLLABUS NO QUESTION CORONA					
15	9	9	50M	110	15	9	9	50M	110	15	9	9	50M	110	15	9	9	50M	110		
BB + Ex	7	1	2	4+2		4	6	6	3		7Q	4+	4	7		11	5	7	5+1		
Mark	7	2	6	24	39	4	12	18	17	51	7	12	12	38	69	11	10	21	30		72
	Name reaction questions=4(8) Organic problem =1(2) Physical problem=1(3)					Name reaction questions=3(6) Organic problem =1(2) Physical problem=1(2)					Name reaction questions=6(13) Organic problem mechanism=1(5) Physical problem=2(4)					Name reaction questions=3(5) Organic problem =2(7) Physical problem=1(2)					

C- Compulsory CP- COMPULSORY PROBLEM PRO- PROBLEM*E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.****B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

Kindly Send Me Your Key Answer to Our email id - Padasalai.net@gmail.com

ACTC ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892**PLAN!****PREPARE!!****PRESENTATION!!!**

LN	MARCH 2024 3-23-24					JULY 2022 27-6-24					MARCH 2023 3-4-23					JUNE 2023 26-6-23							
	1M	2M	3M	5M		1M	2M	3M	5M	5M		1M	2M	3M	5M	5M		1M	2M	3M	5M		
1	1bb	1bb		1(3) 1(2) bb	8	1 bb		1	1(5) bb	9	1bb	1 bb		1(5)bb	8	1bb		1bb	1(3) 1(2)	9			
2	1bb			bb 1(2) 1(3)	6	1 bb		1	bb 1(5)	9	1bb	1 bb	1 bb	1(3)bb 1(2)bb	11	1bb	1		1(3) bb	6			
3	1bb		1bb	1(3) 1(2)	9	1 bb	1		1(5) bb	8	1			1(2)bb 1(3)bb	6	1bb	1bb	1bb	1(2)	8			
4	1bb	1bb	1		6	1 bb	1		bb 1(5)	8	1bb		1 bb		4	1bb	1		1(5) bb	8			
5	1bb		1C	1(5)	9	1	1bb	1		6	1bb	1	1 Ex	1(5)bb	11	1bb		1	1(5)	9			
6	Inorganic UNIT - 2,3,4,5					Physical Unit 6, 7,8,9,10					Organic Unit 11, 12, 13, 14, 15												
	1bb	1bb	1	1(5)	10	1 bb	1bb		1(5) bb	5	1bb	1 bb		1(5)bb	8	1bb		1(5) bb	6				
	Part I	1	Choose	5x1=5		Part I	Choose	5x1=5			Part I	Choose	5x1=5										
	Part II			3x2=6					1(3)x2=6										3x2=6				
	Part III			3x3=9					bb 3x3=9										3x3=9				
	Part IV	1	1bb	1(5)	11	1		1 bb	1(5) bb	15	1bb		1C	1(2)bb	6	1bb	1bb	1	1(5) bb	11			
8	1bb	1		1(5) bb 1(3) bb	8	1 bb	1bb	1	-	85	1	1		1(5)bb	9	1bb	1(5) PR Ex			3			
9	1bb		1	bb 1(5)	9	1 bb	1C PRO Ex		1(5) bb	8	1		1 bb		4	1bb		1bb		4			
10	2bb	1	1	1(5)	12	1 bb	1 bb	1 bb	1(5) 1(5)	9	1bb	1 bb	1	1(3)bb	9	1bb	1bb	1bb	1(5) bb	11			
11	1bb	1	1		6	1 bb	1	1		6	1bb			1(5)PR	6	1bb	1	1		6			
12	1bb		1	1(5)	9	2 bb	1		1(3) 1(2)	9	1	1	1	1(2)bb	8	1bb	1		1(5)	8			
13	1bb	1C		1(2) 1(3)	8	1 bb		1C	1(3) 1(2) bb	9	1bb	1C		1(2)bb 1(3)	8	1bb		1C	1(3) bb 1(2) bb	9			
14	1bb		1		4	1 bb	1	1 bb		3	1	1 bb	1 bb		6	1bb			1(5)	6			
15	REDUCED SYLLABUS NO QUESTION CORONA					REDUCED SYLLABUS NO QUESTION CORONA					1		1 bb	1(3)	7	1bb	1bb	1bb		6			
	15	9	9	50M	110	15	9	9	50M	110	15	9	9	50	110	15	9	9	50	110			
BB Q	15	3	2			13	3+1	3			9	5	5+			15	4+	5					
BB Mark	15	6	6	19	46	13	8	9	42	71	9	15	18	39	79	15	10	15	36	76			
	Name reactions=3(8) Organic problem= physical=nil					Name reactions=5(10) Organic problem=1(2) phys=1(2)					Name reactions=5(10) Organic problem=1(5) phys=1(3)					Name reactions=6(18) Organic problem= physical= 1(3)							

M20 – MARCH 2020, J20-JULY 2020, S20- SEPTEMBER 2020, A21-AUGUST 2021, MAY 2022 (M22), JULY 2022 (J22), MARCH 2023 (M23)

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
PR-Problem Ex- example problem Me-mechanism

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.

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PLAN!					PREPARE!!					PRESENTATION!!!										
1	1bb	1bb		1(3) bb 1(2) bb	8	1														
2	1bb	1bb		1(3) 1(2)	8	1														
3	1bb	1bb	1bb		6	1														
4	1bb		1bb	1(5) bb	9	1														
5	1bb		1C	1(3) bb 1(2) bb	9	1														
6	1bb		1bb Pro	1(5)	9	1														
7	1bb	1bb C	1bb	1(3) bb	9	1														
8	1	1bb		1(2)	5	1														
9	1bb	1bb		1(3)	6	1														
10	1		1bb	1(2)	6	1														
11	1	1bb		1(5)	8	1														
12	1bb		1	1(3) 1(5) P	12	1														
13	1bb		1bb		4	1														
14	1	1bb	1bb		6	1														
15	1bb	1bb		1(2) bb	5	1														
	15	9	9	50M	110	15	9	9	50M	110	15	9	9	50	110	15	9	9	50	110
BB Q	11	9	7											1 1 0						
BB Mar k	11	18	21	20	60															
Name reactions= 4(13) + PRO Name Organic problem= 1(5) physical=1(3)																				

MAY 2022 PUBLIC QUESTION PAPER B-TYPE 13/5/2022 Friday

Q No	Answer	Book exercise/ Book inside	Page No	Unit	Book MCQ No
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**E.MUTHUSAMY MSc_(Che)., MSc_(Psy)., MEd., MPhil., MA_(Eng)., MA_(T)., MA_(PA)., MA_(Soc)., BLISc., DMLT.
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ACTC PLAN!	ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892			
		PREPARE!!		PRESENTATION!!!
1	c) Glycerine	Book exercise	270	14 25
2	a) Methanol	Book exercise	141	11 6
3	a) Basic	Book exercise	53	2 1
4	d) FeO	Book exercise	200	6 22
5	c)Hydrolysis	Book exercise	101	10 14
6	c)Sn/HCl	Book exercise	229	13 1
7	d) charge carried	Book exercise	63	9 6
8	a) Al ₂ O ₃ .nH ₂ O	Book exercise	20	1 1
9	d) 30 min	Book exercise	229	7 22
10	a)HPO ₄ ²⁻	Book exercise	30	8 19
11	c)Fe(CO) ₅	Book exercise	171	5 16
12	c)+3	Book exercise	127	4 15
13	c)1s ² 2s ² 2p ⁶ 3s ² 3p ³	Book exercise		3 3
14	a)liquid in gas	Book exercise	100	10 4
15	c)nucleophilic addition	Book exercise	189	12 2

CLASS 12 CHEMISTRY

IMPORTANT QUESTIONS- QUESTION BANK 2024-25

LESSON 1 METALLURGY

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
7	6	6	6	8	9	8	9	8			

- Difference between ore and mineral. (2) BB (S20 2M, M22 2M, M24 5Mi)
- Write the ores of copper, silver, Aluminium, Iron, zinc (3)
- What are the various steps involved in the extraction of pure metals from their ores? metallurgical process?(2) J24 2M
- Write note on gravity separation. (3) M22 5Mi
- Explain froth floatation.(6) (A21) 5M
- Describe the underlying principle of froth floatation process. (4) PTA 2M
- Give the depressing agents used in the froth floatation process and why we use depressing agents in that process? (OR)Role of depressing agent in froth floatation process? (4) PTA2M
- Which type of ores can be concentrated by froth floatation method give two examples (J20, M23 2M)
- What are leaching process?(4)
- Explain Cyanide leaching.(4) Explain how gold ore is leached by cyanide process. (4) GM5Mi
- What is Cementation?(4)
- What is Ammonia leaching.(4)
- What is Acid leaching?(4) J22 3M

E.MUTHUSAMY MSc(ChE), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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14. Explain magnetic separation. (6)
15. How will you manage sulphur dioxide produced during roasting process? (7)
16. Define the following terms (i) Roasting (6) (ii) Calcination (7) **PTA3M, M24 2M**
17. What is smelting? (8)
18. What is the role of quicklime in the extraction of iron from its oxide Fe_2O_3 . (8) **(J20) (BB)**
ANS: Used As Flux. (Govt. key)
19. What is Gangue? (3) Explain the following terms with suitable example. a) Gangue b) Slag. (BB) **PTA3M(S20)**
20. Explain extraction of copper from copper pyrites. (8) **PTA5M i**
21. What is the role of silica in the extraction of copper? (8) **M24 5Mii**
22. What is meant by blistered copper. (9)
23. Give one example for (i) Acidic flux (ii) Basic flux (8)
24. CO is reducing agent. Justify with an example. (8) & (LN 2 43) **PTA 2M**
25. Reduction by hydrogen, carbon, metal (9)
26. How Cr_2O_3 is reduced to Cr by Al powder? (10) **PTA 5M ii**
27. Explain Auto reduction. (10)
28. Define, observation, application & **Limitations of Ellingham diagram.** (13) **J23 3M**
29. Extraction of Aluminium-Hall -Herold process. (14)
30. Define refining process (15)
31. Write note on distillation. (15)
32. Write note on Liqation. (15) **J23 5Mii**
33. Explain electrolytic refining of silver. (16) **PTA5M ii** (Explain the principle of electrolytic refining with an example. **J22 5M**)
34. Explain zone refining process. (16) **M20 5M, M23 5M PTA 3M**
35. Explain Mond process. (Describe the method for refining of Nickel.) (16) **PTA5M ii, M22 5Mii, J23 5Mi.**
36. Explain Van-Arkel method. (17)
37. Application of Al, Zn, Fe, Cu & Au. & **Revise Book Back (Evaluation) Question Answer**

LESSON 2 p-block elements-I

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
6	6	6	6	6	9	11	6	8			

1. Explain general characteristics (properties) of p-block elements. (27)
2. Write note on metallic nature of p-block elements. (28)
3. Give one example for **Icosogens, Tetragens, pnictogens, chalcogens.** (28) **J23 2M**
4. What are the anomalous properties of the first elements of the p-block elements. (29) **S20 A21, J24 2M**
5. There is only a marginal difference in decrease in ionization enthalpy from Aluminium to Thallium – Explain why? (29) **M20 Compulsory 3 mark**
6. What is inert pair effect. (30) **M22 5Mi**
7. Occurrence of Group 13 (Boron group) elements. (31)
8. Chemical properties of Boron. (X_2 , N_2 , O_2 , H_2SO_4 , HNO_3 , NaOH) (33)
9. A hydride of 2nd period alkali metal (A) on reaction with compound of Boron (B) in the presence of ether to give a reducing agent (C). Identify A, B and C. **J20 2M Compulsory**
10. Uses of Boron. (22)
11. Preparation, properties & uses of Borax. (33,34)

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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12. Preparation of Boric acid. (34)
13. How will you identify borate radical? Write the reactions involved. (write ethyl borate test) (35) **PTA3M, GM2M, M23 5Mii**
14. How will you convert Boric acid to boron nitride?(35) **PTA2M, M24 2M**
15. Structure of Boric acid.(35)
16. What are the Uses of Boric acid. (35) **J22 3M, M22 5Mii, M24 5Mi**
17. How does Diborane react with H₂O & NaOH? (36)
18. How will you prepare borazine? (37)
19. Write a note on hydroboration. (37) **J23 5Mi**
20. Explain structure of diborane. (37) **M23 5Mi**
21. Mention the uses of diborane (38)
22. How will you prepare BF₃? (38)
23. Write note on McAfee process (39)
24. Mention the uses of Aluminium chloride (39)
25. How to prepare potash alum & uses. (40) **J20, PTA 5M ii**
26. What is burnt alum.(40)
27. Occurrence of Group 14 (Carbon group) elements.(40)
28. What is catenation? Write the conditions for catenation property. (41) **J22 5M** Substantiate this statement. (41) **S20 2M** Write any two conditions for catenation. **M20 2M**
29. What are allotropes of carbon, difference between graphite & diamond. (41)
30. Write note on fullerenes.(42)
31. Write note on nanotubes.(42)
32. Write note on graphene.(43)
33. What is producer gas, water gas? (43,45)
34. Write note on Fischer Tropsch synthesis. (44) **M23 3M**
35. Write note on structure & uses of CO & CO₂ (44, 45)
36. How does SiCl₄ react with alcohol & NH₃? (46)
37. Explain the preparation, uses of silicone. (47 & 48) **M23 2M Uses**
38. What are the types, properties of silicones. (47)
39. What are silicates?(48) **M24 5Mii**
40. Explain types of silicates. (48)
41. Explain Zeolites. (50)

ALL CHEMICAL EQUATION & Revise Book Back (Evaluation) Question Answer**LESSON 3 p-block elements -II**

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
9	9	9	9	9	8	6	8	6			

1. Occurrence of 15th group elements. (57)
2. Physical properties of 15th group elements. (57)
3. How will you prepare nitrogen from sodium azide and atmospheric air? (57)
4. N₂ is a chemically inert. Why? (58)
5. What are the uses of Nitrogen? (58)
6. Write note on Haber's process (58) **S20**
7. How is ammonia prepared in the laboratory? (58)
8. What is the reaction of Ammonia with Iron and copper salts? (60) **PTA5M ii**
9. Structure of Ammonia. (60)

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10. Preparation of Nitric acid Oswald process. (61)
11. How is fuming nitric acid decompose on exposure? (61)
12. How does nitric acid act as nitrating agent? (62)
13. How does copper react with nitric acid? (63)
14. Give the uses of nitric acid (63)
15. Draw the structures of oxides of nitrogen (65)
16. Draw the structures of oxoacids of nitrogen (65) **M22 ONE MARK (hyponitrous acid)**
17. Explain Allotropy of phosphorus. (67)
18. How does phosphorous act as a reducing agent? (68) or
Complete the reaction: $P_4 + NaOH + H_2O \rightarrow$ (68) **PTA 2MC**
19. How does phosphorous react with HNO_3 ? (68)
20. Uses of phosphorus. (68)
21. How is phosphine prepared? (68)
22. What is Holmes signal and uses? (70) **S20 5Mii**
23. Draw the structure of PH_3 (70) PCl_3 (71) P_2O_3 (P_4O_6) (71) P_4O_{10} (72)
24. Write the structure and basicity of following oxy acids. (72) **3M**
i) hypo phosphoric acid ii) ortho phosphoric acid iii) pyro phosphoric acid
25. Occurrence of 16th group elements. (73)
26. Physical properties of 16th group elements. (73)
27. How is ozone estimated? (75) (Ozone (O_3) act as a powerful oxidizing agent why?)
28. Laboratory preparation of O_2 . (74)
29. Laboratory Preparation of ozone (74)
30. Structure of ozone. (74)
31. How is ozone estimated?(75) (Ozone (O_3) act as a powerful oxidizing agent why?) (75)
PTA2M
32. Uses of oxygen (75) **M22 5Mi**
33. Allotropic form of sulphur. (73)
34. Lab preparation of SO_2 (76)
35. SO_2 is an acidic or basic oxide. Why? (76)
36. Explain the bleaching action of Sulphur dioxide.(77) **A21 2M, J23 5Mii**
37. Write note on contact process. (77)
38. Structure of SO_2 , Uses of SO_2 (77)
39. Manufacture of Sulphuric acid by contact process. (77)
40. Sulphuric acid is a dehydrating agent. Give example. (78) **J23 2M, M24 2M**
41. How does H_2SO_4 act as an oxidizing agent? (78, 79)
42. Sulphuric Acid is a dibasic acid. Prove it. (78) **J20 5Mii**
43. Give the uses of sulphuric acid. (80) **J24 3M**
44. How is sulphate radical/sulphuric acid detected? (80)
45. Draw the structure of oxoacids of sulphur. (80) Sulphurous acid, sulphuric acid, Marshall's acid (**M20**), Caro's acid, Dithionic acid.
(Write the molecular formula and draw the structure of sulphurous acid and Marshall's acid.)
(M20 5Mi)
46. Occurrence of 17th group elements. (81)
47. Physical properties of 17th group elements. (81)
48. Why fluorine is more reactive than other halogens? (BB98) **PTA1 2M & PTA3 5M i**

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49. Manufacture of chlorine. (electrolytic process)(83)
50. How will you prepare chlorine in the laboratory? (82BB83) **2M**
51. Explain Deacon's process for manufacture of chlorine. (83) **J20 5Mii**
52. Physical properties of chlorine.(83)
53. Give the balanced equation for the reaction between chlorine with Cold NaOH and hot NaOH. (84) **S20**
54. Write about bleaching action of chlorine (85)
55. How will you prepare bleaching powder? (85) **M20 2M, M22 5Mii**
56. Uses of chlorine.(86)
57. How is aqua regia obtained? (86)
58. HF is not stored in glass bottles. Why? (88) **M20 5Mii**
59. What are interhalogen compound. Give two examples. (89) **GM5Mi A21, M22 3 mark**
60. What are the properties of interhalogen compounds.(89) **PTA5M, J22 5M**
61. Give reasons: ICl is more reactive than I₂. **PTA5M i**
62. Structure of interhalogen compounds AX, AX₃, AX₅, AX₇. (90)
63. What type of hybridisation is found in the following? (a) BrF (b) BrF₅ (c) BrF₃ d) IF₇(91) **(J20)3M, PTA 5M ii)**
64. Occurrence of 18th group elements.(91)
65. Physical properties of 18th group elements.(91)
66. How does XeF₆ react with NaOH? (92)
67. How does XeF₆ react with SiO₂? (92)
68. How does sodium per xenate act as strong oxidizing property? (92)
69. Uses of Helium(93) **GM 3M, S20, A21, PTA 3M, J23 3M, M24 3M**
70. Uses of Neon. (93)
71. Uses of Argon. (93) **PTA 3M J22 2M**
72. Uses of Krypton. (93)
73. Uses of Xenon. (93)
74. Uses of Radon. (93)
75. List any five compounds of xenon and mention the type of hybridization and structure of the compounds. (93) **PTA5M**
76. Find the oxidation state of halogen in the following compounds. BB 98 **M23 5Mi**
- 1) OF₂ 2) I₂O₄
77. Complete the following reactions. BB 99 **M23 5Mii**
- 1) P₄ + NaOH + H₂O →
- 2) XeF₆ + H₂O →
- 3) Cu + conc.H₂SO₄ →

ALL CHEMICAL EQUATION & Revise Book Back (Evaluation) Question Answer**LESSON 4 Transition and inner transition elements (d and f block elements)**

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
6	5	6	7	6	8	4	8	9			

1. d-block elements are called transition elements. Justify this statement. (101)
2. What are transition elements? Write two characteristics of the transition elements?(102) **PTA5Mi**
3. Write general Electronic configuration of d-block, f-block elements.
4. Classify the following elements into d-block and f-block elements: (M20)

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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- i) Tungsten ii) Ruthenium iii) promethium iv) Einsteinium
- How many series are in d-block elements? What are they?(102)
 - Why there is a slight variation in the atomic radii from Cr to Cu?(104)
 - Applying Aufbau principle, write down the electronic configuration of Cr^{3+} and Cu.(102)
 - What are the metallic behavior of d-block elements.(102)
 - Transition metals show high melting points. Why? (103) **PTA 2MARK**
 - d-block elements have variable oxidation state. Why?(106) **PTA 2MARK**
 - Write a note about oxidation state of 3d series.(106)
 - Mn^{2+} is more stable than Mn^{4+} . Why? (106)
 - Which is more stable Fe^{3+} or Fe^{2+} ? Why? **BB M22 2M, M24 3M**
 - Ru and Os have highest oxidation state in which compounds? Explain with example.(106)
 - Which metal in the 3d series exhibits +1 oxidation state most frequently and why?(106-107) **S20 3MARK**
 - Define – Standard electrode potential.(107)
 - Explain why Cr^{3+} is strongly reducing while Mn^{3+} is strongly oxidizing? (108)**PTA5M i**
 - Write note on diamagnetic. Give example.(109)
 - Write note on paramagnetic. Give example.(109)
 - Sc^{3+} , V^{5+} are diamagnetic. Give reason. (110)
 - Calculate the magnetic moment of Ti^{3+} & V^{4+} . (110)
 - Calculate the number of unpaired electrons in Ti^{3+} , Mn^{2+} and calculate the spin only magnetic moment.(110) **A21, PTA 3MARK**
 - Most of the transition metals act as catalyst. Justify this statement.(110) **PTA 3M**
 - Explain the catalytic hydrogenation of alkene to alkane with equation. (110)
 - What is Zeigler – Natta catalyst? In which reaction it is used? Give equation.(110) **J22 2M**
 - Hume-Rothery rule. (110)
 - d-block elements readily form Alloy. Give reason.(111)
 - d-block elements formation of interstitial compounds (What are interstitial Compound)(111) (What are interstitial compounds? How they differ from the properties of its pure metals? Give an example)(111) **S20 2M, A21 2M, PTA 3M, J23 2M, J24 3M**
 - What are the properties of interstitial compounds? (111) **M22 3MARK**
 - d-block elements readily form complexes. Give reason. (111)
 - Describe preparation of potassium dichromate. (112)
 - How does potassium dichromate decompose on heating? (113)
 - Draw the structure of chromate, dichromate ions (113)
 - How does potassium dichromate act as oxidizing agent? (113)
 - Explain chromyl chloride test (114) **M20 3M**
 - Mention the uses of potassium dichromate (114)
 - How will you prepare potassium permanganate? (115)
 - What is Bayer's reagent? (117)
 - Give the uses of potassium permanganate (118)
 - Justify the position of Lanthanoids and Actinoids in the periodic table.(BB)(118) **PTA5M i**
 - Electronic configuration of Lanthanoids.(120) Write down the electronic configuration of Gd(Z=64), Th(Z=90).
 - Oxidation state of Lanthanoids.(120)

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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- PLAN!** **PREPARE!!** **PRESENTATION!!!**
43. Define, cause and consequences of Lanthanoid contraction.(121) **J20 5MARK, PTA 3M J23 5M, M24 5M**
44. Which is more basic among $\text{Lu}(\text{OH})_3$ and $\text{La}(\text{OH})_3$? Why?(BB) (121) **PTA 2M, J24 2M**
45. Electronic configuration of actinoids.(122)
46. Oxidation state of actinoids.(123)
47. Differences between Lanthanoids and Actinoids.(123) **PTA 5MARK, J22 5M M23 3M**
& *Revise Book Back (Evaluation) Question Answer*

LESSON 5 Coordination Chemistry

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
10	9	9	9	9	6	11	9	9			

- Difference between double salt and coordination compounds.(131) (**A21, PTA 3M, M24 5Mi**)
- Explain Werner theory & limitation.(132) (**S20 5M, M22 5M**)
- Write note on coordination entity.(133)
- Define central metal ion (133) **M23 2M**
- Write note on ligand (134)
- Write the IUPAC ligand name for the following: a) $\text{C}_2\text{O}_4^{2-}$ b) H_2O c) Cl^- (137) **J22 3M**
- Define coordination number.(134) **M22 2M**
- Define oxidation number.(134)
- Write note on coordination sphere.(134)
- Write note on coordination polyhedron.(134)
- In the complex $[\text{Pt}(\text{NO}_2)(\text{H}_2\text{O})(\text{NH}_3)_2]\text{Br}$ identify the following i) central metal ion, ii) Ligand iii) coordination entity iv) oxidation number of the central metal ion. V) coordination number. **M23 3M**
- In the complex $\text{K}_4[\text{Mn}(\text{CN})_6]$ identify the following i) nature of Ligand ii) oxidation number of the central metal ion. iii) coordination number. **J23 3M**
- Write the IUPAC name of the following: a) $[\text{Ag}(\text{NH}_3)_2]^+$ B) $[\text{Co}(\text{NH}_3)_5\text{Cl}]^{2+}$ (**M20 2M**)
Write the following for the complex $[\text{Ag}(\text{NH}_3)_2]^+$. **M22 3M Compulsory**
a) Ligand b) Central metal ion c) IUPAC Name.
- In the complex, $[\text{Co}(\text{CN})_2\text{Cl}_2]\text{Cl}$, identify the following. **M24 3M Compulsory**
i) IUPAC name ii) Central metal ion iii) Co-ordination number.
- Write the IUPAC Name for the compound $\text{Na}_2[\text{Ni}(\text{EDTA})]$ (140) **PTA 5M i**
- For the example $[\text{Fe}(\text{en})_2\text{Cl}_2]\text{Cl}_2$, Identify **PTA 5M i**
1) Oxidation number of Fe, 2) Hybridization and shape
3) Magnetic behavior, 4) Number of geometric isomers
5) Whether there may be optical isomer also? 6) IUPAC name
- Explain types of complexes. (135)
- Classification based on the net charge on the complex.(135)
- Classification based on kind of ligands.(135)
- Nomenclature of coordination compounds IUPAC Names(138-141)
- Explain structural isomer. (coordination, Linkage **J24 3M**, ionization, solvate isomers) (142)
- Write any two hydrate isomers of the complex with the molecular formula $\text{CrCl}_3 \cdot 6\text{H}_2\text{O}$.(142) **M20 2M**
- Explain Geometrical isomers (cis, trans isomer)(144,145)
- Why tetrahedral complexes do not exhibit geometrical isomerism?(BB) (143)

E.MUTHUSAMY MSc(Chem), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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- PLAN!** **PREPARE!!** **PRESENTATION!!!**
25. Draw all possible geometrical isomers of the complex $[\text{Co}(\text{en})_2\text{Cl}_2]^+$ and identify the optically active isomer. **BBQ6 J23 5M**
 26. Define mer, fac isomer. (145)
 27. Explain optical isomerism of coordination compounds with an example. (146)
 28. Explain Valence Bond theory (VB Theory) & limitations. **(S20, J22 2M, PTA)**(149 &152)
 29. Apply VB theory in $[\text{Ni}(\text{CO})_4]$, $[\text{Ni}(\text{CN})_4]^{2-}$ **(S20)**, $[\text{Co}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{F})_6]^{3-}$ **(M20)** (149-151)
 30. Explain crystal field theory. (153)
 31. In an Octahedral crystal field, draw the figure to show splitting of d orbitals (154) **J20 3M**
 32. In a tetrahedral crystal field, draw the figure to show splitting of d orbitals (155)
 33. Write note on spectrochemical series (156)
 34. Calculate the CFSE value of $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ in high spin and low spin complexes. (157)
 35. Calculate the CFSE value of $[\text{Fe}(\text{CN})_6]^{3-}$ in high spin and low spin complexes. (158)
 36. $[\text{Sc}(\text{H}_2\text{O})_6]^{3+}$ is colourless – Explain. **M20 3M** (Explain about d-d transition) (159,160)
 37. How are metal carbonyls classified based on the number of metal atom? (161)
 38. How are metal carbonyls classified based on the structure? (161, 162)
 39. Describe the nature of bonding in metallic carbonyls. (162) **M23 5M**
 40. How can the stability of coordination complexes be interpreted? (163)
 41. Define Labile, inert complexes. (163)
 42. What is meant by stability constants? (163) significance of stability constants? (164)
 43. Explain the importance and application of coordination compounds (166)
 44. Give an example of Coordination compound used in medicine and a biologically important Coordination compound. (167) **BB M24 5Mii**
 45. Mention the metal complexes and its metal ions are used in biological system (167) **S20 3M**
 46. Give one test to differentiate $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Cl}$. **(BB) PTA 2M**

ALL IUPAC Name, Apply VB Theory & Revise Book Back (Evaluation) Question Answer

PHYSICAL CHEMISTRY LESSON 6 SOLID STATE

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
5	6	6	9	10	8	8	6	9			

1. Write General characteristics of solids. (177)
2. Difference between crystalline solids and Amorphous solids.(178)**PTA 3M, M22 5M J23 5M**
3. Define Isotropy and anisotropy.(178) **(S20)**
4. Explain ionic solids. (Introduction, NaCl diagram, Characteristics)(179) **PTA 5M i**
5. What are covalent solids? (179) **M22 2M**
6. Explain molecular solids. (179)
7. What are Metallic solids? (180)
8. Classify the following into covalent, molecular, ionic and metallic solids.(**A21**) **3MARK C**
(i) Diamond (ii) Brass (iii) NaCl (iv) Naphthalene (v) Glucose (vi) SiO_2
9. Define the terms crystal lattice and unit cell. (180) **PTA3M** Define unit cell. (180) **J22 2M, J24 2M**
10. What is meant by term “Coordination Number”? What is the Coordination Number of atoms in a bcc structure? (180) **A21 3MARK, M22 2M**
11. Define primitive & non-primitive unit cells? (181)
12. Explain briefly seven types of unit cell. (181)
13. Write note on SC. (183)

E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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14. Write note on BCC. (183)
15. Sketch Face Centered cubic unit cell(FCC) and Calculate the number of atoms present in it. (184) **PTA3M M23 2M**
16. What is Bragg's equation? (184) **PTA 2M**
17. How will you calculate the density of the unit cell? (185)
18. Barium has a body centered cubic unit cell with a length of 508pm along an edge. What is the density of barium in g cm^{-3} ? (185)
19. An element has a face centered cubic unit cell with a length of 352.4 pm along an edge. The density of the element is 8.9 gcm^{-3} . How many atoms are present in 100 g of an element. (186)
20. What is packing efficiency? (187) **PTA 5M ii, J22 5Mi**
21. Calculate the Percentage efficiency of packing in case of simple cubic crystal?(187) **M24 5M**
22. Calculate the percentage efficiency of packing in body centered cubic system (188)**PTA3M**
23. What is void and its type? (190)
24. Note on radius ratio (192)
25. If the radius of the compound is between 0.155 – 0.225, find out the co-ordination number and structure of the compound. (192) **J20 5Mi**
26. If the no. of close packed sphere is 6, calculate the number of Octahedral voids and Tetrahedral voids generated. **(M20) 2MARK**
ANS: Octahedral voids (n)=6 Tetrahedral voids(2n)=2x6=12
27. Calculate the percentage efficiency of packing in face centered cubic system (192)
28. Outline the classification of point defects. (193) **PTA5M ii**
29. Explain Schottky defect **(GM5M, S20)**& Frenkel defect. **(M20, PTA3M, J22 5Mii)** (Stoichiometric defects) (193) **M23 5M** (Schottky, Frenkel defect)
30. Explain 'f' centers with a neat diagram.(194) **PTA5M ii**
31. Explain Metal excess defect, metal deficiency defect. (Non-Stoichiometric defects) (194)
32. Write note on Impurity defect. (195)
33. Aluminium crystallizes in a cubic close packed structure. Its metallic radius is 125pm. Calculate the edge length of unit cell. **BB M24 3M**
34. Atoms X and Y form BCC crystalline structure. Atom X is present at the corners of the cube and Y is at the centre of the cube. What is the formula of the compound? (BB)**PTA 5M i**
35. An atom crystallizes in FCC crystal lattice and has a density of 10gcm^{-3} with unit cell edge length of 100pm. Calculate the number of atoms present in 1g of crystal. (BBQ₂₂201) **5M**
36. A face centred cubic solid of an element (atomic mass 60 gmol^{-1}) has a cube edge of 4Å . Calculate its density.(186) **GM3M**
37. What is piezoelectricity? (195)

ALL INSIDE PROBLEM & Revise Book Back (Evaluation) Question Answer**LESSON 7 CHEMICAL KINETICS**

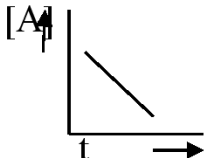
M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
6	6	5	6	11	9	6	11	9			

1. Define chemical kinetics. (205)
2. Define Rate of a chemical reaction. (205)
3. Write note on stoichiometry and rate of a reaction.(206)
4. Define average rate and instantaneous rate. (BB)207

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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- PLAN!** **PREPARE!!** **PRESENTATION!!!**
- Define rate law and rate constant. (BB)208
 - Give the difference between rate of a reaction and rate constant.(209) PTA, A21, J23 3M
 - What is an elementary reaction? (210)
 - Explain the rate determining step with an example. (210) PTA 3M
 - Define order and molecularity of a reaction. (210) PTA 5Mi, J22 3M
 - What is an order of a reaction? M24 2M compulsory
 - Give the differences between order and molecularity of a reaction. (210)
 - The rate of the reaction $x + 2y \rightarrow \text{product}$ is $4 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$, if $[x] = [y] = 0.2\text{M}$ and rate constant at 400k is $2 \times 10^{-2}\text{s}^{-1}$, what is the overall order of the reaction?(211) (J20) 2 MARK
 - Derive integrated rate law for a first order reaction $A \rightarrow \text{product}$.(212) (PTA,M20) 5MARK
 - Derive and describe the graphical representation of first order reaction.(212)
 - Give examples for the first order reaction. (213) M22 2M
 - Explain pseudo first order reaction with an example. (214)GM3M
 - Derive integrated rate law for a zero-order reaction $A \rightarrow \text{product}$ & Example (214) A21 5M, J22 5M, J23 5M, M24 5Mi
 - Give two examples for zero order reaction. (214) M23 5Mi
 - Define half-life-period of reaction. J23 2M Show that for a first order reaction half-life period is independent of initial concentration. (215) PTA 5M I
 - Calculate the half period for a zero order reaction.(215)PTA 2M
 - Explain about collision theory (217, 218)
 - Write Arrhenius equation and explains the terms involved. (220) M22 3M, M24 3M
 - Write the rate law for the following reactions. (BB)
 - A reaction that is 3/2 order in x and zero order in y.
 - A reaction that is second order in NO and first order in Br₂.
 - The rate constant for a first order reaction is $1.54 \times 10^{-3} \text{ s}^{-1}$. Calculate its half life time.(BB 231) (PTA, J20)
 - Identify the order for the following reactions (BB)
 - Rusting of Iron
 - Radioactive disintegration of ${}_{92}\text{U}^{238}$
 - $2\text{A} + 3\text{B} \rightarrow \text{products}$; rate $= k [\text{A}]^{\frac{1}{2}}[\text{B}]^2$
 - Derive Arrhenius equation to calculate activation energy from the rate constant k_1 and k_2 at temperature T_1 and T_2 respectively. (220,221) PTA3MC
 - What are the factors affecting the reaction rate? (222)
 - Explain the effect of catalyst on reaction rate with an example. (222) S20 5Mi
 - Powdered CaCO₃ reacts much faster with dilute HCl than with the same mass of CaCO₃ as marble. Give reason. J20 3M COMPULSORY
 - The rate of formation of dimer in a second order reaction is $7.5 \times 10^{-3} \text{ mol L}^{-1}\text{s}^{-1}$ at 0.05 mol L⁻¹ monomer concentration. Calculate the rate constant. (BB) 5M i
 - For the general reaction $A \rightarrow B$. Plot of concentration of A Vs time is given in the graph below. Answer the following Questions on the basis of this graph. (214) PTA3M



 - What is the order of the reaction?
 - What is the slope of the curve?
 - What is the Unit of rate constant?

E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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32. a first order reaction is 40% complete in 50 minutes. Calculate the value of the rate constant. In what time will the reaction be 80% complete? (BBQ₃₀231) **GM5Mi**
33. Show that in case of first order reaction the time required for the completion of 99% is twice the time required for the completion of 90% of the reaction. (217 ex 6 model) **M23 3M**
- COMPULSORY**

Question

(a) For a reaction $A + B \rightarrow P$, the rate is given by

$$\text{Rate} = k[A][B]^2$$

(i) How is the rate of reaction affected if the concentration of B is doubled?

(ii) What is the overall order of reaction if A is present in large excess?

(b) A first-order reaction takes 30 minutes for 50 % completion. Calculate the time required for 90% completion of this reaction.

a.

(i) For a reaction, $A + B \rightarrow P$

$$R_1 = k[A][B]^2 \text{ -----(i)}$$

If the concentration of B is doubled,

$$R_2 = k[A][2B]^2 \text{ -----(ii)}$$

On dividing (i) and (ii)

$$\frac{R_1}{R_2} = \frac{k[A][B]^2}{k[A][2B]^2}$$

$$\frac{R_1}{R_2} = \frac{B^2}{4B^2}$$

$$R_2 = 4R_1$$

The rate of reaction will be four times the initial rate.

(ii) If A is present in large excess, then the rate of the reaction will be independent of A and will depend only on the concentration of B. The overall rate of the reaction will be 2.

$$(b) K = 0.693/30 = 0.0231$$

The time required to complete 90% reaction,

$$t = (2.303/0.0231) \times \log(100/10) = 100 \text{ minutes}$$

ALL INSIDE PROBLEM & Revise Book Back (Evaluation) Question Answer**PREPARED BY:**

23years experience

E. MUTHUSAMY & SARANYA MUTHUSAMYEmail: actcnagercoil@gmail.com

Facebook: Actc Tuition Centre Nagercoil

Instagram: [actc_chemistry_tuition_centre](https://www.instagram.com/actc_chemistry_tuition_centre)**E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.****B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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E.MUTHUSAMY MSc_(Che)., MSc_(Psy)., MEd., MPhil., MA_(Eng)., MA_(T)., MA_(PA)., MA_(Soc)., BLISc., DMLT.
B. SARANYA MUTHUSAMY BE., BEd., **You Tube:** ACTC Chemistry **Whatsapp:** 9940847892

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ACTC ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892**PLAN!****PREPARE!!****PRESENTATION!!!****SSON 8 IONIC EQUILLIBRIUM**

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
8	10	9	8	8	6	3	3	5			

- Mention the Arrhenius concept of acid and base (2)
- What are the limitations of Arrhenius concepts? (3) **M22 2M**
- Classify acid or base using Arrhenius concept. HNO_3 , CH_3COOH , $\text{Ba}(\text{OH})_2$, H_3PO_4 (3)
- Define Lowery - Bronsted concept of acids and bases (3)
- 0.1 M Solution of HF is weak acid. But 5M solute ion of HF is stronger acid. Why? **PTA3M**
- What are conjugate acid – base pairs? Give example. (3) **PTA5M ii M23 2M**
- Write a balanced equation for the dissociation of the following in water and identify the conjugate acid-base pairs. i) NH_4^+ ii) H_2SO_4 iii) CH_3COOH iv) HCl v) HF (4)
- Classify the following into Lewis acids and Lewis bases. **S20 5Mi**
A) BF_3 (B) CO_2 (C) MgO (D) CH_3^-
- What are Lewis acids and bases? Give two example (4) **M20 2M, J22 2M, J24 3M**
- Difference between Lewis acids and Lewis base. (5)
- Identify the Lewis acid and the Lewis base in the following reactions. (5)
 $\text{Cr}^{3+} + 6\text{H}_2\text{O} \rightarrow [\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
- Identify the Lewis acid and Lewis base in the following reactions.(5)
i) $\text{CaO} + \text{CO}_2 \rightarrow \text{CaCO}_3$ ii) $\text{CH}_3\text{-O-CH}_3 + \text{AlCl}_3 \rightarrow (\text{CH}_3)_2\text{O} + \text{AlCl}_3$
- H_3BO_3 accepts hydroxide ion from water as shown below. (6)
 $\text{H}_3\text{BO}_{3(\text{aq})} + \text{H}_2\text{O} \rightleftharpoons \text{B}(\text{OH})_4^- + \text{H}^+$
Predict the nature of H_3BO_3 using Lewis concept.
- Identify the conjugate Acid Base pair for the following reactions in aqueous solution.(30)**BB J20 5Mii**
(A) $\text{HS}^-_{(\text{aq})} + \text{HF} \rightleftharpoons \text{F}^-_{(\text{aq})} + \text{H}_2\text{S}_{(\text{aq})}$
B) $\text{HPO}_4^{2-} + \text{SO}_3^{2-} \rightleftharpoons \text{PO}_4^{3-} + \text{HSO}_3^-$
- How will you measure the strength of an acid? (6)
- Define ionic product of water. Give its value at room temperature (7) **S20, PTA 3MARK**
- Calculate the concentration of OH^- in a fruit juice which contains $2 \times 10^{-3}\text{M}$, H_3O^+ ion. Identify the nature of the solution. (8) **J23 2M COMPULSORY**
- Derive the relationship between pH and pOH. (9,10)**PTA 5M i**
- Define pH (9) **M22 5Mi, J24 2M**
- Write the pH value of the following substances: **M20 5Mi**
A) Vinegar B) Black coffee C) Baking Soda D) Soapy Water
- Calculate the pH of 10^{-7}M HCl .(11) **PTA3M**
- State Oswald's dilution law. Derive an expression Ostwald's dilution law. (12) **J20 3MARK, PTA 3MARK, M23 5M.**
- A solution of 0.10M of a weak electrolyte is found to be dissociated to the extent of 1.20% at 25°C . Find the dissociation constant of the acid.(14)
- Calculate the pH of 0.1M CH_3COOH solution. Dissociation constant of acetic acid is 1.8×10^{-5} . (15)
- Define common Ion effect with an example (15)**J20 2M, PTA 2M, M22 5M ii, M24 2M**
- What are buffer solutions? Give an example (16) **J22 3M**
- What are the two types of buffer solution? Give example for each type.(16) **PTA5M ii**
- Explain the buffer action of a solution (16) **J20 2MARK**

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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29. Explain buffer action of acidic buffer. (16) **PTA 3M**
30. Define Buffer capacity and buffer index. (18) **M24 5Mi (buffer index)**
31. Derive Henderson-Hasselbalch equation (Derive Henderson equation) (18) **M20, GM 3M**
32. Find the pH of a buffer solution containing 0.20 mole per litre sodium acetate and 0.18 mole per litre acetic acid. K_a for acetic acid 1.8×10^{-5} . (19) **A21 3MARK**
33. Calculate the pH of 0.1M CH_3COONa solution (pK_a for CH_3COOH is 4.74) (20) **S20 2MARK**
34. Derive expression for hydrolysis constant and pH of salt of weak acid and strong base. (21) **5M**
35. Derive expression for hydrolysis constant and pH of salt of strong acid and weak base. (22)
36. Define solubility product (25)
37. Give a condition for a compound to be precipitated (25)
38. How will you calculate solubility product from molar solubility? (26) **PTA 5M ii**
39. Write the expression for the solubility product of $\text{Ca}_3(\text{PO}_4)_2$, BaSO_4 . (26)
40. Define solubility product of a compound. (25) **2M**
41. The K_a value of HCN is 10^{-9} . What is the pH of 0.4M HCN solution? (31) **PTA 5M**
42. 50ml of 0.05M HNO_3 is added to 50ml of 0.025M KOH. Calculate the pH of the resultant solution. (BBQ₁₅₃₁) **GM 2MC**
43. K_{SP} of Ag_2CrO_4 is 1.1×10^{-12} . What is the solubility of Ag_2CrO_4 in 0.1M K_2CrO_4 ? (BBQ₂₅₃₁) **GM 5Mii**

ALL INSIDE PROBLEM & Revise Book Back (Evaluation) Question Answer

LESSON 9 ELECTROCHEMISTRY

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
8	6	8	8	9	8	9	4	6			

1. Define electrochemistry. (34)
2. State Ohm's law. (34)
3. A conductivity cell has two platinum electrodes separated by a distance 1.5 cm and the cross sectional area of each electrode is 4.5sq cm. Using this cell, the resistance of 0.5N electrolytic solution was measured 15Ω. Find the specific conductance of the solution. (36) **M20 2M**
4. Define molar conductivity. (36)
5. Define molar conductance and specific conductance How they are related? (36) **PTA 5M i**
6. Define Equivalent conductance. (37) **A21 2M**
7. What are the factors affecting electrolytic conductance. (37) **A21 2M, M22 3M**
8. Explain measurement of conductivity of ionic solutions. (38)
9. Why is AC current used instead of DC in measuring the electrolytic conductance? (38) (BBQ₁₁₆₆) **PTA 5Mii**
10. Explain variation of molar conductivity with concentration. (39)
11. Write Debye – Huckel and Onsager equation for a uni-univalent electrolyte. (41) **GM 5M ii**
12. State Kohlrausch's law and applications. (41) **J20 5MARK, GM 5Mii**
13. Describe the construction of Daniel cell and write its cell reaction. (45) **G3M**
14. What is the role of salt bridge in Galvanic cell? (46) **PTA 5M ii**
15. What are the conventions used in Galvanic cell notation. (46) **PTA 5M i**
16. Explain about Galvanic cell notation. (46) **M24 5Mi**

E. MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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17. Write note on standard hydrogen electrode(SHE). (48)PTA3 3M & PTA5 5M i
18. Explain Thermodynamics of cell reactions. (50)
19. Derive Nernst equation. (51) **S20 5M, M22 5M, J22 5M**
20. Explain Electrolytic cell and electrolysis. (53)
21. State Faraday's law of electrolysis First law, Second law. (54) **A21 3M, GM 3M, M23 3M**
22. A solution of silver nitrate is electrolyzed for 30 minutes with a current of 2 amperes. Calculate the mass of silver deposited at the cathode.(55) **S20 3MARK COM, J22 2M COM**
23. Write note on Leclanche cell. (56)
24. Write note on Mercury button cell. (57)
25. Write note on secondary batteries. (58)
26. Write note on fuel cell. (59)
27. Explain electrochemical mechanism of corrosion (60)
28. Write note on Electrochemical series.(62)
29. What are electrochemical series? How is it useful to predict corrosion?(62) **PTA3M**
30. How are metals protected from corrosion by cathodic protection method? (61) **M20 3M**
31. The reaction $Zn(s) + Co^{2+} \leftrightarrow Co(s) + Zn^{2+}$ occurs in a cell. Compute the standard emf of the cell. Given that $E^{\circ}_{Zn/Zn^{2+}} = +0.76V$ and $E^{\circ}_{Co/Co^{2+}} = +0.28V$. **PTA2MC**
32. Reduction potential of two metals M_1 and M_2 are $E^{\circ}_{M_1^{2+}/M_1} = -2.3 V$ and $E^{\circ}_{M_2^{2+}/M_2} = 0.2 V$. Predict which one is better for coating the surface of iron. Given: $E^{\circ}_{Fe^{2+}/Fe} = -0.44 V$ (BBQ₁₇₆₆) **PTA5M ii, J23 3M**
33. Is it possible to store copper sulphate in an iron vessel for a long time? Given $E^{\circ}_{Cu^{2+}/Cu} = 0.34 V$ and $E^{\circ}_{Fe^{2+}/Fe} = -0.44V$ (BBQ₁₅₆₆) **PTA2M**
34. Calculate Λ° CH_3COOH using appropriate molar conductance of the electrolytes listed below at infinite dilution at 25°C (BBQ₅₆₃) **PTA5M i**

Electrolyte	NaCl	HCl	CH ₃ COONa
Λ° (S cm ² mol ⁻¹)	126.5	426.2	91.0

35. The equivalent conductance of M/36 solution of a weak monobasic acid is 6 mho cm² equiv⁻¹ and at infinite dilution is 400 mho cm² equiv⁻¹. Calculate the dissociation constant of this acid. (BBQ₁₇₆₄) **PTA2MC**
36. Can Fe³⁺ oxidise bromide to bromine under standard conditions? Given: $E^{\circ}_{Fe^{3+}/Fe^{2+}} = 0.771V$ $E^{\circ}_{Br_2/Br^-} = 1.09V$. **M24 2M**

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LESSON 10 SURFACE CHEMISTRY

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
8	7	8	9	12	9	9	11	6			

- Define adsorption and absorption. (70)
- Characteristics of adsorption. (71) **PTA 2M**
- Distinction between chemical and physical adsorption. (71) **PTA 5Mi**
- Explain the effect of temperature and pressure on physisorption and chemisorption. (72) **M24 3M**
- Give two important characteristics of physisorption. (71) **J23 2M**
- Explain Factors affecting adsorption. (72)

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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7. Write note on Adsorption and isobars. (73)
8. Explain Freundlich adsorption isotherm and limitations. (73)
9. Explain applications of adsorption. (75)
10. Define catalyst and catalysis. (77)
11. Define positive catalysis. (77)
12. Define homogenous catalysis & example (77) **M22 3M**
13. Define heterogeneous catalysis & example (77) **J22 3M**
14. What are the characteristics of catalysis? (78) **J20 5MARK, PTA 5Mi, M22 5M**
15. Define promoters, catalytic poison with suitable example (79) **PTA 2M M23 2M, J24 2M**
16. Define auto catalysis and example (79)
17. Identify the auto catalyst in the following reaction. (79) **J20 5Mi**
 A) $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{COOH} + \text{C}_2\text{H}_5\text{OH}$ B) $2\text{AsH}_3 \rightarrow 2\text{As} + 3\text{H}_2$
18. Define negative catalysis and example (79)
19. Explain intermediate compound formation theory of catalysis with an example & limitations. (80) **GM 5Mi J23 5M**
20. Explain adsorption theory of catalysis. (81) **A21 5MARK J22 5M**
21. What is the role of adsorption in the heterogeneous catalysis? (81) **PTA 3M**
22. What are active centres? (82) **PTA 2M**
23. Define, Mechanism, characteristics of Enzyme Catalysis. (83)
24. Explain Zeolite catalysis. (84)
25. What is Nano Catalysis? Give example. (86) **GM 5M i**
26. Define colloid & particle size. (86)
27. Define dispersed phase and dispersing medium. (86)
28. Define lyophilic colloids & example (87)
29. Define lyophobic colloids & example (87)
30. Why are lyophilic colloidal sols are more stable than lyophobic colloidal sols? (87) **J23 3M**
31. Explain the classification of colloids based on the physical state. (87)
32. Write the dispersed phase and dispersion medium of butter. (88) **M20 2MARK**
33. Write note on preparation of Colloids- mechanical dispersion. (88)
34. Write note on preparation of Colloids- electro dispersion. (89)
35. Write note on preparation of Colloids- Ultrasonic dispersion. (89)
36. Peptising agent is added to convert precipitate into colloidal solution. Illustrate with an example. 90 (BB103) **PTA 2M** (Write note on preparation of Colloids- peptisation.)
37. Write any three condensation methods of preparation of colloids. (Chemical method) (90) **PTA 5M i**
38. What happens when hydrogen sulphide gas is passed through a solution of arsenic oxide? Name the chemical method. (90) **PTA 2M**
39. Write note on Dialysis. (91)
40. Write note on Electrodialysis. (91)
41. Write note on Ultrafiltration. (91) **GM 5M ii**
42. Mention the shapes of the following colloidal particles. (93) **M20 3MARK**
 i) As_2S_3 ii) Blue gold sol iii) Tungstic acid sol
43. Define Tyndall effect. (93) **J20 2M**
44. Define Brownian movement. (94)
45. What is the significance of Brownian movement? (94) **PTA 5M ii**

E.MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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46. Write note on Helmholtz double layer. (94) PTA 3M **M23 3M**
47. Explain Electrophoresis. (94) PTA 5Mi, **M22 2M**
48. Define electroosmosis. (95)
49. Define coagulation. Various method of coagulation. (96) (Explain any one method for coagulation) **J24 3M**
50. What is flocculation value? (96) PTA 2M
51. Define Gold number.(96) **M24 5Mii**
52. Explain types, identification of Emulsions. (97)
53. What is inversion of phase? Give an example. (98) **S20 3M**
54. Explain various application of colloids (98)
55. How colloids are used in tanning of leather and in Rubber industry? **M23 5Mii**

& Revise Book Back (Evaluation) Question Answer

ORGANIC CHEMISTRY**LESSON 11 Hydroxy compounds and ethers**

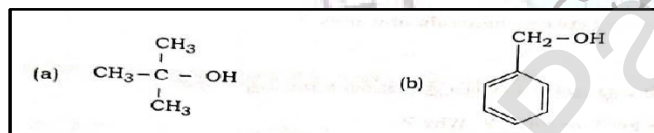
M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
9	10	8	9	6	6	6	6	8			

1. Classification of alcohol.(105)
2. Write the IUPAC names of the following compounds. PTA 2M
 - i) $C_6H_5 - O - CH_2 - CH - CH_3$ (134M)
 - ii) $CH_2 = CH - CH_2 - CH_2OH$ (107M)



- iii) Neopentyl alcohol (106)
- iv) Glycerol (107)

3. Give the IUPAC names: **M22 2M**



4. Write all the possible isomers of an alcohol having molecular formula $C_5H_{12}O$.(107)
5. Structure of alcohol.(107)
6. Preparation of primary, secondary, Tertiary alcohol(108)
7. Propene to 2-propanol.(107)
8. Formaldehyde to primary alcohol (Formaldehyde to ethanol).
(Formaldehyde + $C_6H_5MgBr \rightarrow ?$) (108)
9. Acetaldehyde to secondary alcohol (Acetaldehyde to isopropyl alcohol)
(Acetaldehyde + $CH_3CH_2MgBr \rightarrow ?$)(108)
10. Acetone to Tertiary alcohol (Acetone to tert-butyl alcohol)
(Acetone + $CH_3CH_2CH_2CH_2MgBr \rightarrow ?$) (108)
11. Ethyl methanoate to isopropyl alcohol. (108)
12. How will you prepare the following by using Grignard reagent? **M20 5M ii**
 - A) Propan-1-ol
 - B) propan-2-ol
13. Write note on Hydroboration.(109)
14. Crotonaldehyde to crotyl alcohol. (109)
15. Benzyl alcohol to benzaldehyde(109)
16. What is Baeyer's reagent? How it is useful to convert ethane to ethane-1, 2-diol? **S20 5Mi**

E.MUTHUSAMY MSc(ChE), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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- PLAN!** **PREPARE!!** **PRESENTATION!!!**
- (What happens when ethylene reacts with cold dilute alkaline KMnO_4 ?) (110)
17. Write note on saponification. (110)
18. Lucas test for primary, secondary, tertiary alcohol. (110) **J20 5MARK, S20 5M I, J23 5M, M24 5M**
19. Victor Meyer test for primary, secondary, tertiary alcohol. (111)
20. State Saytzeff's rule. (2, 3-dimethylpentan-3-ol) 114
21. Swern oxidation. (117) **PTA 5M i**
22. Biological oxidation (118)
23. Esterification. (118)
24. Oxidation primary, secondary alcohol, Tertiary alcohol. (117)
25. Is it possible to oxidize t-butyl alcohol using acidified dichromate to form a carbonyl compound? (BB142) **PTA 2M**
26. $\text{Cu}/573\text{K}$ of primary, secondary alcohol, Tertiary alcohol. (118)
27. Glycol to ethene, Glycol to dinitroglycol. (119)
28. Glycol to oxirane, glycol to acetaldehyde. **A21 3M i** (119)
29. Write the reaction of ethylene glycol with $\text{Con H}_2\text{SO}_4$? (120)
- Ethylene glycol $\xrightarrow{\text{Con H}_2\text{SO}_4}$ X. Identify X. **J23 2M**
30. Oxidation of Ethylene glycol. (120)
31. Write the chemical equation for oxidation of ethylene glycol with periodic acid. (120) **PTA 2M**
32. Glycerol to TNG. (121)
33. What happens when glycerol react KHSO_4 ? (121) (Glycerol to Acrolein) **A21 3Mi GM 3M PTA 5Mi**
34. Oxidation of glycerol (121)
35. What is meant by glycerose. (121)
36. Uses of glycerol. (122) **J22 2M**
37. Preparation of phenol
- From chlorobenzene – Dow process, From benzene sulphonic acid, From aniline, From benzene or cumene
38. Chemical properties of phenol
- Zn, NH_3 / Anhydrous ZnCl_2 , CH_3COCl , $\text{C}_6\text{H}_5\text{COCl}$, NaOH / CH_3I , Oxidation - Acidified $\text{K}_2\text{Cr}_2\text{O}_7$, Reduction – $\text{Ni}/160^\circ\text{C}$, Nitrosation – $\text{HNO}_2/278\text{K}$, 20% $\text{HNO}_3/298\text{K}$, Conc $\text{HNO}_3/\text{Conc H}_2\text{SO}_4$, Sulphonation – $\text{Conc. H}_2\text{SO}_4$, $\text{Br}_2/\text{H}_2\text{O}$, $\text{Br}_2/\text{CCl}_4 /278\text{K}$, Kolbe (or) Kolbe schmit reaction **M24 2M**
39. Riemer-tiemann reaction, **PTA 5M i** Pthalein reaction.
40. Schotten – Baumann reaction. (127) **PTA 5M i**
41. Test to differentiate alcohol and phenols, Uses of phenol
42. Give the coupling reaction of phenol. (131) **M20 5Mi**
43. How the following conversions are effected? **GM 5M**
- phenol to salicylaldehyde (130)
 - phenol to phenolphthalein (131)
 - Glycol to 1,4 dioxane (120)
44. Acidity of phenol. (124)
45. Why is C – O – C bond angle in ether slightly greater than the tetrahedral bond angle? (133) **M20 2MARK COMPULSORY**

E. MUTHUSAMY MSc(Che.), MSc(Psy.), MEd., MPhil., MA(Eng.), MA(T.), MA(PA.), MA(Soc.), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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46. Preparation of ether(134) Write any one method of preparation for diethyl ether? **M22 3M**
47. Chemical properties of ether.(136)
48. Explain auto oxidation of ethers. (137) **S20 5M ii**
49. Mention the mechanism in the following reactions: (137) **J20 3MARK**
- (a) One mole of HI reacts with methoxy ethane **ANS: SN²**
- (b) One mole of HI reacts with 2-methoxy 2-methyl propane **ANS: SN¹**
50. Electrophilic substitution reactions. (137)
51. Give the uses of diethyl ether. (138) **A21 5Mii**
52. A ether (A) C₆H₁₂O when heated with excess of hot concentrated HI, produced two alkyl halides, which on hydrolysis forms compound (B) and (C). Oxidation Of (B) gives an acid (D) where as oxidation of (C) gives ketone (E). Identify A, B, C, D and E and write the chemical equation. **PTA 5M**
53. Anisole $\xrightarrow[t\text{-butylchloride AlCl}_3]{}$ A $\xrightarrow{Cl_2/FeCl_3}$ B \xrightarrow{HBr} C. Complete the above reaction and Find A,B,C. (BB142) **PTA3M**
54. dehydration of glycerol (121) **5M ii**
55. How will you prepare 2-methyl hexan -2-ol form Grignard reagent? (108) **3M**
56. Write the mechanism of acid catalysed dehydration of ethanol to give ethene.(115) **5M i**
57. What are the tests to differentiate ethanol and phenols? (131) **3M**
58. An organic compound (A) – C₃H₈O₃ used a sweetening agent, which on oxidation with Fenton's reagent gives a mixture of compounds B and C. Identify A, B and C. Write Possible reactions. **3MC(121,122)**
59. Give four uses of diethyl ether. (138)**2M**
60. What will be the product (X and A) for the following reaction? **5M ii** (BBQ₂₂143)
- Acetyl chloride $\xrightarrow{CH_3MgBr/H_3O^+}$ X $\xrightarrow{acidic/K_2Cr_2O_7}$ A
61. The major product formed when 1- ethoxy prop-1-ene is heated with one equivalent of HI (BBQ₂142)**PTA 3Mi**
62. What happens when 1-phenyl ethanol is treated with acidified KMnO₄?(BBQ₉142) **PTA 3Mii**
63. An organic compound C₂H₆O (A) heated with Con H₂SO₄ at 443K to give an unsaturated hydrocarbon C₂H₄ (B), which on treatment with Bayer's reagent to give compound C₂H₆O₂ (C) which is used as antifreeze in automobile radiator. Compound (C) distilled with con H₂SO₄ to give cyclic compound C₄H₈O₂ (D). Compound (A) is heated with Con H₂SO₄ at 413K to give compound C₄H₁₀O (E). Identify Compounds (A) to (E) and write equations. **PTA5M**
64. How the following conversions are effected? **G5M**
- phenol to salicyaldehyde (130)
 - phenol to phenolphalein (131)
 - Glycol to 1,4 dioxane (120)

LESSON 12 Carbonyl compounds and carboxylic acid

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
8	11	9	10	9	9	8	8	12			

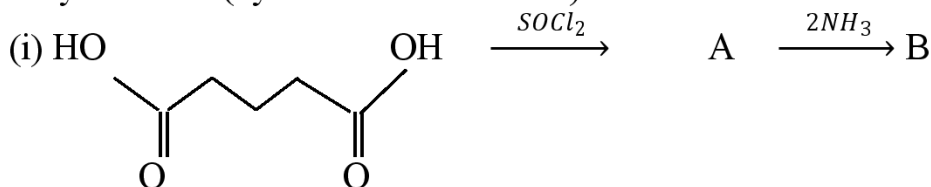
- How will you prepare ethanal by ozonolysis? (149) Ethene, propene, 1-butene, 2-butene
- What happens when isobutylene is subjected to reductive ozonolysis? (149) **J23 3M**

E.MUTHUSAMY MSc(ChE), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

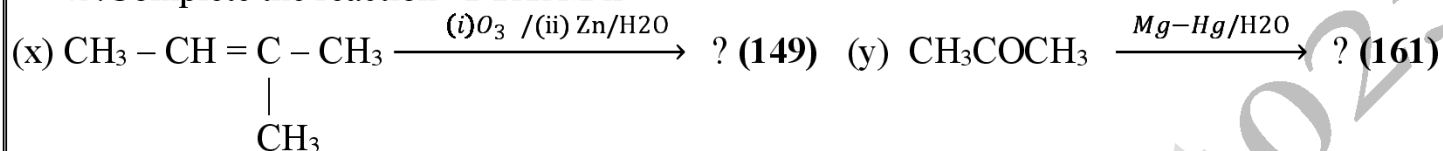
ACTC ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892**PLAN!****PREPARE!!****PRESENTATION!!!**

3. How are the following conversions effected? **PTA 2M**
 i) Hex-3-yne \rightarrow hexan-3-one (150 model)
 ii) benzaldehyde \rightarrow 2-hydroxy phenyl acetic acid. (BBQ₈193)
4. Rosenmund reduction (151) **J22 2M**
5. Name the catalyst used in Rosenmund reduction and state its importance. (151) **M20 2M**
6. How is the following conversion affected? Hex-4-enitrile \rightarrow hex-4-enal (151) **PTA 5M ii**
7. Stephen's reaction (151)
8. Etard reaction (151) **PTA 3M**
9. Gattermann Koch reaction (151)
10. Friedel crafts acylation (151)
11. How is benzaldehyde manufactured commercially? (152)
12. How are the following conversions affected? **5M ii**
 (X) Benzene \rightarrow acetophenone (153) (Y) Benzaldehyde \rightarrow hydrobenzamide (159)
13. How will you prepare aldimine? (158)
14. What is Urotropine? How it is prepared? and uses (158) **J20 2M**
15. Popoff's rule (159)
16. Clemmensen reduction (160) How will you c
17. Wolf kishner reduction (161)
18. Haloform reaction (161) **M22 3M**
19. Crossed aldol condensation (162)
20. What happens on heating of aldol? (161)
21. Explain Aldol condensation with mechanism (161) **S20 5M GM 3M**
22. Explain Cannizaro reaction with mechanism (163) **PTA 3M**
23. Claisen Schmidt condensation (163)
24. Crossed cannizaro reaction (164)
25. Perkin's reaction (165)
26. Knoevenagal reaction (165) **PTA 3Mi, M24 3M**
27. How will you convert benzaldehyde into the following compounds? (165) **A21 5M**
 (i) Benzoin **J22 5Mii** (ii) Cinnamic acid (iii) Malachite green **PTA 2M**
28. Note on Schiff's base (165)
29. Test for aldehyde (166)
30. Explain Benedict's solution test. (167) **S20 3M**
31. What is Formalin? What is its use? (167) **M20 5Mi J23 2M**
32. How acetic acid is prepared from Grignard reagent? (170) **M24 5Mi**
33. How will you prepare benzoic acid from toluene? (171) **PTA 3M I, J24 2M**
34. What happens when ethanoic acid reacts with ethanol in the presence of con H_2SO_4 . Give its complete mechanism. (173) **5M i**
35. How does sodium salt react with soda lime? (175)
36. HVZ reaction (176)
37. Formic acid reduces Tollens reagent whereas acetic acid does not reduce. (177) **M20 3M**
 Explain the reducing action of formic acid with example. (177) **M22 5M**
38. Test for carboxylic acid (177) **J20 3M, A21 3M, J22 5Mi**
39. Why formic acid act as strong reducing agent? Give one equation to show its reducing property. (177) **2M**
40. Benzoic acid $\xrightarrow{PCl_5}$ A $\xrightarrow{\text{benzene/ anhydrous } AlCl_3}$ B **J24 3M**

E.MUTHUSAMY MSc(ChE), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

ACTC ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892**PLAN!****PREPARE!!****PRESENTATION!!!**41. Identify A and B (by bond line structure) **J20 5Mi**

42. Effect of substituents on the acidity of carboxylic acid. (178)

43. Complete the reaction **PTA5M ii**44. Arrange the following in the increasing order of relative reactivity of acid derivatives and mention the reason alone. $CH_3COOC_2H_5$, CH_3COCl , CH_3CONH_2 , $CH_3COOCOCH_3$ (180)**J20 5Mii**

45. How will you convert Ethylacetate into Ethylaceto acetate? (Claisen Condensation) (186)

M23 3M

46. Uses of formic acid (188)

47. A carbonyl compound A having molecular formula $C_5H_{10}O$ forms crystalline precipitate with sodium bisulphate and gives positive iodoform test. A does not reduce Fehling's solution. Identify 'A'. (BBQ₁₀193) **PTA 5M ii**48. An organic compound C_3H_4 (A) on hydration with Hg^{2+} / H_2SO_4 gives compound (B) which gives positive iodoform test. Compound (B) heated with $NH_2 - NH_2 / C_2H_5ONa$ to give hydrocarbon (C). (B) also treated with HCHO in the presence of dil NaOH gives compound (D). Identify A, B, C and D. Write the chemical reactions involved. **5M**49. An organic Compound (A) - C_2H_4O reduces Tollen's and Fehling's solution. A reacts with methanol and HCl to give compound (B) - $C_4H_{10}O_2$. A on reaction with Methanal in the presence of dilute NaOH to give compound (C) - $C_3H_6O_2$. Identify Compounds A, B and C with necessary reactions. (155, 163) **PTA5M ii**50. An organic Compound C_2H_5Br (A) on treatment with Mg in dry ether gives (B) which on treatment with CO_2 followed by acidification gives (C). Identify (A), (B) & (C) and write possible equations. **PTA3MC**51. Compound A of molecular formula C_7H_6O reduces Tollen's reagent when A reacts with 50% NaOH gives compound B of molecular formula C_7H_8O and C of molecular formula $C_7H_5O_2Na$. Compound C on treatment with dil HCl gives compound D of molecular formula $C_7H_6O_2$. When D is heated with sodalime gives compound E. Identify A, B, C, D & E. Write the corresponding equations. (163) **GM 5M****LESSON 13 Organic Nitrogen Compounds**

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
8	6	8	8	8	9	8	9	4			

1. Explain Isomerism of nitro compound? (199)

2. There are two isomers with the formula CH_3NO_2 . How will you distinguish between them? (199) **PTA3M, J24 2M COMPULSORY**

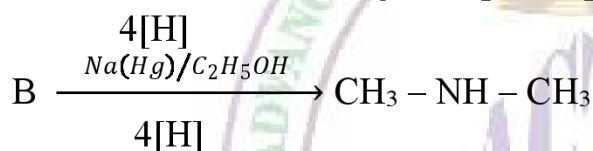
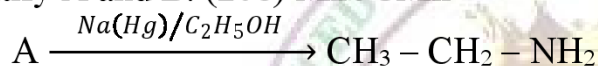
3. Acidic nature of nitro alkanes. (200)

4. How will you prepare oil of mirbane? (201)

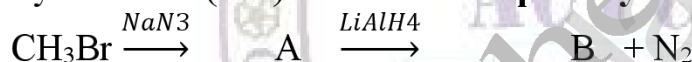
E. MUTHUSAMY MSc(Chem), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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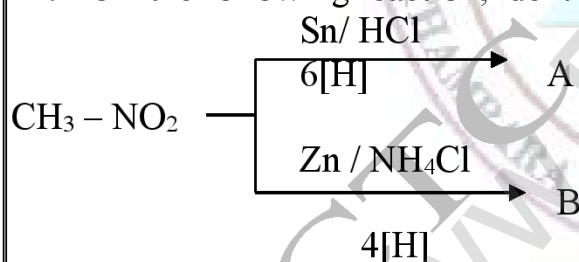
5. Ethyl nitrite to ethanol.(202)
6. How is Chloropicrin prepared (203) **M20 2 MARK**
7. Hofmann's bromide reaction (209)
8. Gabriel phthalimide synthesis (209) **J20 3M, M22 5Mii**
9. Hoffmann's ammonolysis (209)
10. Sabatier – Mailhe method (210)
11. Schotten – Baumann reaction (214) **J23 5Mi**
12. Diazotisation (215)
13. Libermann's nitroso test. (215)
14. Carbylamine reaction (216) **M22 5Mi**
15. Mustard oil reaction (216) **S20 5Mii, J22 5Mii, J23 5Mii**
(write the reaction of primary amine with carbon disulphide (CS₂). **M24 3M**)
16. Hofmann-Mustard oil reaction. (216)
(How will you prepare phenyl mustard oil?)
17. How does aniline react with Br₂/H₂O (Bromination of aniline)? (217) **J22 5Mi**
18. Why aniline does not undergo Friedel Crafts reaction. (218) **J20 2M**
19. Identify A and B. (208) **M20 5Mii**



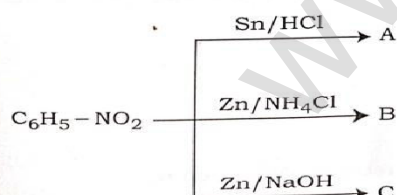
20. Identify A and B. (208) **M22 2M Compulsory**



21. From the following reaction, identify A and B. (202) **A21 2M Compulsory**



22. From the following reaction, identify A, B and C. (203) **J22 3M Compulsory**



23. $CH_3CH_2NO_2 \xrightarrow{Sn/HCl} A \xrightarrow{CH_3COCl} B$. **M23 2M COMPULSORY**

24. How will you convert nitrobenzene into (203)

Aniline, Phenyl hydroxyl amine, Nitrosobenzene, Azo benzene, azoxybenzene, hydrozobenzene, m - nitro aniline (204), 1,3,5 - trinitrobenzene (204), 3-nitro benzene sulphonic acid, 3-chloro nitro benzene.

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25. Name the reducing agent used in the reduction of nitrobenzene to the following compounds.

(203) **S20 5Mi**

(A) Aniline

(B) Phenyl hydroxylamine

(C) Nitrosobenzene

26. How will you distinguish between primary secondary and tertiary aliphatic amines?

27. Arrange the following: (212BB234) **PTA2M**

(i) In decreasing order of the pK_b values: $C_2H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$, CH_3NH_2

(ii) Increasing order of basic strength: $C_2H_5NH_2$, $C_6H_5N(CH_3)_2$, $(C_2H_5)_2NH$, CH_3NH_2

28. How the following conversion are effected? **PTA5M**

(i) Nitro benzene \rightarrow N - phenyl hydroxyl amine (203)

(ii) Propanamide \rightarrow Propan - 1 - amine (209)

(iii) Aniline \rightarrow p - nitroaniline (218)

29. An organic compound (A) on reduction gives compound (B). (B) on treatment with $CHCl_3$ and alcoholic KOH gives (C). (C) on catalytic reduction gives N - methyl aniline. Identify A, B, C and write its equation. (216 Carbylamine) **PTA3M**

30. Account the following **PTA3M (BBQ₈234)**

i) Aniline does not undergo Friedel - crafts reaction. **M23 5Mi**

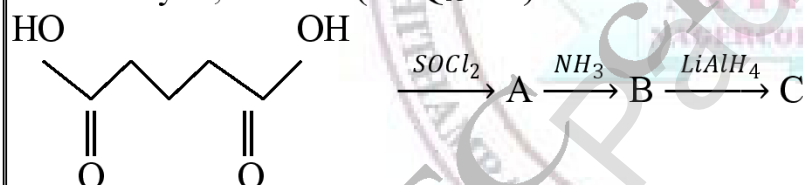
ii) Ethylamine is soluble in water whereas aniline is not

iii) Amines are more basic than amides.

31. An organic compound (A) - C_7H_7NO on treatment with Br_2 and KOH gives an amine (B), which gives carbylamines test. (B) upon diazotization to give (C). (C) on coupling with P. cresol to give compound (D). Identify A, B, C and D with necessary reaction. (209) **PTA5M**

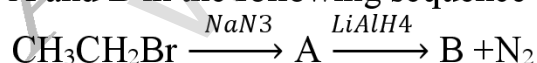
32. An organic compound (A) - $CNCl$ react with methyl magnesium Bromide to give compound B - (C_2H_3N) . B-upon catalytic reduction to give compound C - (C_2H_7N) . C gives carbylamine test. Identify compound A, B and C and write the reactions. (224, 225) **3MC**

33. Identify A, B and C (BBQ₁₃235) **PTA5M i**



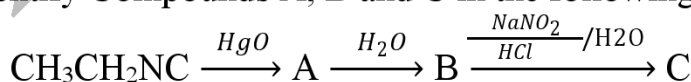
34. An aromatic nitro compound (A) on reduction with Sn/HCl gives compound (B) C_6H_7N , which on treatment with Benzoyl chloride in the presence of pyridine to give compound (C). Compound (B) on treatment with CH_3Br to give compound (D) which further reacts with $NaNO_2/HCl$ to give compound (E) with yellow oil liquid. Identify (A) to (E) and write the reactions. **PTA 5M**

35. Identify A and B in the following sequence of reactions. (210) **M22 2M COMPULSORY**



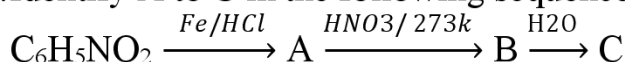
36. Write a note on Sabatier - mailhe method? (210) **PTA 2M**

37. Identify Compounds A, B and C in the following sequence of reaction. (BBQ_{5vii}233) **3MC**



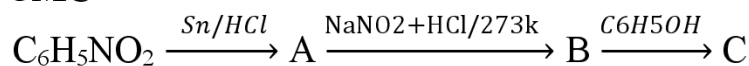
38. Write the uses of nitroalkanes. (228) **PTA 5M ii**

39. Identify A to C in the following sequence? (BBQ_{5i}233) **GM 3MC**



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40. Identify Compounds A, B and C in the following sequence of reaction (203, 215, 222) **J23 3MC**



41. Write short notes on **GM 5M** a) Mustard oil reaction (216) b) Carbylamines reaction (216) c) Gabriel phthalamide synthesis. (209)

LESSON 14 Biomolecules

M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
7	7	6	6	4	3	6	6	6			

- Outline the classification of carbohydrates giving example for each (239)
- What are the different types of monosaccharides. (240)
- Elucidate the structure of glucose (241)
- Draw the cyclic structure of glucose (243) (Write the structure of α -D(+)-Glucopyranose, β -D-glucopyranose) (243) **PTA 2M, M24 2M**
- Define anomer. Give example. (243)
- Define mutarotation. (244)
- Define epimers and epimerization. (244) What are epimers? Give an example. **M22 3M**
- Explain the structure of Fructose. (245) **GM5M**
- Draw the structure of D(+)-Fructose. (246) **J22 2M**
- What are reducing and non-reducing sugars? Give an example. (BB) **J24 3M**
- What happens when fructose is partially reduced with sodium amalgam and water? (245) **PTA 5M ii**
- Draw the cyclic structure of fructose. (246)
- Write about the structure of sucrose (247)
- Explain the structure of lactose (247)
- Explain the structure of maltose (248)
- What is glycosidic linkage? (247) **M20 5Mi**
- Mention the importance of Carbohydrates (250)
- Define isoelectric point (252)
- What is Called Zwitter ion? Give an example (252) **J22 3M M23 3M** Give the structure of a Zwitter ion.
- Write a short note on peptide bond. (252) **PTA 5M i, M24 3M**
- Write the Zwitter ion structure of alanine. (252) **2M**
- Write a note on denaturation of proteins. (256) **S20 2M**
- Mention the importance of proteins in living organisms. (256) **J23 5M**
- Write any three biological importance of lipids. (258) **S20 3M**
- How are vitamins classified? (259) **J24 2M**
- Name the vitamins whose deficiency causes. (a) Rickets (b) Scurvy (259) **J20 2M**
- Explain composition and structure of nucleic acids. (260)
- Explain types of RNA molecules (264) **J20 5Mi**
- Give any four differences between DNA and RNA. (264) **A21 3M GM2M**
- Write note on DNA finger printing. (265)
- Explain Hormones (266). What are Hormones? Give example. (166) **M23 2M**

LESSON 15 CHEMISTRY IN EVERYDAY LIFE

E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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M20	J20	S20	A21	M22	J22	M23	J23	M24	J24	M25	J25
6	6	7	Corona reduced syllabus			7	6	5			

1. What are antibiotics? BB 274 **M24 2M**
2. Give a brief account on Antioxidants. (283) **J20 5Mi**
3. How do you classify the following into various class of drugs? (277-282) **J20 5Mii**
(A) Milk of Magnesia (B) Aspirin (C) Penicillin (D) Procaine
4. How do antiseptics differ from disinfectants? (282) **S20 5Mi**
5. What are bio degradable polymers? Give two examples.(293) **PTA3M, J23 2M, M24 5Mii**
6. How the tranquilizers work in body? 277 (BB 296) **PTA 2M**
7. Write a note on TFM value. ((284) **PTA 5M ii**
8. How nylon -6 is prepared? (289) **PTA 2M**
9. Write the made of action and uses of antacids. Give an example (279) **PTA 5M ii**
10. What are food preservatives? Give two examples. (283) **PTA 2MC M23 3M**
11. Define food additives. (282) State any three advantages of food additives. (283) **M20 3M**
12. Define the term therapeutic index. How is it related to the safety of the drug? (273) **PTA 5M ii**
13. How is terylene prepared? (290) **PTA 2M**
14. Explain the mechanism of cleaning action of soaps and detergents. (284) **PTA 5M i**
15. What are Antiseptics? Give an example (282) **PTA 2M**
16. How polymers are classified on the basis of structure and molecular forces, give examples of each one. (286) **PTA 5M**
17. Write short notes on Antioxidants. (283) **G2M**
18. Explain the preparation of Nylon-6,6 and Buna-S. (289, 292) **G3M**
19. How Nylon-2-Nylon-6 is prepared? **M23 5Mii**
20. What is Vulcanization?(292) **M20 5Mii** Write note on Vulcanization of rubber. (292) **J23 3M**
21. How is neoprene prepared? **S20 3M**

**2M- 2 marks; 2MC- 2 marks Compulsory; 3M- 3 marks; 5M- 5 marks;
GM2M- Govt model question paper 2 marks;**

ALL THE BEST SCORE MORE MARKS

NAME REACTIONS ORGANIC CHEMISTRY

LESSON 11

1. Markonikoff's rule. (108)
2. Grignard reagent (108)
3. Hydroboration (109)
4. Bayer's reagent. (110)
5. Saponification (110)
6. Lucas test (111) **J20 5M, S20 5M I, J23 5M, M24 5M**
7. Victor Meyer test for primary, secondary, tertiary alcohol. (111)
8. Victor meyer's test (111)
9. Saytzeff's rule.(116)
10. Swern oxidation. (117)

E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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11. Esterification (118)
12. Biological oxidation (118)
13. TNG(121)
14. Acrolein (121)
15. Dows process(127)
16. Schotten- baumann reaction (128)
17. Williamson ether synthesis(128)
18. Kolbe's (or) Kolbe's schmit reaction(131) **M24 2M**
19. Riemeier tiemann reaction(131)
20. Phthalein reaction(132)
21. Coupling reaction(132)
22. Friedel craft's reaction(139)

LESSON 12

23. Ozonolysis(149)
24. Rosenmund reduction(151)
25. Stephen's reaction(151)
26. Etard reaction (152)
27. Gattermann-koch reaction(152)
28. Friedel crafts acylation (152)
29. Urotropine(158)
30. Popoff's rule (159)
31. Clemmensen reduction(160) acetone to propane **M23 2M, M24 5M problem**
32. Wolfkishner reduction(161)
33. Aldol condensation(162)
34. Crossed aldol condensation(163)
35. Claisen-schmidt condensation(163)
36. Cannizaro reaction(164)
37. Crossed cannizaro reaction(164)
38. Benzoin condensation(164)
39. Penkins reaction(165)
40. Knoevenagal reaction(165) **M24 3M**
41. Schiff's base(165)
42. Malachite green dye(165) **M23 5Mi**
43. Tollens reagent test(166)
44. Fehlings solution test(166)
45. Benedicts solution test(167)
46. Schiff's reagent test(167)
47. Esterification (173)
48. Kolbs electrolytic(175)
49. decarboxylation(175)
50. Trans esterification(185)
51. Claisen condensation(186)
52. Hoffmanns degradation(188)

LESSON-13

53. Chloropicrin (203)

E.MUTHUSAMY MSc(ChE), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., **You Tube:** ACTC Chemistry **Whatsapp:** 9940847892

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54. Mendius reaction (208)
55. Gabriel phthalimide synthesis(209)
56. Hoffmanns ammonolysis(209)
57. Sabatier –Mailhe method(210)
58. Schotten –baumann reaction(214,215) **M23 2m complete reaction J23 5Mi**
59. Libermanns nitroso test(215)
60. Carbylamine reaction(216)
61. Mustard oil reaction(216) **J23 5Mi, M24 3M**
62. Gattermann reaction(220)
63. sandmeyer reaction(220)
64. Baltz –schiemann reaction(221)
65. Gomberg reaction(221)
66. Coupling reaction(222)
67. Condensation reaction- Thorpe nitrile condensation (225) **M23 5Mii**
68. Carbylamins reaction(226)
69. Levine and hauser acetylation(225)

ORGANIC PROBLEM

- An organic compound (A) of molecular formula C_3H_8O gives turbidity within 5-10 minutes on reaction with anhydrous $ZnCl_2/HCl$. Compound (A) on treatment with PCC (Pyridinium chloro chromate) gives a carbonyl compound(B) which on further chlorination gives compound (C) of molecular formula $C_3H_3OCl_3$. Identify (A),(B) and (C) and explain the reactions. (117)
- An organic compound (A) C_2H_6O liberates hydrogen on treatment with metallic sodium. (A) on mild oxidation gives (B) C_2H_4O which answers iodoform test. (B) when treated with CH_3OH/HCl to give (C) ($C_4H_{11}O_2$). Identify (A), (B) and (C) and explain the reactions. (155)
- An organic compound A of molecular formula C_6H_6O gives a violet colourisation with neutral $FeCl_3$. Compound A on treatment with $NaOH$ gives compound B. Compound B on treatment with CO_2 at 400 K under pressure gives C. This product on acidification gives compound D($C_7H_6O_3$) which is used in medicine. Identify A, B, C and D and explain the reactions. (130 Kolbe reaction)
- An organic compound (A) of molecular formula C_6H_6O gives a purple colourisation with neutral $FeCl_3$. Compound (A) on treatment with ammonia to gives compound (B). Compound (B) and it also reacts with Zn dust to give compound (C). Identify A, B, C explain the reactions. **M23 5M**
- An organic compound A of molecular formula C_3H_6O on reduction with $LiAlH_4$ gives B. Compound B gives blue colour in Victor Mayer's test and also forms a chloride C with $SOCl_2$. (A) reacts with NH_3 to form D($C_6H_{13}NO$). Identify A, B, C and D and explain the reactions.(158)
- An organic compound (A) C_3H_8O answers Lucas test-within 5-10 minutes and on oxidation forms B(C_3H_6O). This on further oxidation forms C($C_2H_4O_2$) which gives effervescence with Na_2CO_3 . B also undergoes iodoform reaction. Identify A, B, and C,. Explain the conversion of A to B and C.

E.MUTHUSAMY MSc(Chem), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.
B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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7. An organic compound (A) of molecular formula C_6H_6O gives violet colour with neutral $FeCl_3$. (A) react with $CHCl_3/aq.NaOH$ to gives B. (A) also reacts with $C_6H_5N_2Cl$ to give the compound (C) which is a red orange dye. Identify (A),(B) and (C). Explain with suitable reactions. (130)
8. Compound (A) of molecular formula C_3H_8O liberates hydrogen with sodium metal. (A) with P/I_2 gives (B). Compound (B) on treatment with silver nitrite gives (C) which gives blue colour with nitrous acid. Identify (A),(B),(C) and explain the reactions. (112)
9. Compound (A) with molecular formula C_6H_6O gives violet colour with neutral $FeCl_3$, reacts with $CHCl_3$ and $NaOH$ gives (B) with molecular formula $C_7H_6O_2$. Compound (A) reacts with Ammonia at 473 K in the presence of $ZnCl_2$ and gives compound (C) with molecular formula C_7H_7N . Compound (D) undergoes carbylamine test. Identify (A), (B), and (C). Explain the reactions. 127
10. An organic compound C_2H_6O (A) reacts with H_2SO_4 at 443 K and gives (B) of molecular formula C_2H_4 . (B) Reacts with cold alkaline $KMnO_4$ (Baeyer's reagent) to give (C) of molecular formula $C_2H_6O_2$. Identify (A). (B), (C). Explain the reactions. (115 & 110)
11. An organic compound A (C_2H_6O) liberates hydrogen with sodium metal. A when heated with alumina at 620 K gives an alkene B which when passed through Bayer's reagent gives C($C_2H_6O_2$). C reacts with PI_3 and gives back B. Identify A, B and C. Write the reactions. (110, 115, 119)
12. A ether (A) $C_5H_{12}O$ when heated with excess of hot concentrated HI, produced two alkyl halides, which on hydrolysis forms compound (B) and (C). Oxidation Of (B) gives an acid (D) where as oxidation of (C) gives ketone (E). Identify A, B, C, D and E and write the chemical equation.
13. An organic compound (A) on reduction gives compound (B). (B) on treatment with $CHCl_3$ and alcoholic KOH gives (C). (C) on catalytic reduction gives N – methyl aniline. Identify A,B,C.
14. An organic compound C_3H_4 (A) on hydration with Hg^{2+} / H_2SO_4 gives compound (B) which gives positive iodoform test. Compound (B) heated with $NH_2 - NH_2 / C_2H_5ONa$ to give hydrocarbon (C). (B) also treated with HCHO in the presence of dil NaOH gives compound (D). Identify A, B, C and D. Write the chemical reactions involved.
15. An organic compound (A) – $C_3H_8O_3$ used a sweetening agent, which on oxidation with Fenton's reagent gives a mixture of compounds B and C. Identify A, B and C. Write Possible reactions.
16. An organic compound (A) – C_7H_7NO on treatment with Br_2 and KOH gives an amine (B), which gives carbylamines test. (B) upon diazotization to give (C). (C) on coupling with P. cresol to give compound (D). Identify A,B,C and D with necessary reaction.
17. An organic Compound (A)- C_2H_4O reduces Tollen's and fehling's solution. A-react with methanol and HCl to give compound (B) – $C_4H_{10}O_2$. A-on reaction with Methanal in the presence of dilute NaOH to give compound (C) – $C_3H_6O_2$. Identify Compounds A, B and C with necessary reactions.
18. An organic Compound C_2H_5Br (A) on treatment with Mg in dry ether gives (B) which on treatment with CO_2 followed by acidification gives (C). Identify (A), (B) & (C) and write possible equations.
19. An aromatic nitro compound (A) on reduction with Sn/HCl gives compound (B) C_6H_7N , which on treatment with Benzoyl chloride in the presence of pyridine to give compound (C). Compound (B) on treatment with CH_3Br to give compound (D) which further reacts with

E.MUTHUSAMY MSc(che), MSc(PSY), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.

B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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NaNO₂/HCl to give compound (E) with yellow oil liquid. Identify (A) to (E) and write the reactions.

20. An organic compound C₂H₆O (A) heated with Conc H₂SO₄ at 443K to give an unsaturated hydrocarbon C₂H₄ (B), which on treatment with Bayer's reagent to give compound C₂H₆O₂ (C) which is used as antifreeze in automobile radiator. Compound (C) distilled with conc H₂SO₄ to give cyclic compound C₄H₈O₂ (D). Compound (A) is heated with Conc H₂SO₄ at 413K to give compound C₄H₁₀O (E). Identify Compounds (A) to (E) and write equations.
21. Compound A of molecular formula C₇H₆O reduces Tollen's reagent when A reacts with 50% NaOH gives compound B of molecular formula C₇H₈O and C of molecular formula C₇H₅O₂Na. compound C on treatment with dil HCl gives compound D of molecular formula C₇H₆O₂. When D is heated with soda lime gives compound E. identify A, B, C, D & E. (163)

GM5M

22. An organic compound (A) – C₇H₇NO on treatment with Br₂ and KOH gives an amine (B), which gives carbylamines test. (B) upon diazotization to give (C). (C) on coupling with P. cresol to give compound (D). Identify A,B,C and D with necessary reaction. (209)

PTA5M

23. An organic compound (A) – CNCl react with methyl magnesium Bromide to give compound B – (C₂H₃N). B-upon catalytic reduction to give compound C – (C₂H₇N). C gives carbylamine test. Identify compound A,B and C and write the reactions. (224, 225)3MC

24. An organic compound (A) of molecular formula C₂H₄O reacts with Zn-Hg/Conc.HCl to give compound (B) which reacts with HNO₃ forming compound (C) (as major product) and Compound (D). Compound (C) reacts with conc.HCl to give compound (E) (Table vinegar) and hydroxylamine. Identify A,B,C,D and E with suitable reactions. M24 5M

Compulsory questions: ORGANIC

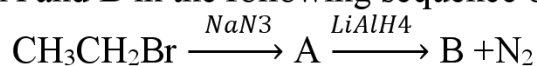
- C₆H₆O (A) $\xrightarrow{NH_3}$ (B) (A) \xrightarrow{Zn} (C)
- C₇H₆O (A) $\xrightarrow{50\% NaOH}$ (B) C₇H₈O + C₇H₅O₂Na (C). (C) \xrightarrow{HCl} (D) $\xrightarrow{Sodalime}$ (E)
- C₂H₆O (A) $\xrightarrow{\text{conc. H}_2\text{SO}_4 \text{ at } 443 \text{ K}}$ (B) $\xrightarrow{\text{Bayer's reagent}}$ (C) C₂H₆O₂ $\xrightarrow{\text{anhydrous ZnCl}_2}$ C₂H₄O (D)
- CH₄O (A) $\xrightarrow{\text{Tollens reagent}}$ (B) CH₂O $\xrightarrow{CH_3MgBr}$ (C) C₂H₆O
- C₂H₆O (A) $\xrightarrow{Cu/573K}$ (B) C₂H₄O $\xrightarrow{CH_3MgBr}$ (C) C₃H₈O $\xrightarrow{Cu/573k}$ (D) C₃H₆O
- C₆H₅Cl (A) \xrightarrow{NaOH} (B) C₆H₆O $\xrightarrow{NH_3-\text{anhydrous ZnCl}_2}$ (C) C₆H₇N
- C₆H₅Cl (A) \xrightarrow{NaOH} (B) C₆H₆O \xrightarrow{NaOH} (C) C₆H₅ONa $\xrightarrow{CO_2}$ (D) C₇H₆O₃
- C₆H₅N₂Cl (A) $\xrightarrow{H_2O}$ (B) C₆H₆O \xrightarrow{Zn} (C) simplest aromatic hydrocarbon $\xrightarrow{\text{Methyl chloride}}$ (D) C₇H₈
- C₆H₆ (A) $\xrightarrow{H_3PO_4 \text{ } 523 \text{ K}}$ (B) C₉H₁₂ $\xrightarrow{\text{Air O}_2}$ (C) C₉H₁₂O₂ $\xrightarrow{H_2SO_4}$ (D) C₆H₆O
- C₃H₈O (A) $\xrightarrow{P/I_2}$ (B) C₃H₇I $\xrightarrow{AgNO_2}$ (C) C₃H₇NO₂ $\xrightarrow{\text{Nitrous acid}}$ (D) C₃H₆N₂O₃ Blue colour
- C₂H₆O (A) $\xrightarrow{Al_2O_3/620K}$ (B) alkene $\xrightarrow{\text{Bayer's reagent}}$ (C) C₂H₆O₂

E.MUTHUSAMY MSc(Chem), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.**B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

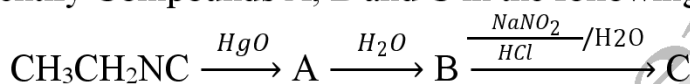
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12. C_6H_6O (A) $\xrightarrow{CHCl_3 \text{ and } NaOH}$ (B) $C_7H_6O_2$ (A) $\xrightarrow{NH_3 \text{ Anhydrous chloride}}$ (C) C_6H_7N
13. Organic compound (A) $\xrightarrow{\text{reduction}}$ (B) $\xrightarrow{CHCl_3 \text{ alc KOH}}$ (C) $\xrightarrow{\text{catalytic reduction}}$ (D) N - methyl aniline
14. C_3H_4 (A) $\xrightarrow{Hg^{2+} / H_2SO_4}$ (B) (Positive iodoform test) $\xrightarrow{NH_2 - NH_2 / C_2H_5ONa}$ (C)
- (B) $\xrightarrow{HCHO / \text{dil NaOH}}$ (D)
15. $C_3H_8O_3$ (A) $\xrightarrow{\text{Fenton's reagent}}$ (B) and (C)
16. C_7H_7NO (A) $\xrightarrow{Br_2 \text{ and } KOH}$ (B) $\xrightarrow{\text{diazotization}}$ (C) $\xrightarrow{\text{coupling with p-cresol}}$ (D)
17. C_2H_4O (A) $\xrightarrow{\text{Methanol/HCl}}$ (B) $C_4H_{10}O_2$ (A) $\xrightarrow{\text{Methanal in the presence of dilute NaOH}}$ (C) $C_3H_6O_2$
18. C_2H_5Br (A) $\xrightarrow{Mg \text{ dry ether}}$ (B) $\xrightarrow{CO_2}$ (C)
19. (A) $\xrightarrow{Sn/HCl}$ (B) C_6H_7N $\xrightarrow{\text{Benzoyl chloride / pyridine}}$ (C) (B) $\xrightarrow{CH_3Br}$ (D) $\xrightarrow{NaNO_2/HCl}$ (E)
20. C_2H_6O (A) $\xrightarrow{\text{Conc } H_2SO_4 \text{ at } 443K}$ (B) C_2H_4 $\xrightarrow{\text{Bayer's reagent}}$ $C_2H_6O_2$ (C). (A) $\xrightarrow{\text{Conc } H_2SO_4}$ $C_4H_{10}O$ (E).

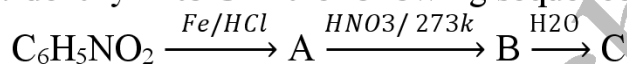
21. Identify A and B in the following sequence of reactions. (210) M22 2M C



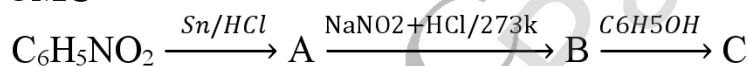
22. Identify Compounds A, B and C in the following sequence of reaction. (BBQ_{5vii}233) 3MC



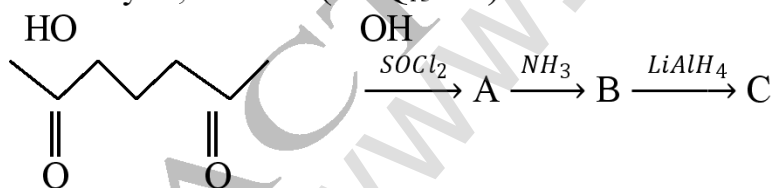
23. Identify A to C in the following sequence? (BBQ_{5i}233) GM 3MC



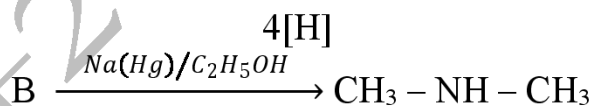
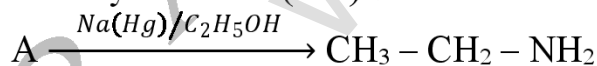
24. Identify Compounds A, B and C in the following sequence of reaction (203,215,222) J23 3MC



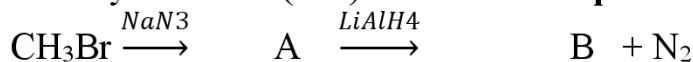
25. Identify A, B and C (BBQ₁₃235) PTA5M i



26. Identify A and B. (208) M20 5Mii

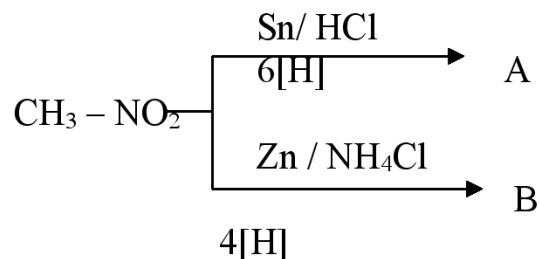


27. Identify A and B. (208) M22 2M Compulsory

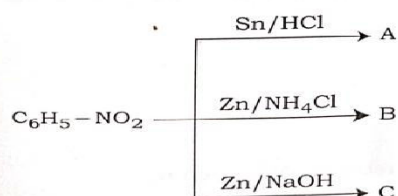


28. From the following reaction, identify A and B. (202) A21 2M Compulsory

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29. From the following reaction, identify A, B and C. (203) J22 3M Compulsory



30. $\text{CH}_3\text{CH}_2\text{NO}_2 \xrightarrow{\text{Sn/HCl}} \text{A} \xrightarrow{\text{CH}_3\text{COCl}} \text{B}$. **M23 2M COMPULSORY**

▪ **“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

PREPARED BY:

(23Years experience)

E. MUTHUSAMY & SARANYA MUTHUSAMY

Email: actcnagercoil@gmail.com

Facebook: Actc Tuition Centre Nagercoil

Instagram: actc_chemistry_tuition_centre

You tube: ACTC Chemistry

E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.
B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892

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**E.MUTHUSAMY MSc(Che), MSc(Psy), MEd., MPhil., MA(Eng), MA(T), MA(PA), MA(Soc), BLISc., DMLT.
B. SARANYA MUTHUSAMY BE., BEd., You Tube: ACTC Chemistry Whatsapp: 9940847892**

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