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+2 CHEMISTRY IMPORTANT QUESTIONS- SECOND MID TERM 2023

II-MIDTERM QUESTION PATTERN - 2023 (CHEMISTRY +2)

MCQ	8	8x1=8
2MARK	4/6	4x2=8 (1Q COMPULSORY)
3MARK	3/5	3x3=9 (1Q COMPULSORY)
5MARK	2/4	2x5=10
	TOTAL	35 MARKS

EXAM PORTION- SECOND MID TERM EXAM 2023

UNIT 5 COORDINATION CHEMISTRY

UNIT 9 ELECTROCHEMISTRY

UNIT 10 SURFACE CHEMISTRY

UNIT 13 ORGANIC NITROGEN COMPOUNDS

INORGANIC CHEMISTRY

LESSON 5 Coordination Chemistry

M2020	J2020	S2020	A2021	M2022	J2022	M2023	J2023	
10	9	9	9	9	6	11	9	

1. Difference between double salt and coordination compounds. (131) (**A21, PTA 3M**)
2. Explain Werner theory & limitation.(132) **(S20 5M, M22 5M)**
3. Define central metal ion (133) **M23 2M**
4. Write note on ligand (134)
5. Write the IUPAC ligand name for the following: a)$C_2O_4^{2-}$ b) H_2O c) Cl^- (137) **J22 3M**
6. Define coordination number.(134) **M22 2M**
7. Define oxidation number.(134)
8. In the complex $[Pt(NO_2)(H_2O)(NH_3)_2]Br$ 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**
9. In the complex $K_4[Mn(CN)_6]$ identify the following i) nature of Ligand ii) oxidation number of the central metal ion. iii) coordination number. **J23 3M**
10. Write the IUPAC name of the following: a) $[Ag(NH_3)_2]^+$ B) $[Co(NH_3)_5Cl]^{2+}$ **(M20 2M)** Write the following for the complex $[Ag(NH_3)_2]^+$. **M22 3M Compulsory** a)Ligand b) Central metal ion c) IUPAC Name
11. Write the IUPAC Name for the compound $Na_2[Ni(EDTA)]$ (140) **PTA5M i**
12. For the example $[Fe(en)_2Cl_2]Cl_2$, Identify   **PTA5M 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
13. Explain structural isomer. (coordination, Linkage, ionization, solvate isomers) (142)

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 any two hydrate isomers of the complex with the molecular formula $CrCl_3.6H_2O$.(142)**M20 2M**
15. Explain Geometrical isomers (cis, trans isomer)(144,145)
16. Why tetrahedral complexes do not exhibit geometrical isomerism?(BB) (143)
17. Draw all possible geometrical isomers of the complex $[Co(en)_2Cl_2]^+$ and identify the optically active isomer. BBQ6 **J23 5M**
18. Define mer, fac isomer. (145)
19. Explain optical isomerism of coordination compounds with an example. (146)
20. Explain Valence Bond theory (VB Theory) & limitations. **(S20, J22 2M, PTA)**(149 &152)
21. Apply VB theory in $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$**(S20)**, $[Co(CN)_6]^{3-}$, $[Co(F)_6]^{3-}$**(M20)** (149-151)
22. Explain crystal field theory. (153)
23. In an Octahedral crystal field, draw the figure to show splitting of d orbitals (154) **J20 3M**
24. In a tetrahedral crystal field, draw the figure to show splitting of d orbitals (155)
25. Write note on spectrochemical series (156)
26. Calculate the CFSE value of $[Fe(H_2O)_6]^{3+}$ in high spin and low spin complexes. (157)
27. Calculate the CFSE value of $[Fe(CN)_6]^{3-}$ in high spin and low spin complexes. (158)
28. $[Sc(H_2O)_6]^{3+}$ is colourless – Explain. **M20 3M** (Explain about d-d transition) (159,160)
29. How are metal carbonyls classified based on the number of metal atom? (161)
30. How are metal carbonyls classified based on the structure? (161, 162)
31. Describe the nature of bonding in metallic carbonyls. (162) **M23 5M**
32. How can the stability of coordination complexes be interpreted? (163)
33. Define Labile, inert complexes. (163)
34. Explain the importance and application of coordination compounds (166)
35. Mention the metal complexes and its metal ions are used in biological system (167) **S20 3M**
36. Give one test to differentiate $[Co(NH_3)_5Cl]SO_4$ and $[Co(NH_3)_5SO_4]Cl$. **(BB) PTA 2M**

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

IMPORTANT MCQ UNIT 5 Coordination chemistry

1. According spectrochemical series which of the following ligand produces strongest field and cause maximum splitting? **PTA1 Pg 156**
      (a) F^- **b) CO**   c) H_2O d) Cl^-
2. Which statement is **incorrect? PTA2 Pg149**
      a) $[Ni(CO)_4]$ – Tetrahedral, Paramagnetic   b) $[Ni(CN)_4]^{2-}$ – square planner, diamagnetic
      c) $[Ni(CO)_4]$ – Tetrahedral, diamagnetic   d) $[Ni(Cl)_4]^{2-}$ – Tetrahedral, Paramagnetic
3. Which kind of isomerism is possible for a complex $[CO(NH_3)_4Br_2]Cl$? **PTA3**
      a) geometrical and Ionisation   b) geometrical and Optical
      c) Optical and Ionisation   d) Geometrical only
4. Co-ordination number of Ni in $[Ni(C_2O_4)_3]^{4-}$ is **PTA4**
      a) 3   **b) 6**   c) 4   d)2
5. Which of the following paramagnetic in nature? **PTA5**
      a) $[Zn(NH_3)_4]^{2+}$ b) $[CO(NH_3)_6]^{3+}$ **c) $[Ni(H_2O)_6]^{2+}$**   d) $[Ni(CN)_4]^{2-}$
6. Among the following complexes, which one shows Zero Crystal field stabilization energy (CFSE) is **PTA6**
      a) $[Mn(H_2O)_3]^{3+}$ **b) $[Fe(H_2O)_6]^{3+}$**   c) $[Co(H_2O)_6]^{2+}$ d) $[Co(H_2O)_6]^{3+}$
7. Match the following : **J20**
               (1) $[Ni(CO)_4]$ (i) Trigonal bipyramidal
               (2) $[Pt(NH_3)_4]^{2+}$ (ii) Octahedral

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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        (3) $[Fe(CO)_5]$ (iii) Tetrahedral

        (4) $[Co(NH_3)_6]^{3+}$ (iv) Square planar

    a) (1) – (ii); (2) – (iii); (3) – (iv); (4) – (i)   b) (1) – (iii); (2) – (i); (3) – (iv); (4) – (ii)

    c) (1) – (iii); (2) – (iv); (3) – (i); (4) – (ii)   d) (1) – (iv); (2) – (i); (3) – (ii); (4) – (iii)

8. A magnetic moment of 1.73B will be shown by one among the following: **J20**

   a) $[Cu(NH_3)_4]^{2+}$ b) $[Ni(CN)_4]^{2-}$ c) $TiCl_4$ d) $[CoCl_6]^{4-}$

9. Fac-mer isomerism is shown by **S20**

   a) $[Co(en)_3]^{3+}$ b) $[Co(NH_3)_4Cl_2]^+$ **c) $[Co(NH_3)_3Cl_3]$**   d) $[Co(NH_3)_5Cl]SO_4$

10. In $K_4[Fe(CN)_6]$, the co-ordination number of Fe^{2+} is _____. **A21**

   a) 4   b) 2   c) 3   **d) 6**

11. A complex in which the oxidation number of the metal is zero is: **M22 BB**

a) $K_4[Fe(CN)_6]$ b) $[Fe(CN)_3(NH_3)_3]$ **c) $[Fe(CO)_5]$**   d) Both (b) and (c)

12. An example for double salt: **J22 Pg 131**

   a)$FeSO_4$ **b) $FeSO_4(NH_4)_2SO_4.6H_2O$**   c) $K_4[Fe(CN)_6]$ d) $K_2SO_4.2H_2O$

13. A magnetic moment of 1.732 BM will be shown by one among the following: **M23 BB**

   a)$[CoCl_6]^{4-}$ b)$TiCl_4$ **c)$[Cu(NH_3)_4]^{2+}$**   d)$[Ni(CN)_4]^{2-}$

14. How many geometrical isomers are possible for $[Pt(Py)(NH_3)(Br)(Cl)]$? **J23 BB**

(a) 3   (b) 4   (c) 0   (d) 15

PHYSICAL CHEMISTRY
LESSON 9 ELECTROCHEMISTRY

M2020	J2020	S2020	A2021	M2022	J2022	M2023	J2023	
8	6	8	8	9	8	9	4	

1. 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**

2. Define molar conductivity. (36)

3. Define molar conductance and specific conductance How they are related? (36) **PTA5M i**

4. Define Equivalent conductance. (37) **A21 2M**

5. What are the factors affecting electrolytic conductance.(37) **A21 2M, M22 3M**

6. Explain measurement of conductivity of ionic solutions.(38)

7. Why is AC current used instead of DC in measuring the electrolytic conductance? (38) (BBQ$_{11}$66) **PTA 5Mii**

8. Explain variation of molar conductivity with concentration.(39)

9. Write Debye – Huckel and Onsager equation for a uni-univalent electrolyte. (41) **GM 5M ii**

10. State Kohlrausch's law and applications. (41) **J20 5MARK, GM 5Mii**

11. Describe the construction of Daniel cell and write its cell reaction. **(45) G3M**

12. What is the role of salt bridge in Galvanic cell? (46) **PTA5M ii**

13. What are the conventions used in Galvanic cell notation. (46) **PTA 5M i**

14. Write note on standard hydrogen electrode(SHE). (48)**PTA3 3M & PTA5 5M i**

15. Explain Thermodynamics of cell reactions. (50)

16. Derive Nernst equation. (51) **S20 5M, M22 5M, J22 5M**

17. Explain Electrolytic cell and electrolysis. (53)

18. State Faraday's law of electrolysis First law, Second law. (54) **A21 3M, GM 3M, M23 3M**

E.MUTHUSAMY MS$C_{(Che)}$., MS$C_{(Psy)}$., 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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19. 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**

20. Write note on Leclanche cell. (56)

21. Write note on Mercury button cell. (57)

22. Write note on secondary batteries. (58)

23. Write note on fuel cell. (59)

24. Explain electrochemical mechanism of corrosion (60)

25. Write note on Electrochemical series.(62)

26. What are electrochemical series? How is it useful to predict corrosion?(62) **PTA3M**

27. How are metals protected from corrosion by cathodic protection method? (61) **M20 3M**

28. The reaction $Zn(s) + Co^{2+} \leftrightarrow Co(s) + Zn^{2+}$ occurs in a cell. Compute the standard emf of the cell. Given that $E°_{Zn/Zn2+} = +0.76V$ and $E°_{Co/Co}^{2+} = +0.28V$. **PTA2MC**

29. Reduction potential of two metals M_1 and M_2 are $E°_{M_1^{2+}/M_1} = -2.3$ V and $E°_{M_2^{2+}/M_2} = 0.2$ V. Predict which one is better for coating the surface of iron. Given: $E°_{Fe^{2+}/Fe} = -0.44$ V (BBQ$_{17}$66) **PTA5M ii, J23 3M**

30. Is it possible to store copper sulphate in an iron vessel for a long time? Given $E°_{Cu^{2+}/Cu} = 0.34$ V and $E°_{Fe^{2+}/Fe} = -0.44$V (BBQ$_{15}$66) **PTA2M**

31. Calculate $\Lambda°$ CH$_3$COOH using appropriate molar conductance of the electrolytes listed below at infinite dilution at 25°C (BBQ$_5$63) **PTA5M i**

Electrolyte	NaCl	HCl	CH$_3$COONa
$\Lambda°$ (S cm^2 mol^{-1})	126.5	426.2	91.0

32. The equivalent conductance of M/36 solution of a weak monobasic acid is 6 mho cm^2 equiv^{-1} and at infinite dilution is 400 mho cm^2 equiv^{-1}. Calculate the dissociation constant of this acid. (BBQ$_{17}$64) **PTA2MC**

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

UNIT 9 Electrochemistry MCQ

1. While charging the lead storage battery _____. **PTA1**
   (a) PbSO$_4$ on anode is reduced to Pb   b) PbSO$_4$ on anode is oxidized to PbO$_2$
   c) PbSO$_4$ on cathode is reduced to Pb   d) PbSO$_4$ on cathode is Oxidised to Pb

2. The number of electrons that have a total charge of 965 colombs is ___. **PTA2**
   a) 6.022×10^{25} b) 6.022×10^{26} c) 6.022×10^{22} **d) 6.022×10^{21}**

3. Which of the following statement is not correct with respect to electrolytic conductance? **PTA3**
   a) Conductivity increases with the decreases in Viscosity
   b) Conductivity increases with increase in temperature
   c) Molar conductance of a solution decreases with increase in dilution
   d) Conductance decreases with increase in temperature

4. Faradays Constant is defined as **PTA4**
   a) Charge carried by one electron   b) Charge carried by 6.22×10^{10} electrons
   c) Charge required to deposit one mole of substance
   d) Charge carried by one mole of electrons.

5. Which of the following is Secondary Cell? **PTA5**

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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a) Laclanche cell   **b) lithium ion battery**   c) Mercury button Cell   d) both (a) and (c)

6. The general representation of a fuel cell is **PTA6**
   a) Fuel / Electrode / Electrolyte / electrode / Oxidant b) Oxidant / Electrode / Electrolyte / Electrode / Reductant   c) Fuel / Electrode / Electrolyte / Electrode/ Reductant
   d) Oxidant / Electrode / Electrolyte / Electrode / reductant

7. Laptops have: **M20**
   a) Lead storage battery b) Fuel cell   c) Mercury button cell   **d) Lithium-ion battery**

8. In $H_2 - O_2$ fuel cell, the reaction occurs at cathode is: **J20**
   a) $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$ b) $H^+ + e^- \rightarrow \frac{1}{2} H_2$
   c) $O_{2(g)} + 2H_2O_{(l)} + 4e^- \rightarrow 4OH^-_{(aq)}$ d) $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$

9. The number of electrons that have a total charge of 9650 Coulombs is: **A21, J23**
   a) 6.022×10^{22} b) 6.22×10^{23} c) 6.022×10^{-34} d) 6.022×10^{24}

10. Faraday constant is defined as: **M22**
    a) Charge required to deposit one mole of substance   b) Charge carried by 1 electron
    c) Charge carried by 6.22×10^{10} electrons **d) Charge carried by one mole of electrons**

11. How many Faradays of electricity are required for the following reaction to occur?
    $MnO_4^- \rightarrow Mn^{2+}$ **M20, J22**
    a) **5F**   b) 3F   c) 1F   d) 7F

12. The emf of standard hydrogen electrode (SHE) is____   **M23**
    a)-1.0   **b)0**   c)1.1   d)+1.0

LESSON 10 SURFACE CHEMISTRY

M2020	J2020	S2020	A2021	M2022	J2022	M2023	J2023	
8	7	8	9	12	9	9	11	

1. Define adsorption and absorption. (70)
2. Characteristics of adsorption. (71) **PTA 2M**
3. Distinction between chemical and physical adsorption. (71) **PTA 5Mi**
4. Give two important characteristics of physisorption. **(71) J23 2M**
5. Explain Factors affecting adsorption. (72)
6. Write note on Adsorption and isobars. (73)
7. Explain Freundlich adsorption isotherm and limitations. (73)
8. Explain applications of adsorption. (75)
9. Define catalyst and catalysis. (77)
10. Define positive catalysis. (77)
11. Define homogenous catalysis & example (77) **M22 3M**
12. Define heterogeneous catalysis & example (77) **J22 3M**
13. What are the characteristics of catalysis? (78) **J20 5MARK, PTA 5Mi, M22 5M**
14. Define promoters, catalytic poison with suitable example (79) **PTA 2M M23 2M**
15. Define auto catalysis and example (79)
16. Identify the auto catalyst in the following reaction. (79) **J20 5Mi**
    A)$CH_3COOC_2H_5 + H_2O \rightarrow CH_3COOH + C_2H_5OH$ B) $2AsH_3 \rightarrow 2As + 3H_2$
17. Define negative catalysis and example (79)
18. Explain intermediate compound formation theory of catalysis with an example & limitations. (80) **GM 5Mi J23 5M**

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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19. Explain adsorption theory of catalysis. (81) **A21 5MARK J22 5M**

20. What is the role of adsorption in the heterogeneous catalysis? (81) **PTA 3M**

21. What are active centres? (82) **PTA 2M**

22. Define, Mechanism, characteristics of Enzyme Catalysis. (83)

23. Explain Zeolite catalysis.(84)

24. What is Nano Catalysis? Give example.(86)**GM 5M i**

25. Define colloid & particle size.(86)

26. Define dispersed phase and dispersing medium. (86)

27. Define lyophilic colloids & example(87)

28. Define lyophobic colloids & example (87)

29. Why are lyophilic colloidal sols are more stable than lyophobic colloidal sols? (87) **J23 3M**

30. Explain the classification of colloids based on the physical state.(87)

31. Write the dispersed phase and dispersion medium of butter. (88) **M20 2MARK**

32. Write note on preparation of Colloids- mechanical dispersion.(88)

33. Write note on preparation of Colloids- electro dispersion.(89)

34. Write note on preparation of Colloids- Ultrasonic dispersion.(89)

35. 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.)

36. Write any three condensation methods of preparation of colloids. (Chemical method) (90) **PTA5M i**

37. What happens when hydrogen sulphide gas is passed through a solution of arsenic oxide? Name the chemical method. (90) **PTA 2M**

38. Write note on Dialysis. (91)

39. Write note on Electrodialysis. (91)

40. Write note on Ultrafiltration. (91) **GM5Mii**

41. Mention the shapes of the following colloidal particles. (93) **M20 3MARK**
    i) As_2S_3 ii) Blue gold sol   iii) Tungstic acid sol

42. Define Tyndall effect. (93) **J20 2M**

43. Define Brownian movement. (94)

44. What is the significance of Brownian movement? (94) **PTA 5M ii**

45. Write note on Helmholtz double layer. (94) **PTA 3M M23 3M**

46. Explain Electrophoresis. (94) **PTA 5Mi, M22 2M**

47. Define electroosmosis. (95)

48. Define coagulation. Various method of coagulation. (96)

49. What is flocculation value? (96) **PTA 2M**

50. Define Gold number.(96)

51. Explain types, identification of Emulsions. (97)

52. What is inversion of phase? Give an example. (98) **S20 3M**

53. Explain various application of colloids (98)

54. How colloids are used in tanning of leather and in Rubber industry? **M23 5Mii**

& Revise Book Back (Evaluation) Question Answer

UNIT 10 surface chemistry   MCQ

1. Which one of the following correctly method? **PTA 1**
    a) Emulsion   -   Paint
    b) Liquid   -   Milk

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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c) Foam   -   Pumiee stone
d) Gel   -   Butter

2. Which of the following is incorrect? **PTA2**
    a) Enzymes can be inhibited(poisoned)
    b) Catalytic activity of enzymes is decreased by coenzymes
    c) Enzyme catalysis is highly specific in nature
    d) The rate of enzyme catalyzed reactions varies with the pH of the system

3. For Freundlich isotherm a graph of $\log \frac{x}{m}$ is plotted against log p. The slope of the line and its y- axis intercept respectively corresponds to **PTA3**
    a) $\frac{1}{n}$, k   b) $\log \frac{1}{n}$, k   **c) $\frac{1}{n}$, log k**   d) $log \frac{1}{n}$, log k

4. Which one of the following is negatively charged colloid? **PTA4**
    a) arsenic sulphide   b) Ferric hydroxide   c) Haemoglobin   d) Basic dyes

5. The blue colour of the sky in nature is due to_____ **PTA5**
    a) Electrophoresis of sol particles   b) Brownian movement
    c) Tyndall effect   d) Deemulsification

6. The change of W/O emulsion in to O/W emulsion is called_____. **PTA6**
    a) Coagulation b) Emulsification   c) Decomposition   **d) Inversion of phase**

7. The mechanism proposed for the enzyme catalysis reaction is: **J20**
    a) P + E → E + S ⇌ ES   **b) E + S ⇌ ES → P + E**
    c) ES ⇌ P + E → E + S   d) E +S → ES ⇌ P + E

8. When $\Delta S < 0$ and $T\Delta S$ is negative **S20**
    a) adsorption is exothermic   b) absorption is exothermic
    c) adsorption is endothermic d) absorption is endothermic

9. Match the following : **A21**
    (1) Emulsion   (i) Whipped Cream
    (2) Gel   (ii) Ink
    (3) Foam   (iii) Cream
    (4) Sol   (iv) Butter
    a) (1) – (iv), (2) – (iii), (3) – (ii), (4) – (i) b) (1) – (iii), (2) – (i), (3) – (ii), (4) – (iv)
    c) (1) – (iii), (2) – (i), (3) – (iv), (4) – (iii) **d) (1) – (iii), (2) – (iv), (3) – (i), (4) – (ii)**

10. The phenomenon observed when a beam of light is passed through a colloidal solution is: **A21, J22**
    a) Coagulation b) Cataphoresis   **c)Tyndall effect**   d) Electrophoresis

11. Which one of the following is an example for homogenous catalysis? **M22**
a) Hydrogenation of oil   b) Manufacture of ammonia by Haber's process
    c) Hydrolysis of sucrose in presence of dil.HCl
    d) Manufacture of sulphuric acid by Contact Process

1. Fog is colloidal solution of: **M22**
a) **Liquid in gas**   b) Solid in gas   c) Gas in liquid   d) Gas in gas

2. What one is correctly matched **M23**
    a)Foam   -   mist
    b)Emulsion -   smoke
    c)Sol   -   whipped cream
    d)Gel   -   butter

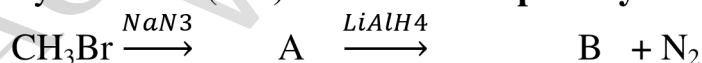19. Adsorption of a gas on solid metal surface is spontaneous and exothermic, then: **J23**

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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(a) ΔH increases (b) ΔS increases (c) ΔG increases (d) ΔH decreases

ORGANIC CHEMISTRY

LESSON 13 Organic Nitrogen Compounds

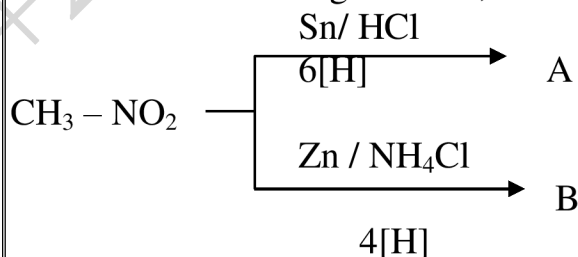| M2020	J2020	S2020	A2021	M2022	J2022	M2023	J2023	
8	6	8	8	8	9	8	9	

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**
3. Acidic nature of nitro alkanes.(200)
4. How will you prepare oil of mirbane? (201)
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**
16. Hofmann-Mustard oil reaction. (216)
    (How will you prepare phenyl mustard oil?)
17. How does aniline react with Br_2/H_2O (Bromination of aniline)? (217) **J22 5Mi**
18. Why aniline does not undergo Fridel Crafts reaction. (218)**J20 2M**
19. Identify A and B. (208) **M20 5Mii**

$$A \xrightarrow[4[H]]{Na(Hg)/C_2H_5OH} CH_3 - CH_2 - NH_2$$

$$B \xrightarrow[4[H]]{Na(Hg)/C_2H_5OH} CH_3 - NH - CH_3$$
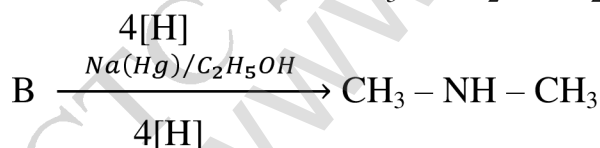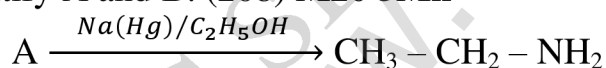
20. Identify A and B. (208) **M22 2M Compulsory**

$$CH_3Br \xrightarrow{NaN3} A \xrightarrow{LiAlH4} B + N_2$$

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

$$CH_3 - NO_2 \begin{cases} \xrightarrow[6[H]]{Sn/ HCl} A \\ \xrightarrow[4[H]]{Zn / NH_4Cl} B \end{cases}$$

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

$$C_6H_5-NO_2 \begin{cases} \xrightarrow{Sn/HCl} A \\ \xrightarrow{Zn/NH_4Cl} B \\ \xrightarrow{Zn/NaOH} C \end{cases}$$
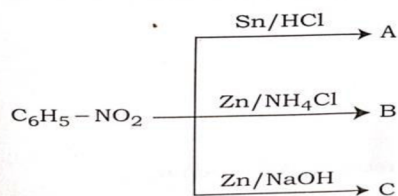
23. $CH_3CH_2NO_2 \xrightarrow{Sn/HCl} A \xrightarrow{CH3COCl} B$. **M23 2M COMPULSORY**

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.

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 pKb 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

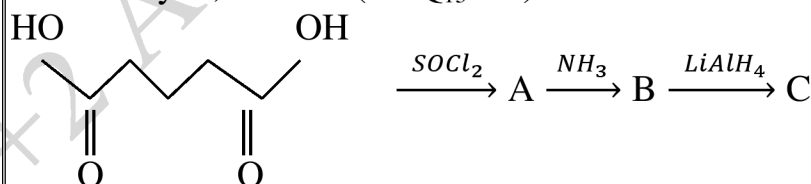28. How the following conversion are effected? **PTA5M**
   (i) Nitro benzene → N – phenyl hydroxyl amine (203)
   (ii) Propanamide → Propan – 1 – amine (209)
   (iii) Aniline → p – nitroaniline (218)

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
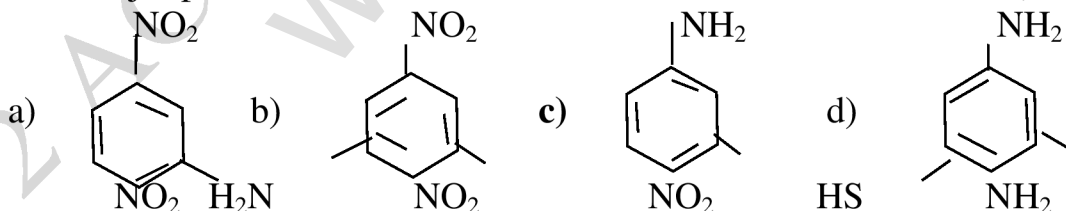   iii) Amines are more basic than amides.

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**

$$\text{HO}\overset{OH}{\underset{O \quad\quad O}{\diagdown\diagup\diagdown\diagup}} \xrightarrow{SOCl_2} A \xrightarrow{NH_3} B \xrightarrow{LiAlH_4} C$$

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**

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

$$CH_3CH_2Br \xrightarrow{NaN3} A \xrightarrow{LiAlH4} B + N_2$$
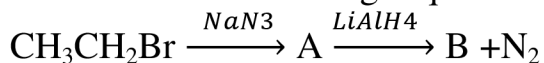
36. Write a note on Sabatier – mailhe method?(210) **PTA 2M**

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

$$CH_3CH_2NC \xrightarrow{HgO} A \xrightarrow{H_2O} B \xrightarrow[HCl]{NaNO_2/H2O} C$$
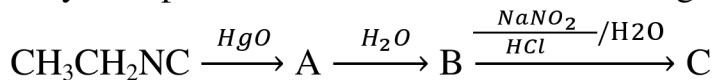
38. Write the uses of nitroalkanes. (228) **PTA 5M ii**

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

$$C_6H_5NO_2 \xrightarrow{Fe/HCl} A \xrightarrow{HNO3/273k} B \xrightarrow{H2O} C$$
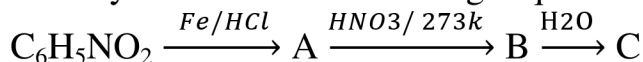
40. Identify Compounds A, B and C in the following sequence of reaction(203,215,222) **J23 3MC**

$$C_6H_5NO_2 \xrightarrow{Sn/HCl} A \xrightarrow{NaNO2+HCl/273k} B \xrightarrow{C6H5OH} C$$
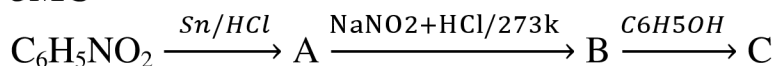
41. write short notes on **GM 5M** a)Mustard oil reaction (216) b)Carbylamines reaction (216) c)Gabriel pthalamide synthesis. (209)

LESSON-13 NAME REACTION

1. Chloropicrin (203)
2. Mendius reaction (208)
3. Gabriel phthalimide systhesis(209)
4. Hoffmanns ammonolysis(209)
5. Sabatier –Mailhe method(210)
6. Schotten –baumann reaction(214,215) **M23 2m complete reaction J23 5Mi**
7. Libermanns nitroso test(215)
8. Carbylamine reaction(216)
9. Mustard oil reaction(216) **J23 5Mi**

10. Gattermann reaction(220)
11. sandmeyer reaction(220)
12. Baltz –schiemann reaction(221)
13. Gomberg reaction(221)
14. Coupling reaction(222)
15. Condesation reaction- Thorpe nitrile condensation (225) **M23 5Mii**
16. Carbylamins reaction(226)
17. Levine and hauser acetylation(225)

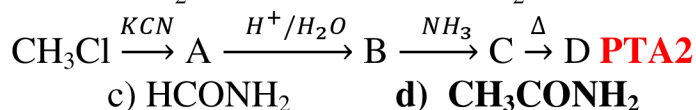## UNIT 13 Organic Nitrogen compounds   MCQ

1. Identify X in the following sequence of reaction **PTA1**

$$C_4H_7OCl \xrightarrow{NH_3} C_4H_9ON \xrightarrow{Br_2, KOH} CH_3CH_2CH_2NH_2$$
(X)
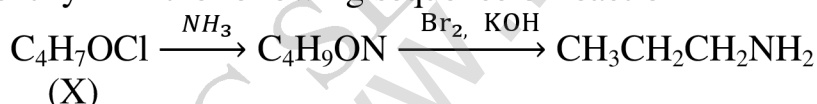
a) $(CH_3)_2CHCOCl$ b) $CH_3CH_2CH(OH)CH_2Cl$

c) $CH_3CH_2CH_2COCl$ d) $ClCH_2CH_2CH_2CHO$

2. The major product of the reaction between m-dinitrobenzene with $(NH_4)_2S_x$ is ____. **PTA1**

a) NO$_2$ ... NO$_2$ b) NO$_2$ ... H$_2$N ... NO$_2$ **c)** NH$_2$ ... NO$_2$ d) NH$_2$ ... HS ... NH$_2$ ... NH$_2$

3. The product 'D' of the reaction $CH_3Cl \xrightarrow{KCN} A \xrightarrow{H^+/H_2O} B \xrightarrow{NH_3} C \xrightarrow{\Delta} D$ **PTA2**

a) $CH_3CH_2NH_2$ b) CH_3CN c) $HCONH_2$ **d) CH_3CONH_2**

4. Two molecules of propannitrile in the presence of Na/Ether to form 3-imino-2- ethylpentane nitrile. This reaction is known as **PTA3**
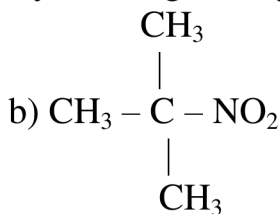
a) Baltz –schiemann   **b) Thorpe nitrile condensation**

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
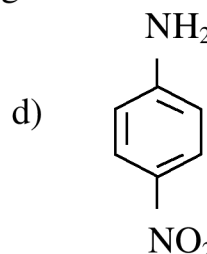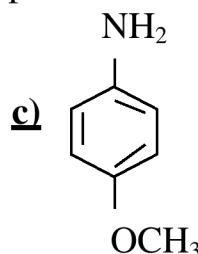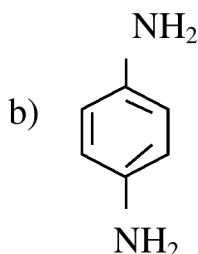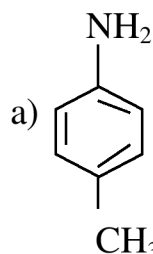
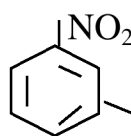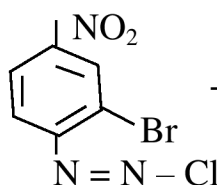**ACTC   ADVANCED CHEMISTRY TUITION CENTRE, NAGERCOIL, KK DIST 9940847892**

c) Gomberg reaction   d) Schotten – Baumann reaction

5. Nef carbonyl synthesis given by **PTA4**

a) C₆H₅CHO   b) $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - NO_2$ c) $C_6H_5CH_2NO_2$ d) All of these

6. Which one of the following compounds is a strong base? **PTA5**

a) [aniline with CH₃ para]   b) [aniline with NH₂ para]   **c)** [aniline with OCH₃ para]   d) [aniline with NO₂ para]

7. [structure with NO₂, Br, N=N–Cl] $\xrightarrow{A}$ [structure with NO₂, Br]   'A' is

   a) **H₃PO₂ and H₂O**   b) H^+ / H_2O c) $HgSO_4/H_2SO_4$ d) Cu_2Cl_2 **PTA6**

8. Which one of the following is most basic? **M20**

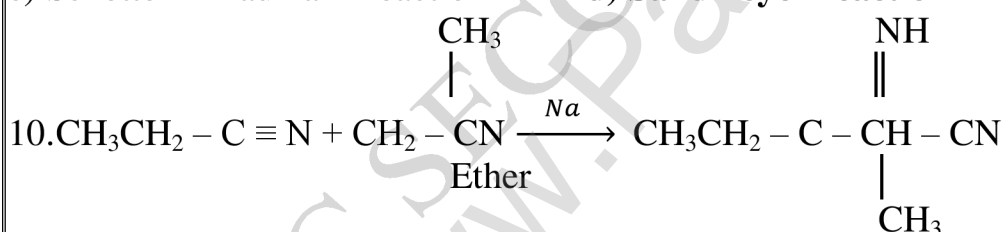   a) 2, 4-dibromo aniline b) 2, 4-dichloro aniline **c) 2, 4-dimethyl aniline** d) 2, 4-dinitro aniline

9. $C_6H_5 - N_2Cl \xrightarrow{Cu_2Cl_2/ HCl} C_6H_5 - Cl + N_2$ this reaction is known as: **J20**

a) Gattermann reaction   b) Gomberg reaction

c) Schotten – Baumann reaction   **d) Sandmeyer reaction**

10. $CH_3CH_2 - C \equiv N + CH_2 - CN \xrightarrow[\text{Ether}]{Na} CH_3CH_2 - \underset{}{\overset{\overset{NH}{\|}}{C}} - \underset{\underset{CH_3}{|}}{CH} - CN$ **S20**

The above reaction is

   a) **Thorpe nitrile condensation**   b) Levine and Hauser acetylation

   c)   Lederer-Manasse reaction   d) Aldol condensation

11. IUPAC name for the amine $H_2N - CH_2 - (CH_2)_4 - CH_2 - NH_2$ **A21**

   a) Heptane – 1, 7 – diamine   b) Hexamethylene diamine

   c) Hexane – 1, 6 – amine   **d) Hexane – 1, 6 – diamine**

12. Which of the following reagent can be used to convert nitrobenzene to aniline? **M22**

a) ZnHg / NaOH   b) Zn / NH₄Cl   **c) Sn / HCl**   d) All of these

13. Aniline + benzoyl chloride $\xrightarrow{NaOH} C_6H_5 - NH - COC_6H_5$. This reaction is known as: **J22**

a) Friedel – Crafts reaction b) HVZ reaction **c) Schotten – Baumann reaction** d) Kolbe's reaction

14. The product formed by the reaction of an aromatic aldehyde with primary amine is: **M23**

      a) Schiff's base   b) Carboxylic acid   c) Ketone   d) Aromatic acid

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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15. Secondary nitro alkanes react with nitrous acid to form: **J23**

(a) Red colour Solution   **(b) Blue colour Solution** (c) Green colour Solution (d) Yellow colour Solution

"NO PAIN, NO GAIN".

Never Dreamed about success, Worked for it.

"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: E. MUTHUSAMY

Email: actcnagercoil@gmail.com

Facebook: Actc Tuition Centre Nagercoil

Instagram: actc_chemistry_tuition_centre

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

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SECOND MID TERM EXAM -2023

CLASS: XII   TIME : 1.30HRS
SUB: CHEMISTRY   MARKS :35

PART-I   CHOOSE THE CORRECT ANSWER   **8 x 1 =8**

1. Zinc can be coated on iron to produce galvanized iron but the reverse is not possible. It is because
   a) Zinc is lighter than iron   b) Zinc has lower melting point than iron
   c) Zinc has lower negative electrode potential than iron
   d) Zinc has higher negative electrode potential than iron

   2. Which of the following electrolytic solution has the least specific conductance
   a) 2N   b) 0.002N   c) 0.02N   d) 0.2N

   3. IUPAC name of the complex is $K_3[Al(C_2O_4)_3]$ is____
   a) potassiumtrioxalatoaluminium(III)   b) potassiumtrioxalatoaluminate(II)
   c) potassiumtrisoxalatoaluminate(III)   d) potassiumtrioxalatoaluminate(III)

   4. $[Co(en)_2Cl_2]Cl$ coordination number is _____
   a) 4   b) 6   c) 2   d)1

   5. $[Ni(CO)_5]$ complex geometry is _____
   a) Linear   b) Trigonal planar   c) Tetrahedral   d) Octahedral

   6. Which one of the following is not strong ligand
   a) Cl   b) CN^- c) NH_3 d) CO

   7. Which one of the following is most basic?
   a) 2,4 – dichloroaniline   b)2,4- diethylamine c) 2,4 – dimethyl aniline d) 2,4 – dinitroaniline

   8. When aniline reacts with acetic anhydride the product formed is
   a) o – aminoacetophenone. b) m-aminoacetophenone c) p – aminoacetophenone. d) acetanilide

PART-II ANSWER THE FOLLOWING NOTE: QUESTION NO : 14 IS COMPULSORY   4 x 2 =8

9. Homogeneous and heterogenous catalysis.
10. In an octahedral crystal field draw the figure to show splitting of d orbitals
11. Define anode and cathode
12. Give any two difference between double salt and coordination compound
13. Mention any two factors that affect electrolytic conductance
14. How is chloropicrin prepared ?

PART-III ANSWER THE FOLLOWING NOTE : QUESTION NO : 19 IS COMPULSORY   3 x 3 =9

15. Explain postulates of VB theory ?
16. Difference between chemical adsorption and physical adsorption.
17. $[Ni(CO)_4]$ diamagnetic, explain using VB theory
18. i)write short note on Gabriel phthalimide synthesis?
       ii)Why PKb of aniline is more than ethylamine?
19. Ionic conductance at infinite dilution of Al_{3+} and SO_4 2- 189 and 160 mho cm^2 equivalent calculate the equivalent and molar conductance of the electrolyte $Al_2(SO_4)_3$ at infinite dilution.

PART-IV   ANSWER ALL THE QUESTIONS 2 x 5 = 10

   20. A) write the postulates of Werner's theory & limitation. OR
       b) Explain adsorption theory.
   21. A)i)Derive an expression for Nernst equation(3)
       ii)What are the conversion used Galvanic cell notation? (2) OR
b)How will you distinguish between primary, secondary and tertiary aliphatic amines. (5)

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

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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2MD

12 - Std

Second Mid Term Test - 2022

Chemistry

Time : 1.30 hrs.

Marks : 35

I   Choose the best answer.   10 X 1 = 10

1.   Oxidation state of Iron and the charge on the ligand NO in $[Fe(H_2O)_5 NO]SO_4$ are

    a) +2 and 0 respectively

    b) + 3 and 0 respectively

    c) + 3 and - 1 respectively

    d) +1 and +1 respectively

2.   Fac-mer isomerism is shown by

    a) $[CO(en)_3]^{3+}$

    c) $[CO(NH_3)_4 Cl_2]^+$

    b) $[CO(NH_3)_3 Cl_3]$

    d) $[CO(NH_3)_5 Cl]SO_4$

3.   Which of the following electrolytic solution has the least specific conductance

    a) 2N   b) 0.002N   c) 0.02N   d) 0.2N

4.   Assertion : Pure iron when heated in dry air is converted with the layer of rust.

    Reason : Rust has the composition Fe_3O_4.

    a) both assertion and reason are true and reason is the correct explanation of assertion.

    b) both assertion and reason are true but reason is not the correct explanation of assertion.

    c) assertion is true but reason is false.

    d) both assertion and reason are false.

5.   Statement : To stop bleeding from an injury, ferric chloride can be applied. Which comment about the statement is justified?

    a) It is not true, ferric chloride is a poison.

    b) It is true, Fe^{3+} ions coagulate blood which is a negatively charged sol.

    c) It is not true, ferric chloride is ionic and gets into the blood stream.

    d) It is true. Coagulation takes place because of formation of negatively charged sol with Cl.

6.   Which are the following is correctly matched?

    a) Emulsion   -   Smoke

    b) Solid sol   -   Pearls

    c) Foam   -   Mist

    d) Whipped cream   -   Sol

7.   Nano bi metallic catalyst have

    a) Zero valent State

    b) Monovalent State

    c) Bivalent State

    d) Trivalent State

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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8. When aniline reacts with acetic anhydride the product formed is

    a) o - aminoacetophenone   b) m - amino acetophenone

    c) p - aminoacetophenone   d) acetanilide

9. Which one of the following is most basic?

    a) 2,4 di chloro aniline   b) 2,4 - dimethyl aniline

    c) 2,4 - di nitro aniline   d) 2,4 - di bromo aniline

10. $CH_3 - NC + 4 [H] \xrightarrow[Ni/H_2]{Na/C_2H_5OH} ?$

    a) Amide   b) Primary amine   c) Secondary amine   d) Tertiary amine

II   Answer any three of the following and Q.No. 15 is compulsory.   3 X 2 = 6

11. Classify the following ligand based on the number of donor atoms.

    a) NH_3 b) en   c) OX^{2-} d) pyridine.

12. State Kohlrausch law.

13. What do you mean by the term Promoter? Give an example.

14. List any two differences between physisorption and chemisorption.

15. Write any two electrophilic substitution reactions of nitro benzene.

III   Answer any three of the following questions.   3 X 3 = 9

    (Q.No. 20 is compulsory)

16. Write the postulates of Werner's theory. (3 points)

17. What are hydrate Isomers? Explain with an example.

18. List down the various steps involved in a heterogeneous catalysed reaction based on Langmair adsorption theory.

19. Write short notes on i) Hofmann's bromamaide reaction   ii) Carbylamine reaction.

20. Calculate the standard emf of the $Cd|Cd^{2+}||Cu^{2+}|Cu$ and determine the cell reaction. The standard reduction potentials of $Cu^{2+}|Cu$ and $Cd^{2+}|Cd$ are 0.34V and -0.40volts reproductively. Predict the feasibility of the cell reaction.

IV   Answer all the following.   5 X 2 = 10

21. a) Derive an expression for Nernst equation. *(OR)*

    b) Based on VB theory explain why $[NiCN_4]^{2-}$ is diamagnetic, while $[Ni(Cl)_4]^{2-}$ is paramagnetic .

22. a) Explain : i) Electrophoresis. (3)   ii) Ultrafiltration. (2)   *(OR)*

    b) (i) How will you distinguish primary, secondary and tertiary aliphatic amines. (3)

       (ii) Why Aniline does not undergo Friedal - Crafts reaction. (2)

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**