

INORGANIC CHEMISTRY -II (33CT22)

SECTION – A

Answer ALL questions

(5 x 1 = 5)

- Identify the chiral complexes from the following: (CO1)
(A) $[\text{Cr EDTA}]^-$; (B) $[\text{Ru}(\text{bipy})_3]^{3+}$; (C) $[\text{PtCl}(\text{diene})]^{4-}$
(a) A only (b) A and B only (c) A and C only (d) B and C only
- Among H_2O , NH_3 , CO and F^- , the ligand that stabilizes the low oxidation state of W is --- (CO2)
(a) H_2O (b) NH_3 (c) CO (d) F^-
- The number of microstates for d^2 -electron configuration is (CO3)
(a) 35 (b) 45 (c) 55 (d) 65
- In the dissociative mechanism of octahedral complexes, the more stable intermediate formed is (CO4)
(a) square planar (b) square pyramidal (c) prismatic (d) trigonal pyramidal
- The +3 ion of which one of the following has half filled 4f sub-shell (CO5)
(a) La (b) Lu (c) Gd (d) Ac

SECTION – B

Answer any FIVE questions

(5 x 2 = 10)

- Give example for ionization, hydrate, linkage and coordination isomerism (any one example for each) (CO1)
- The spin only magnetic moments of $\text{K}_3[\text{Fe}(\text{ox})_3]$ and $\text{K}_3[\text{Ru}(\text{ox})_3]$ are 5.91 BM and 1.73 BM respectively. Write down their ligand field electronic configurations. (CO2)
- Which of the following should have comparatively more intense d-d transition? (CO3)
 $\text{Ni}(\text{CO})_4$ or $\text{Fe}(\text{CO})_5$
- Identify the ground state term symbols for d^5 state (Both HS and LS) (CO3)
- Distinguish between inert and labile complexes. (CO4)
- Why does separation of lanthanides is difficult? (CO5)
- Tell the electronic configuration for the following atoms Ce^{3+} , Eu^{3+} , Gd^{3+} and Lu^{3+} . (CO5)

SECTION – C

Answer any THREE questions

(3 x 5 = 15)

- Provide the IUPAC name / formula / structure of the following: (CO1)
(i) $\text{K}_2[\text{Pd}(\text{ONO})(\text{NCS})\text{Cl}_2]$ (ii) $[\text{Co}(\text{OH})(\text{py})_2(\text{N}_2)_2]\text{Cl}_2$ (iii) $[\text{Pt}(\text{NH}_2\text{NH}_3)(\text{NO})\text{Cl}_2]^+$
(iv) Trans-diamminetetraisoithiocyanatochromate (III) (v) octa-ammine- μ -hydroxodicobalt(III) ion
- The magnetic moment of $[\text{Mn}(\text{H}_2\text{O})_6](\text{NO}_3)_2$ is approximately 6.0 BM. Find the number of unpaired electrons. Show the crystal field splitting and calculate the CFSE. (CO2)
- Explain the reasons of broadening of absorption bands in the electronic spectra of metal complexes. (CO3)
- Define trans effect, with utility suggest for the preparation of three isomers of $[\text{Pt}(\text{NH}_3)(\text{py})(\text{Cl})(\text{Br})]$. (CO4)
- Illustrate the consequences of lanthanide contraction. (CO5)

SECTION – D

Answer any TWO questions

(2 x 10 = 20)

- (i) Discuss the molecular orbital diagram of $[\text{Co}(\text{NH}_3)_6]^{3+}$. (6 mark) (CO2)
(ii) Assume the complex of $[\text{Ni}(\text{PPh}_3)_2(\text{SCN})_2]$ is paramagnetic. The analogous complex of Pd (II) is diamagnetic. Draw all the probable isomers for both the complexes considering SCN^- is an ambidentate ligand. (4 mark)
- (i) Explain the $\text{S}_\text{N}1$ (CB) mechanism of base hydrolysis and at very high concentration of OH^- ions its rate is independent of $[\text{OH}^-]$. (7 mark) (CO4)
(ii) The high spin d^4 complex ion $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ is labile but low spin d^4 complex ion $[\text{Cr}(\text{CN})_6]$ is inert. Explain (3 mark)
- (i) Explain why Ce^{3+} and Tb^{3+} are colourless but show strong absorption in UV region. (CO5)
(ii) Calculate magnetic moment (μ) in BM of Pm^{3+} with outer configuration $4f^4, 6s^2$

I M.Sc., CHEMISTRY

**Dept. of Chemistry
Vivekananda College
Tiruvadakam West
Date: 10.01. 2019**

**I Sessional Test
II Semester
Max. Marks: 50
Time: 2 Hours**

PHYSICAL CHEMISTRY - II (33CT23)

SECTION – A

Multiple choice questions:

(5 x 1 = 5)

1. A Variation method is ----- function (CO1)
(a) wave (b) trial (c) eigen (d) a & b
2. A pair of eigenvalues of the perturbed Hamiltonian, using first order perturbation theory, is (CO1)
(a) $3 + 2\varepsilon, 7 + 2\varepsilon$ (b) $3 + 2\varepsilon, +2 + \varepsilon$ (c) $3, 7 + 2\varepsilon$ (d) $3, 2 + 2\varepsilon$
3. Which of the following statements is correct about the principal moments of inertia of an XY molecule that lies on the A axis? (CO2)
(a) $I_A = I_B$ and $I_C = 0$ (b) $I_A = I_B = I_C$ (c) $I_A > I_B$ and $I_B = I_C$ (d) $I_A = 0$ and $I_B = I_C$
4. The difference between the incident and scattered frequencies in the Raman spectrum is called the (CO 3)
(a) Stokes line (b) Anti-Stokes line (c) Raman frequency (d) P-branch
5. A photochemical reaction takes place by the absorption of (CO 5)
(a) visible and UV radiations (b) IR radiations (c) heat energy (d) none of these

SECTION – B

Answer ANY FIVE questions

(5 x 2 = 10)

6. Why do we need to approximation method? (CO1)
7. Show Slater determinant wave function for Beryllium atom. (CO1)
8. Define Self consistent field. (CO1)
9. Which of the following molecules will show a pure microwave spectrum and why? (CO2)
i) H_2 ii) HCl iii) H_2O iv) CO
10. Define the following terms i) stokes Raman scattering ii) Rayleigh scattering (CO3)
11. Tell the selection rules for Radiationless transitions. (CO5)
12. Define bimolecular photophysical pathways. (CO5)

SECTION – C

Answer any THREE questions

(3 x 5 = 15)

13. List out the Slater rules to calculate the effective nuclear charge Z' (CO1)
14. Give an account of the Hartree – Fock self consistent field method. (CO1)
15. Discuss the classical theory of Raman spectroscopy. (CO3)
16. Classify the molecules on the basis of moment of inertia (CO2)
17. Discuss fluorescence and phosphorescence emission (CO5)

SECTION – D

Answer any TWO questions

(2 x 10 = 20)

18. Explain the theory and its application of variation method to helium atom (CO1)
19. Derive an expression for the rotational energy of a diatomic molecule taking it as a rigid rotator. (CO2)
Draw the rotational energy level diagram for such a molecule.
20. Explain the Jablonski diagram. (CO 5)

ORGANIC CHEMISTRY -IV (33CT41)

SECTION – A

Answer ALL questions

(5 x 1 = 5)

- Which of the following would react fastest with N-bromosuccinimide?
(a) Benzene (b) Methane (c) Pyridine (d) Toluene
- On treatment of benzopyrrole with pyridine-SO₃ at 50° C gives
(a) Indole-2-sulphonic acid (b) Indole-3-sulphonic acid
(c) Indole-6-sulphonic acid (d) Indole-8-sulphonic acid
- The total number of dissimilar symmetric carbon atoms in cholesterol are
(a) 6 (b) 7 (c) 8 (d) 9
- Any molecule which acts directly on an enzyme to lower its catalytic rate is called
(a) Regulator (b) Repressor (c) Inhibitor (d) Moderator
- The number of OH groups, angular methyl groups and double respectively present in cholesterol
(a) 1,1 and 1 (b) 1,2 and 2 (c) 2,1 and 1 (d) 1,2 and 1

SECTION – B

Answer any FIVE questions

(5 x 2 = 10)

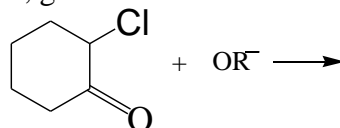
- Why N-alkyl substituted amides do not undergo Hoffmann rearrangement?
- How aldehydes can be prepared by allylic alcohols using ene reaction?
- What happens when benzofuran is treated with POCl₃ and DMF?
- Write any one medicinal use of benzopyrrole.
- What happens when indole is treated with strong nitrating mixture?
- What are biological catalysts? Give an example.
- What happen when cholesterol is distilled with Se at 160 °C?

SECTION – C

Answer any THREE questions

(3 x 5 = 15)

- Complete the following equation; give its name and mechanism.



- Write the synthesis of Vitamin A.
- Give the synthesis of progesterone.
- Discuss Michaelis-Menton hypothesis.
- Explain the presence of angular methyl group in cholesterol.

SECTION – D

Answer any TWO questions

(2 x 10 = 20)

- Explain the following reactions with mechanism: i) Baeyer-Villiger oxidation reaction
ii) Hofmann rearrangement.
- a) Discuss the Fischer-Indole synthesis of benzopyrrole with mechanism. (6)
b) Write a note on Fischer's lock and key model of enzymes. (4)
- Discuss the following in the structural elucidation of cholesterol.
(i) Position of hydroxyl group and double bond
(ii) nature and position of side chain.

II-M.Sc CHEMISTRY

Dept. of Chemistry
Vivekananda College
Tiruvedakam West
Date: 08.01. 2019

I Sessional Test
IV Semester
Max. Marks: 50
Time : 2 Hours

INORGANIC CHEMISTRY IV (33CT42)

SECTION – A

Answer ALL questions

(5 x 1 = 5)

- The interhalogen compound not obtained is
(a) ICl (b) IF₅ (c) BrF₅ (d) BrCl₇
- Which of the following has peroxy linkage?
(a) H₂SO₅ (b) H₂S₂O₃ (c) H₂SO₄ (d) H₂S₂O₇
- Sensor is an
a) Analytical device b) Chip c) instrument d) Both A & B
- What is the primary valency of Fe in potassium ferric oxalate
a) 4 b) 5 c) 6 d) 7
- Pick out light Scattering technique from the following
a) TGA b) DTA c) DSC d) Nephelometry

SECTION – B

Answer any FIVE questions

(2 x 5 = 10)

- What is Adamson's rule
- Define photo chemical & photophysical process
- What is the principle of Raman spectroscopy
- Why are interhalogens reactive?
- What is meant by pseudohalogen?
- Find out the structure and hybridization of peroxyborate, peroxymono and disulphuric acid.
- Define the term fluorescence

SECTION – C

Answer any THREE questions

(3 x 5 = 15)

- Write short notes on nephelometry and Turbidimetry
- List out the photo substitution reaction of Chromium ammine complexes
- Write note on Caro's acids (or) Marshall acids.
- Define Interhalogens and pseudohalogen.
- Write down the advantages of fluorescent based sensors (or)

SECTION – D

Answer any TWO questions

(2 x 10 = 20)

- Explain in detail oxidative and reductive quenching reactions of excited tris 2,2' bipyridine ruthenium(II) complex
- Discuss preparation, properties and structure of Xenon fluorides.
- Explain the PET mechanism in detail.

Physical Chemistry-IV (33CT43)

SECTION – A**Answer ALL questions****(5 x 1 = 5)**

- The current for electrode polarisation is
(a) $i_c = i_a$ (b) $i_c \neq i_a$ (c) $i_c = i_a = 0$ (d) $i_c = i_a = i$
- Which of the following phenomena is not a factor that affects polarization at an electrode?
(a) Diffusion of the analyte to the electrode surface
(b) Diffusion of the product from the electrode surface
(c) The standard cell potential for the redox couple
(d) A significant activation barrier for the reaction
- Thermodynamics properties of the system using the methods of statistical mechanics is called
(a) Thermodynamics (b) Kinetics
(c) Quantum mechanics (d) Statistical thermodynamics
- Which is one of the following Stirling formula
(a) $E = Q + W$ (b) $PV = nRT$
(c) $S = \ln W$ (d) $\ln N! = N \ln N - N$
- Large molecules made up of small monomers are called
(a) Peptides (b) Polymers (c) Peptones (d) Monomers

SECTION – B**Answer any FIVE questions****(5 x 2 = 10)**

- Differentiate polarisable and non-polarisable electrodes
- Write the mechanism of electrochemical reaction carried out in electro-catalyst
- Rationalize the use of Ilkovic equation in polarography
- What is the major difference between classical statics and quantum statics?
- Distinguish microstate and macrostate
- Define degree of polymerization
- What is condensation polymerization? Give an example.

SECTION – C**Answer any THREE questions****(3 x 5 = 15)**

- Depict the working principle of fuel cells. Mention their merits and demerits
- Discuss in detail about the different types of Ensembles
- Write down the postulates of statistical thermodynamics
- How is molecular weight determined by using light scattering method?
- Explain the general reaction scheme for studying a polymerization reaction which proceeds by free radical mechanism.

SECTION – D**Answer any TWO questions****(2 x 10 = 20)**

- Discuss the principle, instrumentation, characterization and applications of cyclic voltammogram
- Derive the Boltzmann distribution law. Mention its important draw backs.
- Deduce Butler-Volmer equation. Mention their importances.

I M.Sc., CHEMISTRY

I Sessional Test

**Dept. of Chemistry
Vivekananda College
Tiruvedakam West
Date: 11.01. 2019**

**II Semester
Max. Marks: 50
Time: 2 Hours**

Medicinal and Pharmaceutical Chemistry (33EP2A)

SECTION – A

Multiple choice questions:

(5 x 1 = 5)

1. The phytochemical constituent present in *tulsi* **(CO2)**
a) Eugenol b) Reserpine c) Morphine d) Quinine
2. The anesthetic, which is used intravenously is **(CO3)**
(a) Propofol (b) Halothane (c) Desflurane (d) Nitrous oxide.
3. Local anesthetic produce **(CO3)**
(a) Analgesia, amnesia (b) Blocking pain sensation without loss of consciousness.
(c) pain with an altered level of consciousness (d) a stupor or somnolent state
4. The most important hormone involved in the maintenance of diabetes are **(CO4)**
a) amylin & insulin b) insulin & glucagon c) glucagon & incretins d) incretins & amylin
5. The brand name for Vitamin D is **(CO5)**
a) Paracetamol b) Calciferol c) Aspirin d) Taxol

SECTION – B

Answer ANY FIVE questions

(5 x 2 = 10)

6. Define Pharmacokinetics. **(CO2)**
7. Write down the categories of drugs? **(CO2)**
8. What are analgesics? Give one example. **(CO3)**
9. Draw the structure of penicillin. **(CO3)**
10. Write the chemical structure of insulin. **(CO4)**
11. What is the basic structure of sulphonyl ureas as hypoglycemic drugs and quote the adverse effect they produce when taken in excess. **(CO4)**
12. Why do we need micronutrients and give suitable examples **(CO5)**

SECTION – C

Answer any THREE questions

(3 x 5 = 15)

13. Discuss the various sources of drugs. **(CO2)**
14. What do you mean by anaesthetics? Discuss general and local anaesthetic. **(CO3)**
15. Define: (i) antipyretics and (ii) anti-inflammatory agents. **(CO3)**
16. Define blood pressure and briefly explain its two types. **(CO4)**
17. List out the uses of Vitamin A, B, C **(CO5)**

SECTION – D

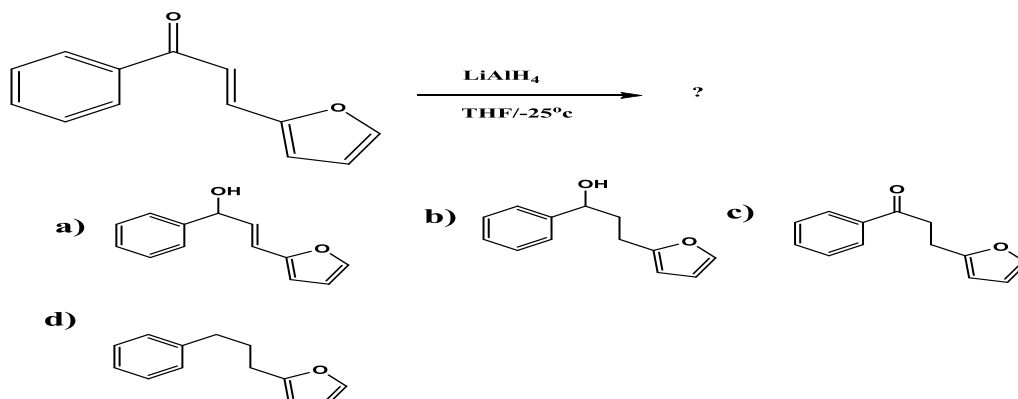
Answer any TWO questions

(2 x 10 = 20)

18. Explain any five detail classifications of chemotherapeutic drugs **(CO2)**
19. What are antibiotics? Discuss any three antibiotics. **(CO3)**
20. Describe in detail about diabetes explaining its types, causes and control measures. **(CO4)**

CHEMISTRY FOR NATIONAL ELIGIBILITY TEST- (33EP4B)

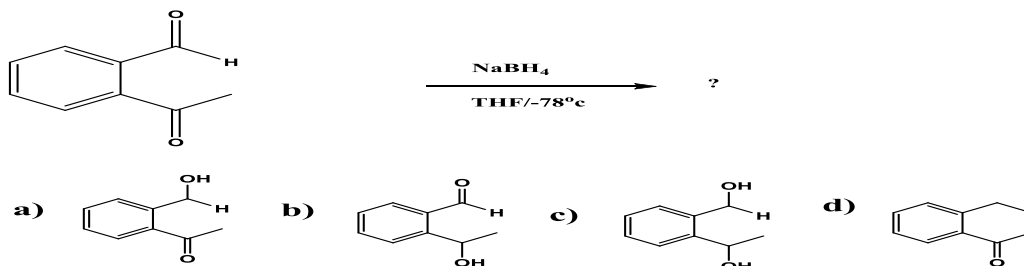
1)



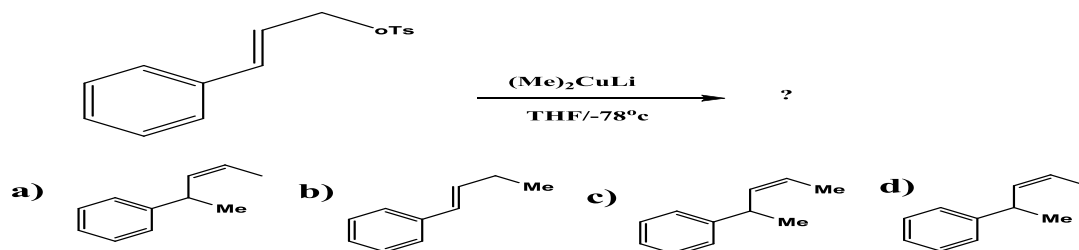
2) Which one will dissociate fast when reacted with water?

a) LiAlH_4 b) NaBH_4 c) $\text{Zn}(\text{BH}_4)_2$ d) $(\text{CH}_3)_2\text{CuLi}$

3)



4)



5) Lithium diisopropyl amide is also called as

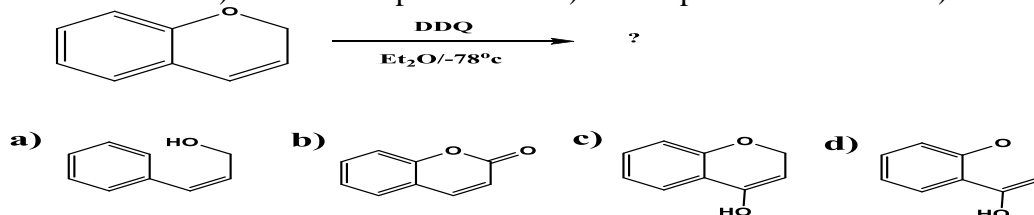
a) Harpoon base

b) Non-Nucleophilic Base

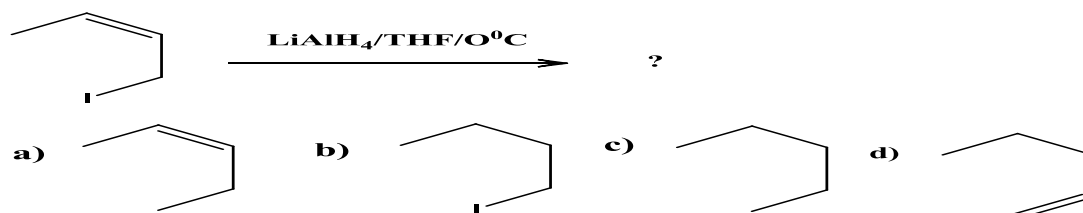
c) Nucleophilic base

d) Both a & b

6)



7)



8) In general, Prevost and Woodward Reagent gives

- a) Anti:Cisdiols b) Cis:Antidiols c) Anti:Antidiols d) Cis:Cisdiols

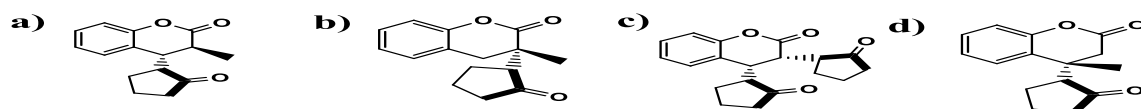
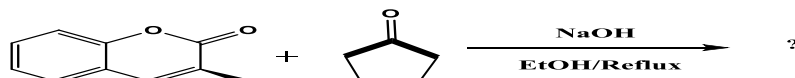
9) Which one is highly reactive ?

- a) $\text{LiAl(OR)}_3\text{H}_3$ b) $\text{LiAl(OR)}_2\text{H}_2$ c) LiAl(OR)H_3 d) LiAlH_4

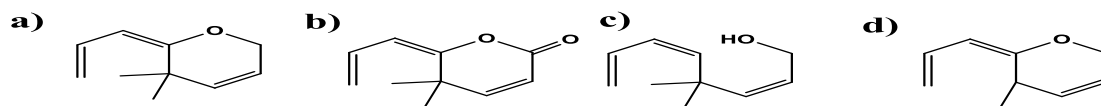
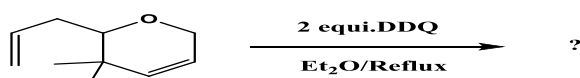
10) When NaBH_4 is treated with Ce(III) salt, that selectively reduces

- a) Aldehyde b) α,β - unsaturation c) both a & d d) Ketone

11) Find out the major product



12)



13)



14) Inversion of carbonyl carbon polarity is

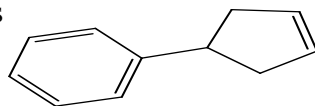
- a) Umpolung rule b) Zaitzeff rule c) Retro rule d) Markovnikov's

rule

15) Among the following which one is chemoselective reagent

- a) LiAlH_4 b) $\text{Zn(BH}_4\text{)}$ c) NaBH_4 d) $\text{NaBH}_4/\text{Ce(III)}$

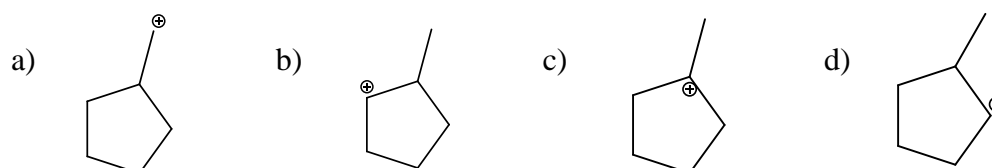
16) The following compound is



- a) Aromatic b) non-aromatic c) Planar d) Non resonance but

aromatic

17) Predict which of the following carbocation has the highest stability



18) Primary carbanions are more stable due to lesser.

- a) +I effect b) -I effect c) +M effect d) -M effect

- 19) Based on Saytzeff's rule, select the most stable alkene.
 a) 1-methylcyclohexene b) 3-methylcyclohexene c) 4-methylcyclohexene d) They are all of equal stability
- 20) Spin value for bent triplet carbene is
 a) 0 b) $1/2$ c) 1 d) $3/2$
- 21) Which of the following is a hard acid?
 a) Na^+ b) I^+ c) Ag^+ d) Ti^+
- 22) According to Lewis, acid is an
 a) Electron pair donor b) Oxide donor c) Oxide acceptor d) Electron pair acceptor
- 23) Benzene is an example ofsolvent.
 a) Protic b) Polar c) Non-polar d) Amphoteric
- 24) According to MO theory, a molecule or ion is stable if
 a) $N_b = N_a$ b) $N_a < N_b$ c) $N_b < N_a$ d) $N_a - N_b = +ve$
- 25) The molecule CO_2 belong to the point group
 a) C_{2v} b) C_2 c) $\text{D}_{\infty h}$ d) $\text{D}_{\infty v}$
- 26) The selection rule of vibrational Raman spectroscopy is
 a) $\Delta v = \pm 1$ b) $\Delta v = \pm 2$ c) $\Delta v = 0$ d) $\Delta v = +1$
- 27) Which among the following is aromatic?
 a) Cyclo-octatetatrienyl dianion b) Methlenecyclohexadiene
 c) Cycloheptatriene d) Cyclopropenyl anion
- 28) The reactive intermediate involved in the Reimer Tiemann reaction is ...
 a) Carbocation b) Carbanion c) Free radical d) Dichlorocarbene
- 29) A bromination of cis-2-butene gives a
 a) Racemic-tetrabromide b) meso-2,3-Dibromobutane c) (\pm) -2,3-Dibromobutane d) Meso-tetrabromide
- 30) Addition of BH_3 to a carbon-carbon double bond is:
 a) anti-Markovnikov anti addition b) anti-Markovnikov syn addition
 c) Markovnikov syn addition d) Markovnikov anti addition
- 31) Which of the following decreases on dilution?
 a) conductance b) specific conductance c) equivalent conductance d) molar conductance
- 32) The electrode at which oxidation takes place with respect to SHE will have a _____ sign in electrochemical series:
 a) + (positive) b) - (negative) c) \pm (positive or negative) d) none of the above
- 33) The Debye Huckel Onsager equation is:
 a) $\Lambda_m^c = \Lambda_m^0 - A\sqrt{C}$ b) $\Lambda_m^c = \Lambda_m^0 + A\sqrt{C}$ c) $\Lambda_m^0 = \Lambda_m^c - A\sqrt{C}$ d) $\Lambda_m^0 = \Lambda_m^c + A\sqrt{C}$
- 34) The emf of the cell: $\text{Cd} \mid \text{Cd}^{2+} (0.001\text{M}) \parallel \text{Fe}^{2+} (0.6\text{M}) \mid \text{Fe}$ at 25°C is:
 a) 0.441 V b) 0.0441 V c) 0.221 V d) 0.0221 V
- 35) The molar conductance at infinite dilution for acetic acid is (Given Λ^0 values: $\text{HCl} = 425$, $\text{NaCl} = 188$, $\text{CH}_3\text{COONa} = 96$, all values in units of $\text{S cm}^2 \text{mol}^{-1}$)
 a) 300 b) 323 c) 333 d) 343

- 36) Calculate the standard free energy change for the reaction: $\text{Zn} + \text{Cu}^{2+} \rightleftharpoons \text{Cu} + \text{Zn}^{2+}$
 (Given: $E^0_{\text{Zn}^{2+}/\text{Zn}} = -0.76$, $E^0_{\text{Cu}^{2+}/\text{Cu}} = +0.34$, $F = 965000$)
 a) 112.3kJ b) 312.3kJ c) 412.3kJ d) 212.3kJ
- 37) In conductometric titrations, the electrical conductance depends on _____ of ions:
 a) number b) mobility c) both a) & b) d) charge
- 38) The function of Photosystem I is to:
 a) oxidise water to molecular oxygen b) produce two moles of ATP
 c) check the inflow and outflow of oxygen d) reduce CO_2 to carbohydrate
- 39) The active site of enzyme nitrogenase is:
 a) Fe^{2+} b) Mo^{2+} c) Cu^{2+} d) Zn^{2+}
- 40) LADH is a _____ type of enzyme:
 a) isomerase b) oxido-reductase c) hydrolases d) catalyses
- 41) The main function of myoglobin is:
 a) carry O_2 from lungs to tissues b) to store dioxygen c) absorbing of iron d) electron carrier
- 42) The metals involved in superoxide dismutase is:
 a) Cu & Zn b) Zn & Mg c) Mg & Mn d) Mn & Cu
- 43) A negative catalyst
 a) raises the potential energy barrier b) lowers the potential energy barrier
 c) doesn't alter the potential energy barrier d) none of the above
- 44) Colloidal solutions have particle size between:
 a) $<1\text{nm}$ b) $1-100\text{nm}$ c) $100-1000\text{nm}$ d) $1000\text{nm} <$
- 45) Miscelles are classified under _____ colloids:
 a) multimolecular b) macromolecular c) associated d) dissociated
- 46) Gel is a colloidal system in which dispersed phase and dispersion medium are ___ & ___ respectively.
 a) solid & liquid b) liquid & gas c) liquid & solid d) gas & solid
- 47) A photochemical reaction takes place by the absorption of
 a) UV-Visible b) IR radiation c) microwaves d) heat energy
- 48) The substance which initiate a photochemical reaction but itself doesn't undergo any chemical change is called:
 a) catalysis b) fluorescence c) sensitizer d) inhibitor
- 49) Which type of electronic transitions can be seen in saturated aldehydes and ketones?
 a) $\sigma \rightarrow \sigma^*$ b) $n \rightarrow \sigma^*$ c) $n \rightarrow \pi^*$ and $\pi \rightarrow \pi^*$ d) only $\pi \rightarrow \pi^*$
- 50) _____ stops as soon as incident light is cut off:
 a) fluorescence b) phosphorescence c) chemiluminescence d) bioluminescence
