



CHE 517 / CHE 518 / CHE 519
M.Sc. IIIrd SEMESTER EXAMINATION, 2022-23
CHEMISTRY

(Group-1 : CHE 517 – Electrodics and Electrochemical Phenomena)

(Group-2 : CHE 518 – Coordination Chemistry)

(Group-3 : CHE 519 – Pericyclic and Rearrangement Reactions)

(4+0)

(CBCS MODE)

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OMR Sheet)

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अनुक्रमांक (अंकों में) :

Roll No. (In Figures)

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Roll No. (In Words) :

Time : 1 Hour

समय : 1 घण्टा

Max. Marks : 60

अधिकतम अंक : 60

नोट : पुस्तिका में 40 प्रश्न दिये गये हैं, सभी प्रश्न करने होंगे। प्रत्येक प्रश्न 1.5 अंक का होगा।

Important Instructions :

1. The candidate will write his/her Roll Number only at the places provided for, i.e. on the cover page and on the OMR answer sheet at the end and nowhere else.
2. Immediately on receipt of the question booklet, the candidate should check up the booklet and ensure that it contains all the pages and that no question is missing. If the candidate finds any discrepancy in the question booklet, he/she should report the invigilator within 10 minutes of the issue of this booklet and a fresh question booklet without any discrepancy be obtained.

महत्वपूर्ण निर्देश :

1. अभ्यर्थी अपने अनुक्रमांक केवल उन्हीं स्थानों पर लिखेंगे जो इसके लिए दिये गये हैं, अर्थात् प्रश्न पुस्तिका के मुख्य पृष्ठ तथा साथ दिये गये ओ०एम०आर० उत्तर पत्र पर, तथा अन्यत्र कहीं नहीं लिखेंगे।
2. प्रश्न पुस्तिका मिलते ही अभ्यर्थी को जाँच करके सुनिश्चित कर लेना चाहिए कि इस पुस्तिका में पूरे पृष्ठ हैं और कोई प्रश्न छूटा तो नहीं है। यदि कोई विसंगति है तो प्रश्न पुस्तिका मिलने के 10 मिनट के भीतर ही कक्ष परिप्रेक्षक को सूचित करना चाहिए और बिना त्रुटि की दूसरी प्रश्न पुस्तिका प्राप्त कर लेना चाहिए।

(GROUP-1 : CHE 517 – Electrodictics and Electrochemical Phenomena)

1. If q_M is the excess charge density on metal and q_{OHP} is the excess charge density on OHP, then which is correct for Gouy-Chapman model of electrical double layer ?
 - (A) $q_{OHP} = -q_M$
 - (B) $q_{OHP} < q_M$
 - (C) $q_{OHP} > q_M$
 - (D) None of the above
2. the potential of an electrified interface falls very sharply along the straight line. This statement is correct for :
 - (A) Stern model
 - (B) Gouy – Chapman model
 - (C) Helmholtz – Perrin model
 - (D) All of the above
3. If ϕ_M , ϕ_H and ϕ_B respectively stand for potentials at the metal, Helmholtz plane and in the bulk of the solution, then the two potential drops in the stern model of electrified interface may be expressed as :
 - (A) $\phi_M - \phi_B = (\phi_M - \phi_H) + (\phi_B - \phi_H)$
 - (B) $\phi_M - \phi_B = (\phi_M - \phi_H) + (\phi_H - \phi_B)$
 - (C) $\phi_B - \phi_M = (\phi_H - \phi_M) + (\phi_H - \phi_B)$
 - (D) None of the above

4. If C_H and C_G are Helmholtz-perrin capacity and Gouy-Chapman capacity respectively, then according to stern model the total capacity (C) of the interface is given by :
- (A) $\frac{1}{C} = \frac{1}{C_H} + \frac{1}{C_G}$
- (B) $C = C_H + C_G$
- (C) $\frac{1}{C} = \frac{1}{C_H} + C_G$
- (D) None of the above
5. If q_S , q_H and q_G are respectively represent the charge on the solution, Helmholtz-Perrin charge and Gouy-Chapman charge, then stern model can be expressed as:
- (A) $q_S = q_H + q_G$
- (B) $q_S = q_H - q_G$
- (C) $q_S = q_G - q_H$
- (D) None of the above
6. Which of the following models of EDL is known as parallel plate condenser model ?
- (A) Helmholtz-Perrin model
- (B) Stern model
- (C) Gouy-Chapman model
- (D) None of the above
7. In Helmholtz-perrin model, if ϵ_0 and ϵ_r are the permittivity of free space and dielectric constant of material between plates respectively, and d is the distance between the plates, then the differential capacity (C) is given by :
- (A) $C = \epsilon_r \epsilon_0 d$
- (B) $C = \frac{\epsilon_r \epsilon_0}{d}$
- (C) $C = \frac{d}{\epsilon_r \epsilon_0}$
- (D) None of the above

8. If q_M and q_{OHP} are respectively the excess charge density on the metal and outer Helmholtz plane (OHP), then which is correct for Helmholtz-Perrin model
- (A) $q_{OHP} > q_M$
 - (B) $q_{OHP} < q_M$
 - (C) $q_{OHP} = -q_M$
 - (D) None of the above
9. Which of the following models is known as diffuse double layer theory of EDL?
- (A) Helmholtz – Perrin model
 - (B) Stern Model
 - (C) Gouy – Chapman model
 - (D) None of the above
10. When the concentration of ions in solution is very large, the stern model of the electrified interface behaves like :
- (A) Gouy – Chapman model
 - (B) Helmholtz – Perrin model
 - (C) (A) and (B) both
 - (D) None of the above
11. Which of the following is an incorrect statement ?
- (A) Corrosion is an irreversible process
 - (B) Corrosion is an non-spontaneous process
 - (C) Corrosion is an degradation process
 - (D) Corrosion is an spontaneous process
12. What is corrosion ?
- (A) Destruction of a material
 - (B) Conversion of metal atoms to metallic ions
 - (C) Conversion of metal ions to metal atoms
 - (D) Destruction of materials involving in the conversion of metal atoms into metal ions.

13. Which of the following are necessary in the process of corrosion ?
- (A) Anode
 - (B) Cathode
 - (C) Electrolyte
 - (D) Anode, Cathode and Electrolyte
14. Corrosion involves reactions.
- (A) Oxidation
 - (B) Reduction
 - (C) Displacement
 - (D) Both oxidation and reduction
15. Electrochemical corrosion takes place on :
- (A) Anodic area
 - (B) Cathodic are
 - (C) Near cathode
 - (D) Near anode
16. Rusting can be prevented by :
- (A) Coating the object with paint
 - (B) Coating the object with grease
 - (C) Galvanizing
 - (D) All of the above
17. Which of the following factor influences the rate and extent of corrosion ?
- (A) Nature of metal only
 - (B) Nature of the environment only
 - (C) Nature of metal and environment both
 - (D) Nature of reaction

18. Excessive corrosion of metal takes place if corrosion product is :
- (A) Volatile
 - (B) Non-volatile
 - (C) Both volatile and non-volatile
 - (D) Initially volatile and then non-volatile
19. The specific volume ratios of W, Cr and Ni are 3.6, 2.0 and 1.6 respectively. Which of them will have the least rate of corrosion ?
- (A) Ni
 - (B) Cr
 - (C) W
 - (D) All will have the same rate of corrosion
20. Which of the following is not associated with the nature of the environment for the corrosion ?
- (A) Humidity
 - (B) Temperature
 - (C) Effects of pH
 - (D) Volatility of corrosion products
21. Rapid corrosion can be expected when the oxidizing and reducing couples have:
- (A) Large difference of electrode potentials
 - (B) Small difference of electrode potentials
 - (C) No difference of electrode potentials
 - (D) All of the above
22. For non-equilibrium reaction $M \xrightleftharpoons[r_2]{r_1} M^{n+} + n\bar{e}$. Which is correct for anodic polarization ?
- (A) $r_1 > r_2$ and $i_c > i_a$
 - (B) $r_1 < r_2$ and $i_c > i_a$
 - (C) $r_1 > r_2$ and $i_a > i_c$
 - (D) $r_1 < r_2$ and $i_a > i_c$

23. Polarization resistance is defined as :

(A) $R_p = \left(\frac{\Delta E}{\Delta P} \right)_{\Delta E \rightarrow 0}$

(B) $R_p = \left(\frac{\Delta E}{\Delta T} \right)_{\Delta P \rightarrow 0}$

(C) $R_p = \left(\frac{\Delta E}{\Delta i} \right)_{\Delta E \rightarrow 0}$

(D) $R_p = \left(\frac{\Delta i}{\Delta E} \right)_{i \rightarrow 0}$

24. The expression for the corrosion current, $I_{corr} = \bar{j} \bar{A} e^{fE/4}$ shows that the rate of corrosion depends on the :

(A) Surfaces exposed

(B) Surfaces covered

(C) (A) and (B) both

(D) None of the above

25. Which of the following is more correct regarding polarization ?

(A) It results from the change in net current flow

(B) It is the deviation from equilibrium potential

(C) The value of polarization is measured in terms of electron volts

(D) It is the deviation of equilibrium potential because of excess flow of current in anode or cathode and its value is measured in terms of over-voltage

26. The undesirable destruction or alteration in non-metallic materials by weathering or other agents is :

(A) Generally classified as corrosion

(B) Is not generally classified as corrosion

(C) (A) and (B) both

(D) None of the above

27. Which is more correct in the following ?
- (A) Corrosion is the extraction of metals.
 - (B) Metals have a natural tendency to convert back to its natural thermodynamically stable state (combined state)
 - (C) Metals do not exist in nature as their compounds.
 - (D) None of the above
28. The process of corrosion is :
- (A) Slow
 - (B) Fast
 - (C) Very fast
 - (D) None of the above
29. Which is the correct statement regarding the corrosion in the following ?
- (A) Corrosion occurs due to existence of separate anodic and cathodic areas between which current flows through the conducting solution
 - (B) At anodic areas, reduction reaction takes place.
 - (C) At cathodic areas, oxidation reaction takes place.
 - (D) Corrosion always occurs at cathodic areas.
30. Corrosion in which hydrogen is evolved is called :
- (A) Absorption of oxygen type of corrosion
 - (B) Hydrogen evolution type of corrosion
 - (C) Corrosion of hydrogen
 - (D) None of the above
31. In hydrogen evolution type corrosion :
- (A) Anodes are very large areas
 - (B) Cathodes are very large areas
 - (C) Anodes are small areas
 - (D) Cathodes are small areas

32. In the presence of dissolved oxygen and in neutral or alkaline medium, the cathodic reaction in electrochemical corrosion is :
- (A) $2H_2O + O_2 + 4\bar{e} \rightarrow 4\bar{O}H$
 - (B) $2H_2 + 2O_2 + 4\bar{e} \rightarrow 4\bar{O}H$
 - (C) $2H_2O + O_2 \rightarrow 4OH$
 - (D) None of the above
33. Presence of impurities in metals :
- (A) Increases the chances of corrosion
 - (B) Decreases the chances of corrosion
 - (C) Do not affect the corrosion
 - (D) None of the above
34. The rate of corrosion is measured by the current of metal ions leaving the metal surface :
- (A) In the anodic region
 - (B) In the cathodic region
 - (C) (A) and (B) both
 - (D) None of the above
35. When dealing with the diffusion of electrolytes, what two forces must you consider ?
- (A) Electrical and chemical forces both
 - (B) Gravitational and chemical forces both
 - (C) Electrical and nuclear forces both
 - (D) Gravitational and nuclear forces both

36. The total equation describes the dependence of current for an electrolytic process to :
- (A) Overpotential
 - (B) Electrode potential
 - (C) Zeta potential
 - (D) None of the above
37. For a redox reaction at the equilibrium potential, electron transfer processes continue at electrode-solution interface in both directions. The cathodic current is balanced by the anodic current. This ongoing current in both directions is called :
- (A) Exchange current density
 - (B) Electron density
 - (C) Exchange density
 - (D) None of the above
38. Exchange current density depends critically :
- (A) Only on the nature of the electrode
 - (B) On the nature and structure of electrode
 - (C) Nature, structure and surface roughness of electrode
 - (D) None of the above
39. At the corrosion potential :
- (A) $\Sigma I_a + \Sigma I_c = 0$
 - (B) $\Sigma I_a - \Sigma I_c = 0$
 - (C) $\Sigma I_a = \Sigma I_c$
 - (D) $\Sigma I_c - \Sigma I_a = 0$
40. Butler-Volmer equation describes the kinetics of a single half reaction at potentials above and below :
- (A) The reversible potential for that reaction
 - (B) The irreversible potential for that reaction
 - (C) The equilibrium state for that reaction
 - (D) None of the above

GROUP-2 : CHE 518 – Coordination Chemistry

1. According to Irving-William series; the correct sequence is :
(A) $Co^{2+} < Ni^{2+} < Cu^{2+} > Zn^{2+}$
(B) $Co^{2+} < Ni^{2+} < Cu^{2+} < Zn^{2+}$
(C) $Ca^{2+} > Ni^{2+} > Cu^{2+} > Zn^{2+}$
(D) None of the above
2. The most stable complex is :
(A) $[Cu(en)_3]^{2+}$
(B) $cis[Cu(en)_2(H_2O)_2]^{2+}$
(C) $trans[Cu(en)_2(H_2O)_2]^{2+}$
(D) None of the above
3. Which one of the following octahedral complex will be distorted ?
(A) $[Mn(H_2O)_6]^{2+}$
(B) $[Fe(H_2O)_6]^{3+}$
(C) $[Cr(H_2O)_6]^{2+}$
(D) $[Cr(H_2O)_6]^{3+}$
4. Which one of the following complex will not have ideal octahedral geometry ?
(A) $[Ni(H_2O)_6]^{2+}$
(B) $[Mn(H_2O)_6]^{2+}$
(C) $[Ti(H_2O)_6]^{3+}$
(D) $[Cr(H_2O)_6]^{3+}$
5. A compound absorbs the radiation of red colour, the colour of compound will be?
(A) Red
(B) Green
(C) Blue
(D) Violet

6. Fill in the blank :
the intensity of colour of $[CoCl_4]^{2+}$ is _____ than that of $[Co(H_2O)_6]^{2+}$.
- (A) lower
(B) greater
(C) equal
(D) None of the above
7. The transitions in which the change in azimuthal quantum number is ± 1 will be?
- (A) Laporte forbidden
(B) Laporte allowed
(C) Both (A) and (B)
(D) None of the above
8. The total orbital angular momentum is given by ?
- (A) $\sqrt{L} \frac{h}{2\pi}$
(B) $\sqrt{L(L+1)} \frac{h}{2\pi}$
(C) $\sqrt{(L+1)} \frac{h}{2\pi}$
(D) None of the above
9. Total number of microstates for d^2 configuration ?
- (A) 15
(B) 30
(C) 45
(D) 50
10. The total spin angular momentum is given by :
- (A) $\sqrt{S} \frac{h}{2\pi}$
(B) $\sqrt{S(SH)} \frac{h}{2\pi}$
(C) $\sqrt{(SH)} \frac{h}{2\pi}$
(D) None of the above

11. The total number of microstates for $3F$ is :
- (A) 15
 - (B) 21
 - (C) 9
 - (D) 12
12. For a given configuration, the ground state term will have ____ spin multiplicity.
- (A) Lowest
 - (B) Equal
 - (C) Highest
 - (D) None of the above
13. Which one will be the ground state term for p^2 configuration ?
- (A) $3p_1$
 - (B) $3p_0$
 - (C) $3p_2$
 - (D) $1p_0$
14. The ground state term for high spin d^5 configuration is :
- (A) $3F$
 - (B) $5S$
 - (C) $6S$
 - (D) $5F$
15. The complex $[Co(H_2O)_6]^{2+}$ is :
- (A) High spin, paramagnetic, coloured
 - (B) Low spin diamagnetic
 - (C) Low spin paramagnetic
 - (D) High spin, diamagnetic, colourless

16. Tanabe-Sugano diagrams are obtained by plotting ?
- (A) E against Δ_0
 - (B) E/B against Δ_0/B
 - (C) E against Δ_0/B
 - (D) None of the above
17. Splitting of "F" term in octahedral field will be :
- (A) T_{2g} and E_g
 - (B) A_{1g} , E_g , T_{1g} and T_{2g}
 - (C) T_{1g} , T_{2g} and A_{2g}
 - (D) None of the above
18. The splitting of "G" term in octahedral field will be :
- (A) E_g , $2T_{1g}$, T_{2g}
 - (B) A_{1g} , E_g , T_{1g} and T_{2g}
 - (C) T_{1g} , T_{2g} and A_{2g}
 - (D) None of the above
19. If the $\Delta L = 0$, the transition will be :
- (A) Laporte allowed
 - (B) Laporte forbidden
 - (C) Both (A) and (B)
 - (D) None of the above
20. Transition between states of different multiplicities are :
- (A) Spin allowed
 - (B) Spin forbidden
 - (C) Not defined
 - (D) None of the above

21. The spectroscopic ground state term and the total number of electronic transitions in $[Ti(H_2O)_6]^{2+}$ ion are :
- (A) $3T_{1g}$ and 2
 (B) $3A_{2g}$ and 3
 (C) $3T_{1g}$ and 3
 (D) $3A_{2g}$ and 2
22. The ground state term for t_{2g}^3, e_g^2 in octahedral field is :
- (A) $3A_{2g}$
 (B) $3E_g$
 (C) $4T_{1g}$
 (D) $2A_{1g}$
23. Which one of the following complex will share $3T_{2g} \leftarrow 3A_{2g}$ transition as the lowest energy band on its electronic spectrum ?
- (A) $[Cr(NH_3)_6]^{3+}$
 (B) $[FeF_6]^{3-}$
 (C) $[Co(NH_3)_6]^{3+}$
 (D) $[Ni(H_2O)_6]^{2+}$
24. For d^2 electronic configuration in octahedral field $T_{2g} \times T_{2g}$ will be :
- (A) $3T_{1g} + {}^2T_{2g} + {}^1E_g + {}^1A_{1g}$
 (B) ${}^1E_g + {}^1A_{1g} + {}^1T_{1g}$
 (C) ${}^3T_{2g} + {}^2T_{1g} + {}^1E_g$
 (D) None of the above
25. If I =current, H =magnetic flux, Me =charge of electron and μ_0 =magnetic susceptibility, the magnetic intensity can be derived by ?
- (A) I/H
 (B) B/I
 (C) Me/H
 (D) B/μ_0

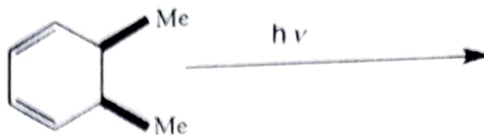
26. Specific magnetic susceptibility is derived by equation $\chi_m = \frac{x}{p}$ here p is ?
- (A) Area
 - (B) Charge
 - (C) Length
 - (D) Density
27. Magnetic permeability of diamagnet is :
- (A) Greater than free space value
 - (B) Zero
 - (C) Less than free space value
 - (D) None of the above
28. In Langevin theory of diamagnetism, the equation $\mu = -\frac{Ze^2B}{4m} \langle P^2 \rangle$ the $\langle P^2 \rangle$ represents ?
- (A) Density
 - (B) Weight
 - (C) Length
 - (D) Mean square chloral
29. Curie-Weiss Law can be written as :
- (A) $\chi_m \propto \frac{1}{T}$
 - (B) $\chi_m = \frac{C}{T}$
 - (C) $\chi_m = \frac{C}{(T-\theta)}$
 - (D) None of the above
30. The orbital angular momentum about an axis is associated with ability to rotate?
- (A) Molecule
 - (B) Molecular orbital
 - (C) Atomic orbital
 - (D) (B) and (C) both

31. The d_{xg} orbital can be rotated about z axis by $\frac{2\pi}{8}$ to give ?
- (A) d_{xy}
 - (B) d_{xz}
 - (C) $d_x^2 - y^2$
 - (D) None of the above
32. In a cubic ligand field the orbital angular momentum is not quenched for term ?
- (A) A
 - (B) E
 - (C) T
 - (D) B
33. Which statement is true for crystal field theory ?
- (A) CFSE is decided by electrons in valence shell
 - (B) CFSE is decided by electrons of sand p orbital
 - (C) CFSE is decided by electrons of d orbital
 - (D) None of the above
34. Crystal field theory is not able to explain :
- (A) Geometry of complex
 - (B) Optical property of complex
 - (C) Magnetic property of complex
 - (D) π -bonding in complex
35. The reduction of "B" value can be reported in terms of :
- (A) Electrical charge
 - (B) Curries effect
 - (C) Lortenz effect
 - (D) Nephelauxetic effect

36. The correct order of Nephelauxetic effect for NH_3 , en and NCS^- ligands will be:
- (A) $NH_3 = en < NCS^-$
 - (B) $NH_3 = < en < NCS^-$
 - (C) $NH_3 = < en > NCS^-$
 - (D) $NH_3 > en = NCS^-$
37. Which statement is true for Nephelauxetic effect ?
- (A) Wave nature of electron
 - (B) Particle nature of electron
 - (C) Electron cloud
 - (D) (A) and (C) both
38. The correct order of Nephelauxetic effect for Mn^{2+} and Mn^{4+} ion will be :
- (A) $Mn^{2+} < Mn^{4+}$
 - (B) $Mn^{2+} \cong Mn^{4+}$
 - (C) $Mn^{2+} > Mn^{4+}$
 - (D) None of the above
39. In an octahedral field the p_x , p_y and p_z orbital will transform as ?
- (A) T_{1g}
 - (B) T_{2g}
 - (C) T_{1u}
 - (D) T_{2u}
40. John-Teller distortion will be seen in metals having :
- (A) Vacant d -orbital
 - (B) Partially filled d -orbital
 - (C) Half filled d -orbital
 - (D) None of the above

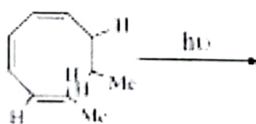
GROUP-3 : CHE 519 – Pericyclic and Rearrangement Reactions

1. The product obtained during the following photochemical reaction is :



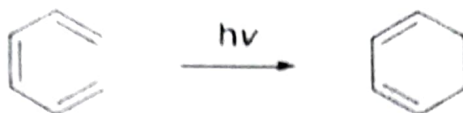
- (A)
- (B)
- (C)
- (D)

2. The following tetraene upon photolysis gives :



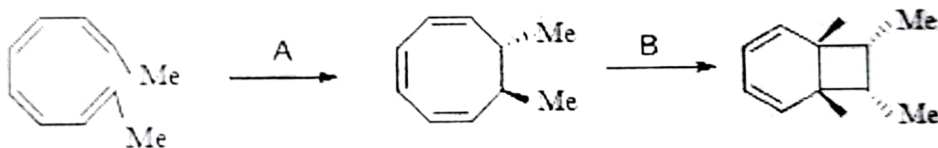
- (A)
- (B)
- (C)
- (D)

3. According to Frontier Molecular Orbital (FMO) theory, the Highest Occupied Molecular Orbital (HOMO) of hexatriene in the following reaction is :



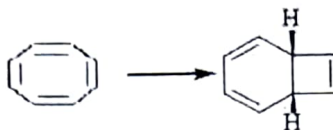
- (A)
- (B)
- (C)
- (D)

4. The conditions $A - B$, required for the following pericyclic reactions are :

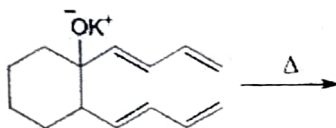


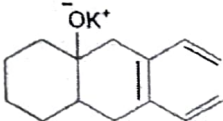
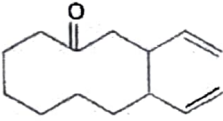
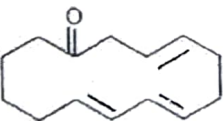
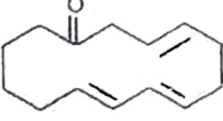
- (A) $A = \Delta$; $B = \Delta$
- (B) $A = h\nu$; $B = \Delta$
- (C) $A = h\nu$; $B = h\nu$
- (D) $A = \Delta$; $B = h\nu$
5. The number of nodes present in the highest occupied molecular orbital of 1,3,5-hexatriene in its ground state is :
- (A) One
- (B) Two
- (C) Three
- (D) Four

6. The most appropriate mode of cyclisation in the following transformation is :

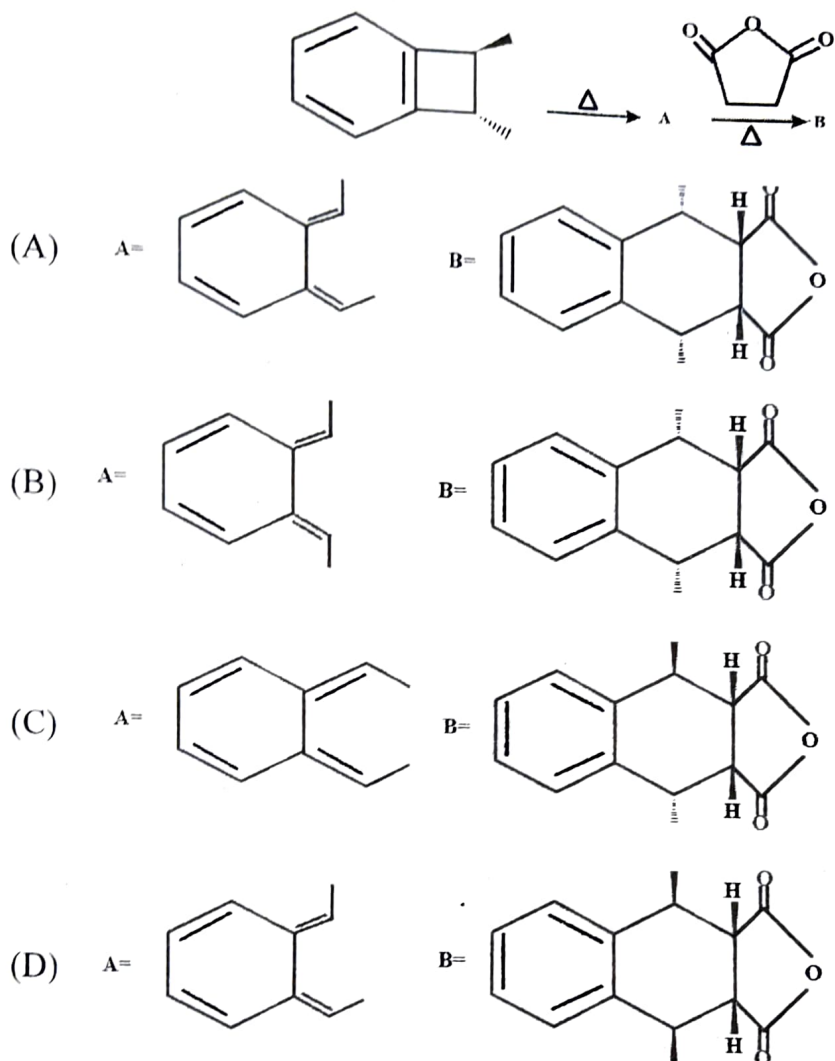


- (A) Conrotatory in photochemical; and disrotatory in thermal conditions
 (B) Conrotatory in thermal; and disrotatory in photochemical conditions
 (C) Conrotatory in thermal; and conrotatory in photochemical conditions
 (D) Disrotatory in photochemical; and disrotatory in thermal conditions
7. The product formed and the process involved in the following reaction is :

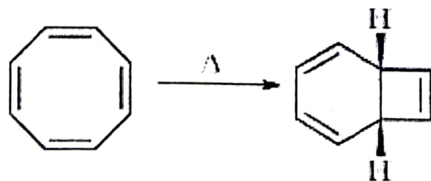


- (A)  [3,3] – Sigmatropic rearrangement
 (B)  [1,3] – Sigmatropic rearrangement
 (C)  [5,5] – Sigmatropic rearrangement
 (D)  [1,5] – Sigmatropic rearrangement

8. The major products *A* and *B* in the following reaction sequence are :



9. In the following concerted reaction, the product is formed by a :



- (A) 6π – disrotatory electrocyclization
 (B) 4π – disrotatory electrocyclization
 (C) 6π – conrotatory electrocyclization
 (D) 4π – conrotatory electrocyclization

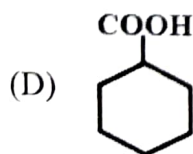
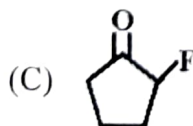
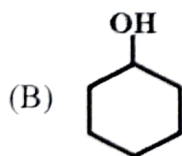
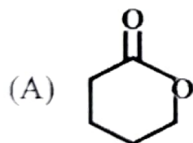
10. The concerted photochemical reaction two olefins leading to a cyclobutane ring is :

- (A) $\pi^2s + \pi^2a$ cycloaddition
- (B) $\pi^2s + \pi^2s$ cycloaddition
- (C) $\sigma^2s + \sigma^2s$ cycloaddition
- (D) $\pi^2s - \pi^2a$ cycloaddition

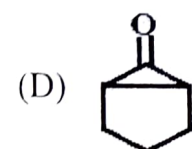
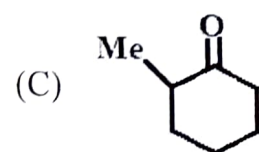
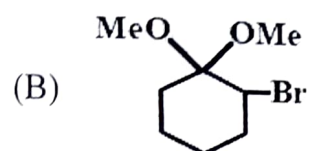
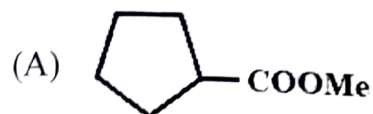
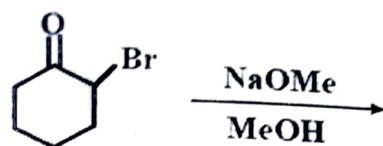
11. Nitrogen ylide formation takes place in which rearrangement ?

- (A) Favorskii
- (B) Wittig
- (C) Steven's
- (D) Wagner-Meerwin

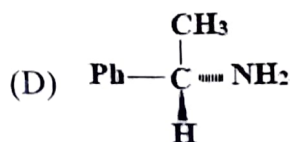
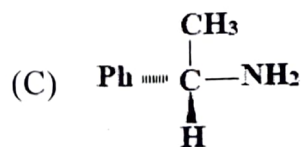
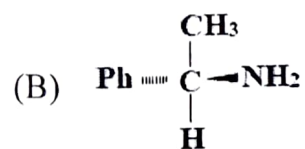
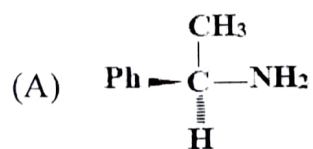
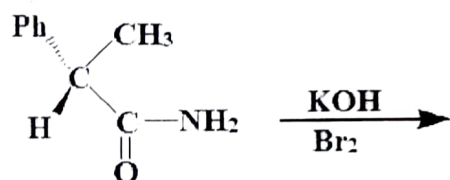
12.



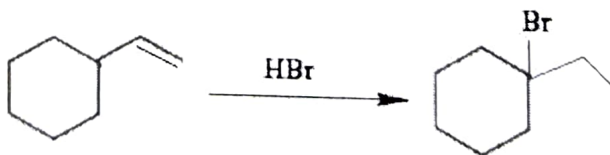
13.



14.

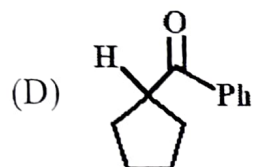
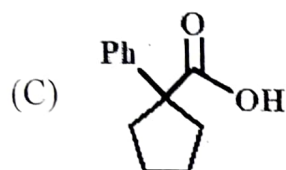
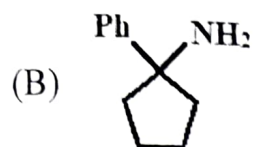
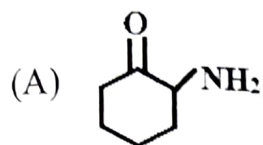
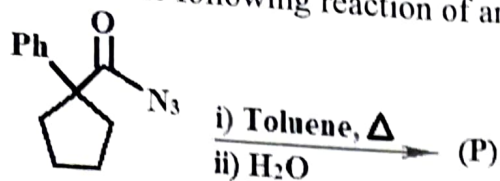


15. Criegee intermediate is formed in which rearrangement ?
- (A) Lossen
 - (B) Schmidt
 - (C) Baeyer-Villiger
 - (D) Curtius
16. In curtius rearrangement, which intermediate is formed ?
- (A) Carbocation
 - (B) Ketene
 - (C) Isocyanate
 - (D) Carbanion
17. Stabilization of a carbocation by alkyl groups involves hyperconjugation between :
- (A) a filled $C-H$ σ - bond with a vacant π^* - orbital
 - (B) a vacant σ^* - orbital with the vacant p - orbital
 - (C) a filled $C-H$ σ - bond with a vacant p - orbital
 - (D) a filled $C-H\sigma$ - bond with a filled π - orbital
18. The product from the reaction below is the result of a :



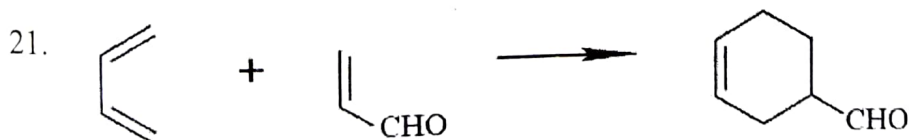
- (A) 1, 2 - methyl shift
- (B) Carbene
- (C) Bromonium ion
- (D) 1, 2 - hydride shift

19. Which is the major product of the following reaction of an acyl azide?



20. Select the incorrect statement from the given statement :

- (A) HOMO is a highest occupied molecular orbital
- (B) In conrotatory motion bonds rotate in the same direction
- (C) Diels-Alder reaction is $[4 + 2]$ cycloaddition
- (D) In the suprafacial reaction both bonds are formed on the opposite face of the component.

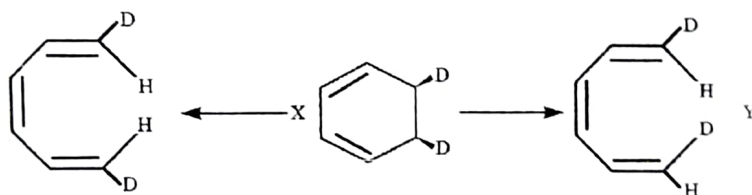


This reaction is an example of :

- (A) $[2 + 2]$ cycloaddition
- (B) $[4 + 2]$ cycloaddition
- (C) $[2 + 1]$ cycloaddition
- (D) None of the above

22. Ene reaction is a :
- (A) 2π electron electrocyclic reaction
 - (B) 4π electron electrocyclic reaction
 - (C) 6π electron electrocyclic reaction
 - (D) None of the above
23. Diels-Alder reaction normally yields endoadduct as a major product. This is due to :
- (A) Higher stability of the product
 - (B) Faster rate of formation of the endoprodut
 - (C) Steric hindrance
 - (D) Secondary orbital interactions between a diene and a dienophile
24. In a reaction of cyclopentadiene with acrylate ester giving Diels-Alder reaction products, the interacting frontier orbitals are :
- (A) HOMO of diene and LUMO of dienophile
 - (B) HOMO of dienophile and LUMO of diene
 - (C) HOMO of diene and HOMO of dienophile
 - (D) LUMO of diene and LUMO of dienophile
25. In a cycloaddition reaction, if both the bonds to a component are formed on the same face, the process is termed as :
- (A) Suprafacial
 - (B) Antrafacial
 - (C) Supra-suprafacial
 - (D) Anta-antrafacial
26. Claisen rearrangement is an example of :
- (A) [2,3] sigmatropic rearrangement
 - (B) [2,4] sigmatropic rearrangement
 - (C) [1,5] sigmatropic rearrangement
 - (D) [3,3] sigmatropic rearrangement

27. The thermal ring opening reaction of cyclobutenes are :
- Conrotatory
 - Disrotatory
 - Conrotatory or disrotatory depending on the temperature at which reaction is carried out
 - Cannot be predicted
28. The electrocyclic reaction for ground state of hexatrienes :
- Conrotatory
 - Disrotatory
 - Conrotatory or disrotatory depending on the temperature at which reaction is carried out
 - Cannot be predicted
29. The product Y and Z are formed, respectively, from X via :



- $h\nu$ conrotatory opening and Δ disrotatory opening
 - $h\nu$ disrotatory opening and Δ conrotatory opening
 - Δ conrotatory opening and $h\nu$ disrotatory opening
 - Δ disrotatory opening and $h\nu$ conrotatory opening
30. Favorskii rearrangement of $\alpha\alpha'$ - dihaloketone with alkoxide produces _____ product.
- α, β - unsaturated ester
 - α, β - unsaturated amide
 - Ring compound
 - β, γ - unsaturated ester

31. The cyclohexanone can be converted to lactone by using _____ enzyme.
- (A) Cyclohexanone oxygenase
 - (B) Cyclohexanone deoxygenase
 - (C) Zymase
 - (D) Cyclohexanone hydrogenase
32. Benzophenone is converted to phenyl benzoate by using _____ reagent.
- (A) Perbenzoic Acid
 - (B) Soda Azide
 - (C) Dil. KMnO_4
 - (D) SOCl_2
33. The following conversion can be achieved by _____ rearrangement.
- Cyclohexanone Oxime $\rightarrow$ ϵ -caprolactum
- (A) Hofmann
 - (B) Curtius
 - (C) Schmidt
 - (D) Beckmann
34. The rearrangement involve formation of cyclopropane intermediate is :
- (A) Perycyclic reactions
 - (B) Favourskii rearrangement
 - (C) Beckmann rearrangement
 - (D) Hoffmann rearrangement
35. Beckmann rearrangement is a type of _____ rearrangement.
- (A) 1, 2 - rearrangement
 - (B) 1, 3 - rearrangement
 - (C) 1, 4 - rearrangement
 - (D) 1, 5 - rearrangement

36. Wagner – meerwin rearrangement involve :
- (A) Classical carbocation
 - (B) Non-classical carbocation
 - (C) Nitrene
 - (D) Carbene
37. Which type of catalytic reaction, does Dienone phenol rearrangement reaction belong ?
- (A) Acid catalysed
 - (B) Base catalysed
 - (C) Acidic
 - (D) Neutral
38. In which Favorskii rearrangement occurs ?
- (A) Acidic
 - (B) Basic
 - (C) Neutral
 - (D) Alkaline
39. What is the main difference between Hoffmann and curtiuss rearrangement ?
- (A) Products are different
 - (B) Intermediate formed is different
 - (C) Reactants are different
 - (D) Isomers
40. Which types of isomers are formed in rearrangement reaction ?
- (A) Structural isomers
 - (B) Geometrical isomers
 - (C) Optical isomer
 - (D) Conformational isomers
