PRACTICE PAPER

17

Time allowed: 45 minutes **Maximum Marks: 200**

General Instructions: *Same as Practice Paper–1.*

Choose the correct option.

1. Which of the following is not satisfied by an ideal solution?

(*a*) $\Delta_{mix} V = 0$ (*b*) $\Delta_{mix} V \neq 0$

(*c*) Obeyance to Raoult's Law (*d*) $\Delta_{mix} H = 0$

2. The vapour pressure of a liquid in a closed vessel depends upon

(*a*) surface area of the vessel (*b*) amount of liquid

(*c*) temperature (*d*) none of the above

3. A 5.25% solution of a substance is isotonic with a 1.5% solution of urea (molar mass = 60 g mol^{-1}) in the same solvent. If the densities of both the solutions are assumed to be equal to 1.0 gcm^{-3}, molar mass of the substance will be

(*a*) 210.0 g mol^{-1} (*b*) 90.0 g mol^{-1} (*c*) 115.0 g mol^{-1} (*d*) 105.0 g mol^{-1}

4. The fraction of total volume occupied by atoms present in a simple cube is

(*a*) $\frac{\pi}{3\sqrt{2}}$ (*b*) $\frac{\pi}{4\sqrt{2}}$ (*c*) $\frac{\pi}{4}$ (*d*) $\frac{\pi}{6}$

5. The INCORRECT statement for cubic close packed (*ccp*) three-dimensional structure is

(*a*) The number of neighbours of an atom present in the topmost layer is 12.

(*b*) The efficiency of the atom packing is 74%.

(*c*) The number of octahedral and tetrahedral voids per atom are 1 and 2 respectively.

(*d*) The unit cell edge length is $2\sqrt{2}$ times the radius of the atom.

6. Ionic solids with Schottky defects contain in their structure

(*a*) equal number of cation and anion vacancies.

(*b*) interstitial anions and anion vacancies.

(*c*) cation vacancies only.

(*d*) cation vacancies and interstitial cations.

7. Substances whose solutions easily diffuse through animal membrane are

(*a*) colloids (*b*) crystalloids

(*c*) electrolytes (*d*) non-electrolytes

8. Given below are two statements labelled as Statement P and Statement Q:

Statement P : A sol of As_2S_3 prepared by the action of H_2S on As_2O_3 is negatively charged.

Statement Q : It is due to the presence of S^{2-} ions in the diffused layer.

(*a*) P is true, but Q is false (*b*) P is false, but Q is true

(*c*) Both P and Q are true (*d*) Both P and Q are false

9. Match the items of Column I with suitable units given in Column II.

Column I	Column II
A. Conductance	(*i*) m^{-1}
B. Molar conductivity	(*ii*) Simen(S)
C. Cell constant	(*iii*) Sm^2mol^{-1}
D. Conductivity	(*iv*) Sm^{-1}

(*a*) A–(*ii*), B–(*iii*), C–(*i*), D–(*iv*) (*b*) A–(*iii*), B–(*iv*), C–(*i*), D–(*ii*)
(*c*) A–(*i*), B–(*iv*), C–(*iii*), D–(*ii*) (*d*) A–(*ii*), B–(*iv*), C–(*i*), D–(*iii*)

10. The cathodic reaction in electrolysis of dilute H_2SO_4 with platinum electrode is
(*a*) oxidation (*b*) reduction
(*c*) both oxidation and reduction (*d*) neutralization

11. The standard reduction potential at 298 K for the following half reactions are given against each

$Zn^{2+} + 2e^- \rightleftharpoons Zn(s)$, $E^\circ = -0.76$ V

$Cr^{3+} + 3e^- \rightleftharpoons Cr(s)$, $E^\circ = -0.74$ V

$2H^+ + 2e^- \rightleftharpoons H_2(g)$, $E^\circ = 0.0$ V

$Fe^{3+} + 3e^- \rightleftharpoons Fe(s)$, $E^\circ = -0.04$ V

which of the following is the strongest reducing agent?
(*a*) Zn (*b*) Cr (*c*) H_2 (*d*) Fe^{3+}

12. The rate of reaction, $A + B \rightarrow$ Products is given by the equation, $r = k[A][B]$. If B is taken in large excess, the order of reaction will be
(*a*) 2 (*b*) 1 (*c*) 0 (*d*) unpredictable

13. When a graph is plotted of $\log k$ vs $\frac{1}{T}$ for an Arrhenius equation, a straight line with a slope –6840 K is obtained. The value of energy of activation for the reaction will be
(*a*) 130.97 kJ mol^{-1} (*b*) 127.7 kJ mol^{-1}
(*c*) 148 kJ mol^{-1} (*d*) 218 kJ mol^{-1}

14. If the initial concentration of the reactant is doubled, time for half reaction is also doubled. The order of the reaction is
(*a*) zero (*b*) first (*c*) second (*d*) third

15. Standard electrode potentials are
$Fe^{2+}/Fe(E^\circ = -0.44$ V), $Fe^{3+}/Fe^{2+}(E^\circ = 0.77$ V)
Fe^{2+}, Fe^{3+} and Fe blocks are kept together, then
(*a*) Fe^{3+} increases (*b*) Fe^{3+} decreases
(*c*) Fe^{2+}/Fe^{3+} remains unchanged (*d*) Fe^{2+} decreases

16. The standard hydrogen electrode has zero electrode potential because
(*a*) hydrogen is easiest to oxidise. (*b*) this electrode potential is assumed to be zero.
(*c*) hydrogen atom has only one electron. (*d*) hydrogen is lightest element.

17. The method of refining which is based on the principle of adsorption is
(*a*) chromatographic method (*b*) zone refining
(*c*) Mond process (*d*) van Arkel method

18. The co-ordination number and oxidation number of Y in the following compound $[Y(SO_4)(NH_3)_5]Cl$ will be
(*a*) 10 and 3 (*b*) 2 and 6 (*c*) 6 and 3 (*d*) 6 and 4

19. Which of the following compounds has colour but no unpaired electrons?
(*a*) $KMnO_4$ (*b*) K_2MnO_4 (*c*) $MnSO_4$ (*d*) $MnCl_2$

20. **Given below are two statements labelled as Assertion and Reason:**

Assertion (A) : Ce^{4+} is used as an oxidising agent in volumetric analysis.

Reason (R) : Ce^{4+} has the tendency of attaining +3 oxidation state.

(*a*) Assertion and reason both are correct statements and reason is correct explanation for assertion.

(*b*) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

(*c*) Assertion is correct statement but reason is wrong statement.

(*d*) Assertion is wrong statement but reason is correct statement.

21. **The thermal stability of the hydrides of group 16_____ down the group.**

(*a*) increases (*b*) decreases

(*c*) first increases then decreases (*d*) first decreases then increases

22. **Which of the following options are not in accordance with the property mentioned against them?**

A. $F_2 > Cl_2 > Br_2 > I_2$	**Oxidising power.**
B. MI > MBr > MCl > MF	**Ionic character of metal halide.**
C. $F_2 > Cl_2 > Br_2 > I_2$	**Bond dissociation enthalpy.**
D. HI < HBr < HCl < HF	**Hydrogen-halogen bond strength.**

(*a*) both A and C (*b*) both A and D (*c*) both B and C (*d*) both A and B

23. **Which is the correct increasing order of boiling points of the following compounds?**

1-Iodobutane, 1-Bromobutane, 1-Chlorobutane, Butane

(*a*) Butane < 1-Chlorobutane < 1-Bromobutane < 1-Iodobutane

(*b*) 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane < Butane

(*c*) Butane < 1-Iodobutane < 1-Bromobutane < 1-Chlorobutane

(*d*) Butane < 1-Chlorobutane < 1-Iodobutane < 1-Bromobutane

24. **The correct IUPAC name for** $H_3C—\underset{\displaystyle C_2H_5}{\underset{|}{CH}}—CH_2—CH_2—Cl$ **is**

(*a*) 1-chloro-3-methylpentane (*b*) 1-chloro-3-ethylbutane

(*c*) 3-methyl-1-chloropentane (*d*) 3-ethyl-1-chlorobutane

25. **Anhydrous Cobalt(II)chloride is blue in colour but on dissolving in water it changes to pink in colour because**

(*a*) its oxidation state changes. (*b*) its magnetic character changes.

(*c*) its coordination number changes. (*d*) in water it shows coloured solution.

26. **The compound $[CoCl_3(C_5H_5N)_2]Br$ will give the chemical test for ions.**

(*a*) Br^- (*b*) I^- (*c*) Cl^- (*d*) Br^- as well as Cl^-

27. **Which one of the following will be able to show geometrical isomerism?**

(*a*) MA_3B (Square planar) (*b*) MA_2B_2 (Tetrahedral)

(*c*) MABCD (Square planar) (*d*) MABCD (Tetrahedral)

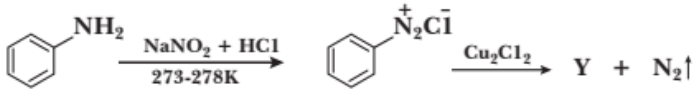
28. **The metal extracted by auto reduction is**

(*a*) Zn (*b*) Ag (*c*) Cu (*d*) Fe

29. **Geometry of $XeOF_4$ molecule is:**

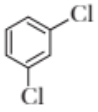
(*a*) square planar (*b*) square pyramidal (*c*) triangular pyramidal (*d*) octahedral

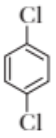
30. **Identify the compound Y in the following reaction.**



(*a*) 

(*b*) 

(*c*) 

(*d*) 

31. **Given below are two statements labelled as Assertion and Reason:**

Assertion (A) : The O—O bond length in ozone is identical with that in molecular oxygen.

Reason (R) : The ozone molecule is a resonance hybrid of two canonical structures.

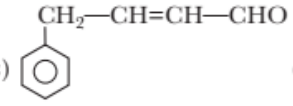
(*a*) Assertion and reason both are correct statements and reason is correct explanation for assertion.

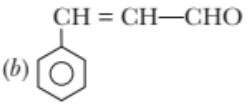
(*b*) Assertion and reason both are correct statements but reason is not correct explanation for assertion.

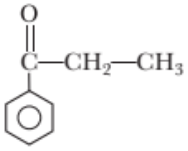
(*c*) Assertion is correct statement but reason is wrong statement.

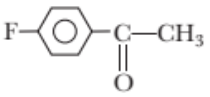
(*d*) Assertion is wrong statement but reason is correct statement.

32. **The structure of 3-phenylprop-2-enal is**

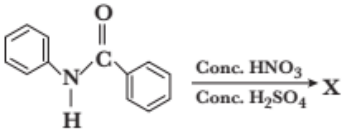
(*a*) 

(*b*) 

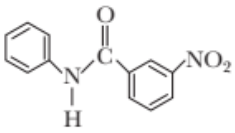
(*c*) 

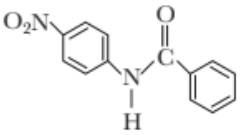
(*d*) 

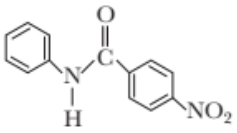
33. **In the following reaction:**

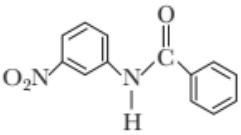


The structures of the major product X is:

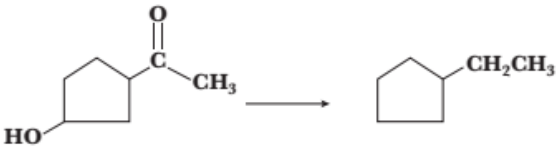
(*a*) 

(*b*) 

(*c*) 

(*d*) 

34. **The appropriate reagent for the given transformation is**



(*a*) Zn (Hg), HCl (*b*) NH_2NH_2, OH^- (*c*) Ni/H_2 (*d*) $NaBH_4$

35. **Isopropyl methyl ether when treated with cold hydrogen iodide gives**

(*a*) isopropyl iodide and methyl iodide (*b*) isopropyl alcohol and methyl iodide

(*c*) isopropyl alcohol and methyl alcohol (*d*) isopropyl iodide and methyl alcohol

36. **Acetone on heating with concentrated H_2SO_4 mainly gives**

(*a*) Mesitylene (*b*) Mesityl oxide (*c*) Toluene (*d*) Xylene

37. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y$

Y in the above reaction is

(*a*) $CH_3CH_2NHCH_3$ (*b*) $CH_3CH_2CH_2NH_2$

(*c*) $CH_3CH_2CH_2CONHCH_3$ (*d*) $CH_3CH_2CH_2CONHCOCH_3$

38. **Which one of the following can be oxidised to the corresponding carbonyl compound?**

(*a*) *o*-Nitrophenol (*b*) Phenol

(*c*) 2-methyl-2-hydroxypropane (*d*) 2-hydroxypropane

39. In the reaction

$$CH_3COOH \xrightarrow{LiAlH_4} CH_3CH_2OH \xrightarrow{PCl_5} B \xrightarrow{Alc.\ KOH} C$$

The products B and C respectively are

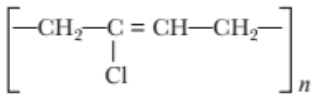
(*a*) Ethyl chloride; Ethene
(*b*) Acetyl chloride; Ethane
(*c*) Ethyl chloride; Acetaldehyde
(*d*) Ethanoyl chloride; Acetaldehyde

40. Which one of the following drugs prevents the interaction of histamine with its receptor?

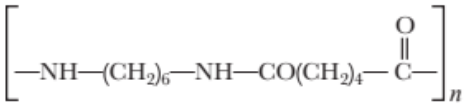
(*a*) Antihistamines (*b*) Analgesics (*c*) Antibiotics (*d*) Disinfectants

41. Which of the following are not correctly matched?

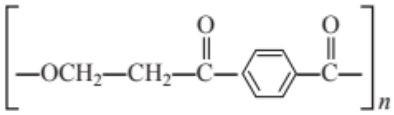
(*a*) neoprene:



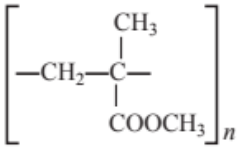
(*b*) nylon-66:



(*c*) terylene:



(*d*) PMMA:



42. Which base is present in RNA but not in DNA?

(*a*) Uracil (*b*) Cytosine (*c*) Guanine (*d*) Thymine

43. When formaldehyde and KOH are heated, then we get

(*a*) Acetylene (*b*) Methane (*c*) Methyl alcohol (*d*) Ethyl formate

44. Anilinium hydrogensulphate on heating with sulphuric acid at 455-475 K produces

(*a*) sulphanilic acid (*b*) benzenesulphonic acid (*c*) aniline (*d*) anthranilic acid

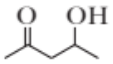
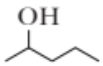
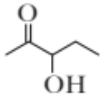
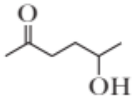
45. Which of the following polymer is stored in the liver of animals?

(*a*) Amylose (*b*) Cellulose (*c*) Amylopectin (*d*) Glycogen

46. Which among the following phenolic compounds is most acidic in nature?

(*a*) *p*-aminophenol (*b*) phenol (*c*) *m*-nitrophenol (*d*) *p*-nitrophenol

47. Which of the following will be readily dehydrated in acidic conditions?

(*a*) 
(*b*) 
(*c*) 
(*d*) 

48. The use of chemicals for treatment of diseases is known as

(*a*) Physiotherapy (*b*) Chemotherapy (*c*) Homeotherapy (*d*) Angiotherapy

49. Interparticle forces present in Nylon-66 are:

(*a*) Van der Waals'
(*b*) Hydrogen bonding
(*c*) Dipole-dipole interactions
(*d*) None of the above

50. Which of the following reaction confirms the presence of carbonyl group (> C=O) in glucose?

(*a*) Reaction with HI
(*b*) Reaction with hydroxylamine
(*c*) Reaction with HCN
(*d*) Both (*b*) and (*c*)

Answers

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1. (*b*)	**2.** (*c*)	**3.** (*a*)	**4.** (*d*)	**5.** (*a*)	**6.** (*a*)	**7.** (*b*)
8. (*a*)	**9.** (*a*)	**10.** (*b*)	**11.** (*a*)	**12.** (*b*)	**13.** (*a*)	**14.** (*a*)
15. (*b*)	**16.** (*b*)	**17.** (*a*)	**18.** (*c*)	**19.** (*a*)	**20.** (*a*)	**21.** (*b*)
22. (*c*)	**23.** (*a*)	**24.** (*a*)	**25.** (*c*)	**26.** (*a*)	**27.** (*c*)	**28.** (*c*)
29. (*b*)	**30.** (*a*)	**31.** (*d*)	**32.** (*b*)	**33.** (*b*)	**34.** (*b*)	**35.** (*b*)
36. (*a*)	**37.** (*b*)	**38.** (*d*)	**39.** (*a*)	**40.** (*a*)	**41.** (*c*)	**42.** (*a*)
43. (*c*)	**44.** (*a*)	**45.** (*d*)	**46.** (*d*)	**47.** (*a*)	**48.** (*b*)	**49.** (*b*)
50. (*d*)						

Solutions

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1. (*b*) An ideal solution has the following condition:

- Volume change (ΔV) of mixing should be zero.
- Enthalpy change (ΔH) of mixing should be zero.
- Obey's Raoult's law at every range of concentration.

2. (*c*) The vapour pressure of a liquid increases with increase in temperature. This is because, with increase in temperature, the K.E. of the molecules increases and therefore large number of molecules will be available for escaping from the surface of the liquid.

It is independent of surface area and volume of the container.

3. (*a*) Isotonic solution have same osmotic pressure.

$$\pi_1 = C_1RT,\ \pi_2 = C_2RT$$

$$\Rightarrow \quad \pi_1 = \pi_2$$

Or, $C_1RT = C_2RT$

$$\frac{n_1}{V}RT = \frac{n_2}{V}RT$$

$$\frac{1.5}{60} = \frac{n_2}{M}$$

$$\frac{1.5}{60} = \frac{5.25}{M}$$

$$M = \frac{5.25 \times 60}{1.5} = 210 \text{ g mol}^{-1}$$

4. (*d*) The maximum properties of the available volume which may be filled by hard sphere in simple cubic arrangement is given as $\frac{\pi}{6}$ or 0.52.

5. (*a*) The atom in the middle layers will have 12 nearest neighbours. But the atom in topmost layer has 9 nearest neighbours (6 atoms in the same layer + 3 atoms in the bottom layer).

6. (*a*) Schottky defect arises when equal number of cations and anions are missing from the lattice so that electrical neutrality is maintained.

7. (*b*) In crystalloids, solutions easily diffuse through animal membrane due to its particle size of molecular dimensions less than 1nm.

8. (*a*) The correct statement Q is, due to preferential adsorption of S^{2-} ion on the surface of As_2S_3 sol, a sol of As_2S_3 prepared by the action of H_2S on As_2O_3 is negatively charged.

10. (*b*) The cathodic reaction in electrolysis of dilute H_2SO_4 with platinum electrode is reduction.

$$H_2SO_4(aq) \longrightarrow 2H^+(aq) + SO_4^{2-}(aq)$$

$$H_2O \rightleftharpoons H^+ + OH^-$$

At cathode:

$$H^+(aq) + e^- \longrightarrow H \text{ (Primary change)}$$

$$H + H \longrightarrow H_2\uparrow \text{ (Secondary change)}$$

11. (*a*) The strongest reducing agent should have the lowest reduction potential. Thus, Zn is the strongest reducing agent among the given options.

12. (*b*) If *B* is taken in excess, then the order of reaction will be 1. This type of reaction is known as psuedo-first order reaction.

13. (*a*) Arrhenius equation is given as

$$\log k = \log A - \frac{E_a}{2.303RT}$$

$$\text{Slope} = -\frac{E_a}{2.303RT} = -6840 \text{ K}$$

$$\therefore \quad E_a = 2.303 \times 8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 6840 \text{ K}$$

$$E_a = 130966.45 \text{ J mol}^{-1}$$

$$\Rightarrow E_a = 130.97 \text{ kJ mol}^{-1}$$

14. (*a*) For zero order reaction, $t_{1/2} = \frac{[A]_0}{2k}$

Therefore if the initial concentration of the reactant is doubled, the half life time of the reaction is also doubled.

15. (*b*) Fe^{2+}/Fe acts as a anode as its standard reduction potential is low and Fe^{3+}/Fe acts as a cathode as its standard reduction is high.

Thus, the cell formed will be

$$Fe \mid Fe^{2+} \mid\mid Fe^{3+} \mid Fe^{2+}$$

$E^\circ_{cell} = 0.77 + 0.44 = +1.21$ V (As, negative E° value indicates oxidation and positive E° value indicates reduction)

Therefore, if Fe^{2+}, Fe^{3+} and Fe blocks are kept together, then the concentration of Fe^{3+} is decreased because of reduction.

16. (*b*) In the field of electrochemistry, hydrogen is taken to be the reference to measure the potential and therefore, to form the basis for comparison with all other electrode reactions, the value of standard hydrogen electrode potential is taken to be zero volt at all temperature.

17. (*a*) Chromatographic method is based on the principle that different components of a mixture are differently adsorbed on an adsorbent.

18. (*c*) $[Y(SO_4)(NH_3)_5]Cl$

As there are 6 ligands attached to the central metal atom Y. Hence, the coordination number of Y will be 6 and the oxidation number of Y can be calculated as

$[Y(SO_4)(NH_3)_5]Cl$

$$x - 2 + 5 \times 0 - 1 = 0$$

$$x - 2 - 1 = 0$$

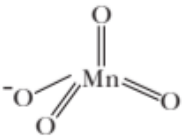
$$x - 3 = 0$$

$$x = +3.$$

Hence, the correct option is (*c*) 6 and 3.

19. (*a*) Mn (Z = 25): [Ar] $3d^5\ 4s^2$

Thus, Mn has 7 electron in the valence shell.



Structure of MnO_4^-

In MnO_4^-, Mn forms 7 bonds and thus it has no unpaired electrons but it shows colour because of ligand to metal charge transfer.

21. (*b*) Thermal stability decreases down the group because as the size of the atom increases the bond dissociation enthalpy decreases.

22. (*c*) The correct order of ionic character of metal halide is in the order:

MI < MBr < MCl < MF

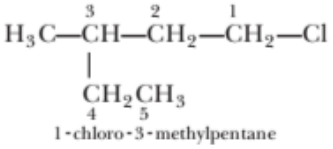
and the correct order of bond dissociation enthalpy is in the order:

$Cl_2 > Br_2 > F_2 > I_2$

23. (*a*) Boiling point of chlorides, bromides and iodides are higher than those of parent hydrocarbon due to greater polarity and higher molecular mass. Thus, the correct increasing order is

Butane < 1-Chlorobutane < 1-Bromobutane < 1-Iodobutane

24. (*a*) The correct IUPAC name of the given compound is



1-chloro-3-methylpentane

25. (*c*) Cobalt(II)chloride has a blue colour in tetrahedral geometry. It changes to pink colour with the change in coordination number to six.

$$\underset{\text{Blue}}{CoCl_2(s)} \rightleftharpoons \underset{\text{Purple}}{CoCl_2.2H_2O(s)} \rightleftharpoons \underset{\text{Pink}}{CoCl_2.6H_2O(s)}$$

26. (*a*) $[CoCl_3(C_5H_5N)_2]Br \longrightarrow [CoCl_3(C_5H_5N)_2]^+ + Br^-$

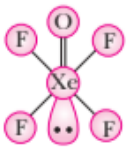
Therefore, it can easily give test for Br- ions.

27. (*c*) Tetrahedral complexes do not show geometrical isomerism as relative position of the ligands attached to central metal atom is same with respect to each other (adjacent). Moreover, tetra coordinated square planar complexes of the type $[MA_4]$, $[MA_3X]$, $[MAX_3]$ are incapable of showing geometrical isomerism because all possible arrangements of ligands in each of these complexes are exactly the same.

28. (*c*) The metals extracted by auto reduction process is Cu, Hg, Pb, etc.

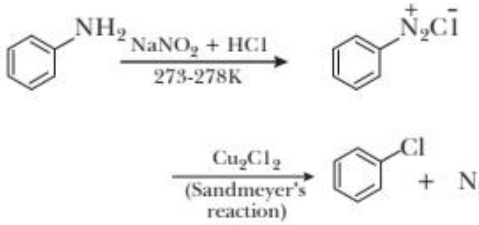
$$2Cu_2O + Cu_2S \longrightarrow 6Cu + SO_2$$

29. (*b*) $XeOF_4(sp^3d^2)$ has square pyramidal geometry. The structure is as follow:



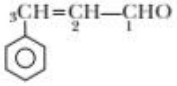
$XeOF_4$ (sp^3d^2)
Square pyramidal

30. (*a*)



31. (*d*) The correct assertion is, "The bond length of O—O in molecular oxygen (O_2) is 120.7 pm while in ozone molecule (O_3), it is 128 pm.

32. (*b*)

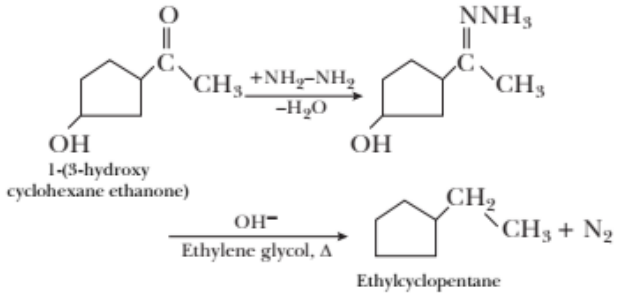


IUPAC name: 3-phenylprop-2-enal

33. (*b*) The —$\ddot{N}$H group is ortho and para directing while the >C=O group is meta directing due to its electron withdrawing nature. Since the nitration involves electrophilic attack, the NO_2 group will prefer to occupy a position in the left ring to which the —NH group is directly attached. Therefore (*b*) will be the major product.

Note: NO_2 group is not attached at ortho position due to bulky ring present adjacent to it.

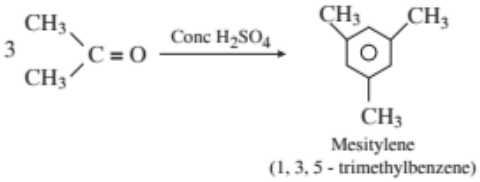
34. (*b*)



35. (*b*) $\underset{\text{Isopropyl methyl ether}}{(CH_3)_2CH—O—CH_3} + HI \longrightarrow \underset{\text{Isopropyl alcohol}}{(CH_3)_2CH—OH} + \underset{\text{Methyl iodide}}{CH_3I}$

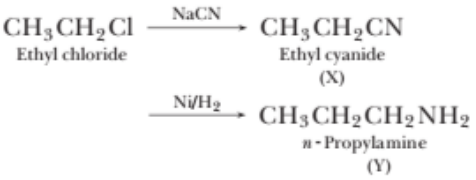
Here, iodine will attach to methyl forming methyl iodide.

36. (*a*)



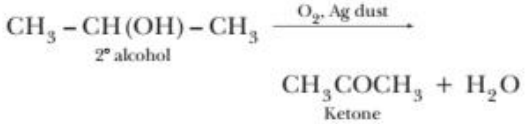
Mesitylene
(1, 3, 5 - trimethylbenzene)

37. (*b*)

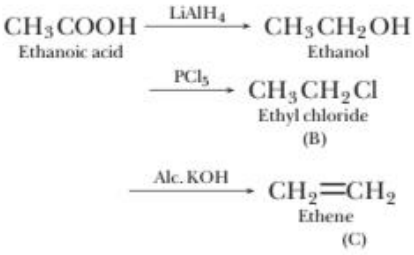


38. (*d*) Primary alcohol or secondary alcohol (2-hydroxypropane) can be oxidized to the corresponding aldehyde, ketones or carboxylic acids by oxidation.

2-hydroxypropane vapour is provided moderately over the Ag dust at 250°C in presence of air to form carbonyl compound.

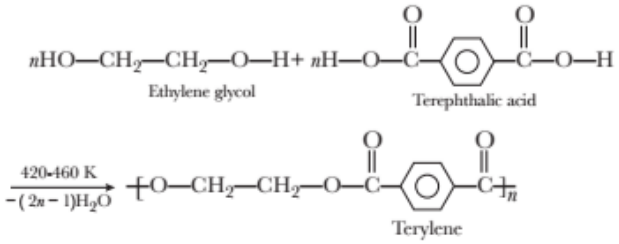


39. (*a*)



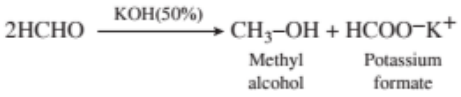
40. (*a*) Antihistamines are drugs which treat allergic rhinitis and other allergies. Antihistamines can give relief when a person has nasal congestion, sneezing, or hives because of pollen, dust mites, or animal allergy. Typically people take antihistamines as an inexpensive, generic, over-the-counter drug with few side effects. As an alternative to taking an antihistamine, people who suffer from allergies can instead avoid the substance which irritates them. However, this is not always possible as some substances, such pollen, are carried in the air, thus making allergic reaction caused by them generally unavoidable.

41. (*c*) The structure of terylene is



42. (*a*) In RNA, thymine is replaced by uracil.

43. (*c*)



44. (*a*)

45. (*d*) Glycogen is present in liver, muscles and brain in animals.

46. (*d*) Deprotonation of *p*-nitrophenol gives *p*-nitrophenoxide ion. The negative charge on O atom is stabilised as strongly electron withdrawing nitro group is present at para position (—R effect). This effect is some what less in *m*-nitrophenol as at *m*-position, $-NO_2$ groups withdraws electron by weaker —I effect. In case of *p*-aminophenol, deprotonation gives *p*-aminophenoxide ion. The negative charge on O atom is destabilised as electron releasing amino group is present in para position. Therefore, *p*-nitrophenol is most acidic.

47. (*a*) Dehydration of  results in formation of α, β unsaturated ketones.

48. (*b*) The word '*chemo*' means 'chemicals' and '*therapy*' means treatment. Thus, chemotherapy is the treatment of disease with the use of chemicals.

49. (*b*) Nylon 6,6 has strong intermolecular forces like hydrogen bonding. These strong forces also lead to close packing of chains and thus impart crystalline nature.

50. (*d*) Glucose reacts with hydroxylamine to form an oxime and adds a molecule of hydrogen cyanide to give cyanohydrin. These reactions confirm the presence of a carbonyl group.