11

PRACTICE PAPER

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

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

Choose the correct option.

1. **AB crystallizes in a body centred cubic lattice with edge length '*a*' equal to 387 pm. The distance between two oppositely charged ions in the lattice is**
   (*a*) 250 pm (*b*) 200 pm
   (*c*) 300 pm (*d*) 335 pm
2. **The closest packing sequence ABAB... represents**
   (*a*) primitive cubic packing (*b*) hexagonal close packing
   (*c*) *fcc* packing (*d*) *bcc* packing
3. **The radius of an octahedral void relative to the radius of the spheres in a close packing is**
   (*a*) 1·414 (*b*) 0·225
   (*c*) 0·414 (*d*) 1·225
4. **In a mixture of A and B, components show negative deviation when**
   (*a*) A–B interaction is stronger than A–A and B–B interaction
   (*b*) A–B interaction is weaker than A–A and B–B interaction
   (*c*) $\Delta V_{mix} > 0, \Delta S_{mix} > 0$
   (*d*) $\Delta V_{mix} = 0, \Delta S_{mix} > 0$
5. **A solution containing 10 g per dm^3 of urea (molecular mass = 60 g mol^{-1}) is isotonic with a 5% solution of a non-volatile solute. The molecular mass of the non-volatile solute is**
   (*a*) 200 g mol^{-1} (*b*) 250 g mol^{-1}
   (*c*) 300 g mol^{-1} (*d*) 350 g mol^{-1}
6. **Given below are two statements labelled as Assertion and Reason:**
   Assertion (A) : Raoult's law is a special case of Henry's law.
   Reason (R) : Higher the value of K_H at a given pressure, the lower is the solubility of the gas in the liquid.
   (*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.
7. **Unit of cell constant is _____**
   (*a*) $ohm^{-1}\ cm^{-1}$ (*b*) $ohm^{-1}\ cm^2(gm.\ equiv)^{-1}$
   (*c*) cm^{-1} (*d*) $ohm^{-1}\ cm^2$

8. A piece of magnesium ribbon is placed into a solution of $AgNO_3$. Later it was seen that Mg has dissolved and crystals of silver has appeared. Which of the following statement is true regarding the given observation?

(*a*) Mg is more electropositive than Ag.

(*b*) Mg acts as an oxidising agent in presence of $AgNO_3$.

(*c*) Mg has higher density than silver.

(*d*) Mg has lower density than silver.

9. Match the items of Column I and Column II.

Column I	Column II
A. Lead storage battery	(*i*) maximum efficiency
B. Mercury cell	(*ii*) prevented by galvanisation
C. Fuel cell	(*iii*) gives steady potential
D. Rusting	(*iv*) Pb is anode, PbO_2 is cathode

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

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

(*c*) A–(*i*), B–(*ii*), C–(*iii*), D–(*ii*)

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

10. What will be the order of reaction if doubling of the concentration of a reactant increases the rate by a factor of 4 and trebling the concentration of the reactant increases the rate by a factor of 9?

(*a*) First order

(*b*) Zero order

(*c*) Second order

(*d*) Third order

11. The rate of a gaseous reaction is given by the expression, rate = $k[A][B]$. If the volume of the reaction vessel is suddenly reduced to 1/8 of the initial volume, the reaction rate related to original rate will be

(*a*) 1/64 (*b*) 1/16 (*c*) 8 (*d*) 64

12. Which one of the following is an unimolecular reaction?

(*a*) $2HI \longrightarrow I_2 + H_2$

(*b*) $N_2O_5 \longrightarrow N_2O_4 + \frac{1}{2}O_2$

(*c*) $H_2 + Cl_2 \longrightarrow 2HCl$

(*d*) $PCl_3 + Cl_2 \longrightarrow PCl_5$

13. Which statement is incorrect for heterogeneous catalysis?

(*a*) Catalyst is adsorbed on the surface

(*b*) Active centres are found on the surface of catalyst

(*c*) Catalyst increases the energy of activation

(*d*) None of the above

14. Which of the following is an example of absorption?

(*a*) Water on silica gel

(*b*) Water on calcium chloride

(*c*) Hydrogen on finely divided nickel

(*d*) Oxygen on metal surface

15. When a rod of metal A is dipped in an aqueous solution of metal B(Conc. of B being 1·0 M) at 25°C, the standard electrode potential, are $A^{2+}/A = -0.76$ V and $B^{2+}/B = 0.34$ V. Which of the following statement is correct regarding the given observation?

(*a*) A will gradually dissolve.

(*b*) B will deposit on A.

(*c*) No reaction will occur.

(*d*) Water will decompose into H_2 and O_2.

16. Which of the following solutions of KCl will have highest specific conductance?

(*a*) 0.0001 N

(*b*) 0.001 N

(*c*) 0.01 N

(*d*) 1.0 N

17. The transition metals have a less tendency to form ions due to

(*a*) High ionisation energy

(*b*) Low heat of hydration of ions

(*c*) High heat of sublimation

(*d*) All of the above

18. Thermite is a mixture of iron oxide and

(*a*) Al powder

(*b*) zinc powder

(*c*) sodium shavings

(*d*) K metal

19. **Among the ions Zn^{2+}, Ni^{2+} and Cr^{3+} (At. Nos. Zn = 30, Ni = 28, Cr = 24)**

(*a*) Only Zn^{2+} is colourless while Ni^{2+} and Cr^{3+} are coloured.

(*b*) All of these are coloured.

(*c*) All of these are colourless.

(*d*) Only Ni^{2+} is coloured while Zn^{2+} and Cr^{3+} are colourless.

20. **Which of the following is not an organometallic compound?**

(*a*) RMgX (*b*) $(C_2H_5)_4Pb$

(*c*) $(CH_3)_4Sn$ (*d*) C_2H_5ONa

21. **In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti-Markownikov's addition to alkenes because**

(*a*) both are highly ionic.

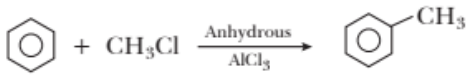
(*b*) one is oxidising and the other is reducing.

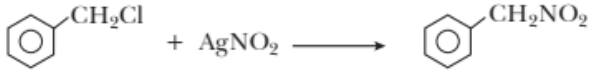
(*c*) one of the step is endothermic in both the cases.

(*d*) all the steps are exothermic in both the reactions.

22. **Which of the following is a free radical substitution reaction?**

(*a*) 

(*b*) 

(*c*) 

(*d*) $CH_3CHO + HCN \longrightarrow CH_3CH(OH)CN$

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

Statement P : Nitrogen does not form compounds in +5 oxidation state with halogens.

Statement Q : All oxidation states of nitrogen from +1 to +4 tend to disproportionate in acid solution.

(*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

24. **Which of the following is not an acidic flux?**

(*a*) $CaCO_3$ (*b*) Borax

(*c*) SiO_2 (*d*) Both (*a*) and (*b*)

25. **Number of moles of $K_2Cr_2O_7$ reduced by one mole of Sn^{2+} ion is**

(*a*) $\frac{1}{3}$ (*b*) 3 (*c*) $\frac{1}{6}$ (*d*) 6

26. **The reactivity order of halides for dehydrohalogenation is**

(*a*) RF > RCl > RBr > RI (*b*) RI > RBr > RCl > RF

(*c*) RI > RCl > RBr > RI (*d*) RF > RI > RBr > RCl

27. **Which of the following compounds has tetrahedral geometry?**

(*a*) $[Ni(CN)_4]^{2-}$ (*b*) $[Pd(CN)_4]^{2-}$ (*c*) $[PdCl_4]^{2-}$ (*d*) $[NiCl_4]^{2-}$

28. **Among the following complexes, the complex which exhibit paramagnetic behaviour and is an outer orbital complex is**

(*a*) $[Ni(NH_3)_6]^{2+}$ (*b*) $[Co(NH_3)_6]^{3+}$ (*c*) $[Zn(NH_3)_6]^{2+}$ (*d*) $[Cr(NH_3)_6]^{3+}$

29. **The source of most of the noble gases is**

(*a*) decay of radioactive minerals. (*b*) the atmospheric air.

(*c*) natural gases coming out of the earth. (*d*) the decay of rocks.

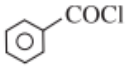
30. **Among the given compounds, the interhalogen compound is**

(*a*) $HClO_4$ (*b*) HCl (*c*) ClF_3 (*d*) Cl_2

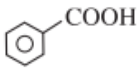
31. **Which of the following bonds has the highest energy?**

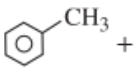
(*a*) Se—Se (*b*) Te—Te (*c*) S—S (*d*) O—O

32. **Reaction by which benzaldehyde cannot be prepared?**

(*a*)  + H_2 in presence of Pd–$BaSO_4$

(*b*)  + CO + HCl in presence of $AlCl_3$

(*c*)  + Zn/Hg and conc. HCl

(*d*)  + CrO_2Cl_2 in CS_2 followed by H_3O^+

33. **Dye test can be used to distinguish between:**

(*a*) Ethylamine and acetamide (*b*) Ethylamine and aniline

(*c*) Urea and acetamide (*d*) Methylamine and ethylamine

34. **Which of the following is/are examples of artificial sweetener?**

(*a*) Sucralose (*b*) Saccharin

(*c*) Neotame (*d*) All of these

35. **Picric acid is**

(*a*) trinitrotoluene (*b*) *o*-nitrophenol

(*c*) 2,4,6–trinitrophenol (*d*) phenol

36. **Which one of the following is used to make 'non-stick' cookwares?**

(*a*) PVC (*b*) Polystrene

(*c*) Poly ethylene terephthalate (*d*) Polytetrafluoroethylene

37. **Glucose molecule reacts with X number of molecules of phenyl hydrazine to yield osazone. The value of X is**

(*a*) three (*b*) two (*c*) one (*d*) four

38. **The product formed by the reaction of an aldehyde with a primary amine is**

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

39. **Which of the following reactions will not give a primary amine?**

(*a*) $CH_3CONH_2 \xrightarrow{Br_2/KOH}$ (*b*) $CH_3CN \xrightarrow{LiAlH_4/Ether}$

(*c*) $CH_3NC \xrightarrow{LiAlH_4/Ether}$ (*d*) $CH_3CONH_2 \xrightarrow{LiAlH_4/Ether}$

40. **An organic compound with molecular formula C_3H_5N on hydrolysis gives an acid which reduces Fehling solution. The compound can be:**

(*a*) Ethyl carbylamine (*b*) Ethanenitrile

(*c*) Ethoxyethane (*d*) Propanenitrile

41. **Phenol on distillation with Zn dust produces**

(*a*) zinc phenoxide (*b*) benzene

(*c*) *o*–chlorophenol (*d*) benzyl alcohol

42. **Dinucleotide is obtained by joining two nucleotides together by phosphodiester linkage. Between which carbon atoms of pentose sugars of nucleotides are these linkages present?**

(*a*) 5′ and 3′ (*b*) 1′ and 5′

(*c*) 5′ and 5′ (*d*) 3′ and 3′

43. **Enzymes provide active sites for holding the substrate molecules through a variety of interactions like**

(*a*) co-ordinate bonding (*b*) metallic bonding

(*c*) covalent bonding (*d*) hydrogen bonding

44. **Glyptal polymer is obtained from glycol by reacting it with**

(*a*) Malonic acid (*b*) Phthalic acid

(*c*) Maleic acid (*d*) Acetic acid

45. **Treatment of cyclopentanone with methyl lithium gives which of the following species?**

(*a*) cyclopentanoyl radical (*b*) cyclopentanoyl biradical

(*c*) cyclopentanoyl anion (*d*) cyclopentanoyl cation

46. **For the reaction of phenol with $CHCl_3$ in presence of KOH, the electrophile is**

(*a*) $\overset{+}{C}HCl_2$ (*b*) $:CCl_2$

(*c*) $*CHCl_2$ (*d*) None of these

47. **Which of the following products is formed when benzaldehyde is treated with CH_3MgBr and the addition product so obtained is subjected to acid hydrolysis?**

(*a*) A secondary alcohol (*b*) A primary alcohol

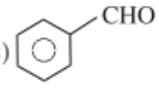
(*c*) phenol (*d*) tert-butyl alcohol

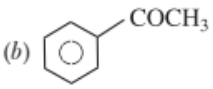
48. **Benzyl alcohol and phenol can be distinguished by**

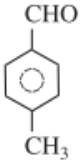
(*a*) Lucas reagent (*b*) $FeCl_3$

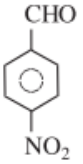
(*c*) PCl_5 (*d*) Na–metal

49. **Which one is most reactive towards nucleophilic addition reaction?**

(*a*) 

(*b*) 

(*c*) 

(*d*) 

50. **In DNA, the complimentary bases are**

(*a*) Uracil and Adenine : Guanine and Cytosine

(*b*) Adenine and Thymine : Guanine and Cytosine

(*c*) Adenine and Thymine : Guanine and Uracil

(*d*) Adenine and Guanine : Thymine and Cytosine

Answers

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

Solutions

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1. (*d*) Distance between two oppositely charge ions for BCC

$$(r^+ + r^-) = \frac{a\sqrt{3}}{2} = \frac{387 \times \sqrt{3}}{2} = 335.15 \text{ pm}$$

2. (*b*) The closest-packing sequence ABAB... represents hexagonal packing. In every second row, the particles occupy the depressions between the particles of first row. In the third row, the particles are vertically aligned with those in the first row giving ABABAB... arrangement.

3. (*c*) The radius of the sphere that would fit well into an octahedral void in a close-packing is given by $r = 0.414R$; where r = radius of octahedral void and R = radius of sphere.

4. (*a*) In a mixture of A and B, components show negative deviation as

$\Delta H_{mix} = -$ve and $\Delta V_{mix} = -$ve

This can be explained as

If the force of attraction between molecules of A and B in the solution are stronger than that of between A–A and B–B, then the tendency of escaping of molecules AB from the solution becomes less than that of pure liquids.

The total pressure of the solution will be lower than the corresponding vapour pressure of ideal solution of the same component A and B. This type of solution shows negative deviation from Raoult's law.

5. (*c*) 5% solution of non-volatile solute means 5 g of solute present in 100 mL of solution. For isotonic solution,

$$\pi_{urea} = \pi_{non\text{-}volatile\ solute}$$

$$C_{urea}RT = C_{non\text{-}volatile\ solute} \times R \times T$$

$$\frac{n_{urea}}{V}RT = \frac{n_{non\text{-}volatile\ solute}}{V}RT$$

$$\frac{w_{urea}}{M_{urea} \times V}RT = \frac{w_{non\text{-}volatile\ solute} \times RT}{M_{non\text{-}volatile\ solute} \times V}$$

$$\frac{10}{60 \times 1000} = \frac{5}{M \times 100}$$

$$M = \frac{5 \times 60 \times 1000}{10 \times 100} = 300 \text{ g mol}^{-1}$$

6. (*b*) Assertion and reason both are correct statements but reason is not correct explanation for assertion. The correct explanation is 'Raoult's law becomes a special case of Henry's law when K_H becomes equal to p_1° in Henry's law.'

7. (*c*) The cell constant of a conductor is defined as the ratio of distance between two parallel electrodes of a cell to the area of cross-section of each electrode. It is denoted by G^*.

$$G^* = \frac{l}{A}$$

$$\text{Unit of cell constant} = \frac{\text{Unit of length}}{\text{Unit of Area}} = \frac{\text{cm}}{\text{cm}^2} = \text{cm}^{-1}$$

8. (*a*) Magnesium is more electropositive than silver, therefore, it is more reactive than silver. So it has tendency to replace silver from its salt solution.

10. (*c*) Rate = $k[A]^m$

Since on doubling and trebling the concentration of reactant, the rate increases by a factor of 4 and 9.Therefore the order of reaction is 2.

11. (*d*) Concentration is inversely proportional to volume. If the volume of vessel is reduced to 1/8th, then the concentration will be increased 8 times.

Now, Rate = $k[A][B]$

Therefore, rate will become 64 times.

12. (*b*) Molecularity is the number of reacting species (molecules, atoms, ions) taking part in an elementary reaction which must collide simultaneously in order to bring about a chemical reaction. Thus reaction given in option 'b' is an unimolecular reaction.

13. (*c*) Catalyst decreases the activation energy by lowering the potential energy barrier.

14. (*b*) Absorption is a bulk phenomenon, *e.g.*, water vapours absorbed by anhydrous calcium chloride as the water vapours are uniformly distributed in $CaCl_2$ to form hydrated calcium chloride ($CaCl_2.2H_2O$).

15. (*a*) Given, $A^{2+}/A = -0.76$ V, $B^{2+}/B = 0.34$ V.

The cell can be represented as $A^{2+}|A||B^{2+}|B$

Cell reaction:

At anode: $A \longrightarrow A^{2+} + 2e^-$

At cathode: $B^{2+} + 2e^- \longrightarrow B$

Overall reaction: $A + B^{2+} \longrightarrow A^{2+} + B$

$\therefore E^\circ_{cell} = E_R - E_L = 0.34 - (-0.76) = 1.1$ V

Since E°_{cell} is positive, therefore, cell reaction is feasible and A will gradually dissolve.

16. (*d*) $\kappa = \Lambda_{eq} \times N/1000$

where κ = specific conductance, Λ_{eq} = equivalent conductance, N=normality of solution

At constant Λ_{eq} , $\kappa \propto N$

Therefore,Higher the normality of solution higher will be its specific conductance. Thus, 1 N solution of KCl will have highest specific conductance.

17. (*d*) Transition metals have a lesser tendency to form ions (than alkali or alkaline earth metals). This is due to of high ionisation energy, low enthalpy of hydration of their ions and high heat of sublimation.

18. (*a*) The thermite is a mixture of finely powdered aluminum and iron(III) oxide in a mass ratio of 1:3 respectively.

19. (*a*) The electronic configuration of the given ions are as follows:

$Zn(Z = 30)$: $[Ar]\ 3d^{10}\ 4s^2$

Zn^{2+} : $[Ar]\ 3d^{10}$

$Ni(Z = 28)$: $[Ar]\ 3d^8\ 4s^2$

Ni^{2+} : $[Ar]\ 3d^8$

$Cr(Z = 24)$: $[Ar]\ 3d^5\ 4s^1$

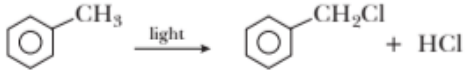
Cr^{3+} : $[Ar]\ 3d^3$

Since, ions with presence of unpaired electrons is coloured and therefore, Ni^{2+} (with 2 unpaired electrons) and Cr^{3+} (with 3 unpaired electrons) will be coloured while Zn^{2+} (with no unpaired electron) will be colourless.

20. (*d*) Organometallic Compounds are those chemical compounds which contain at least one bond between a metallic element and a carbon atom belonging to an organic molecule.

21. (*c*) In case of HI, HF and HCl, one of the step is endothermic while in case of HBr, both the steps are exothermic and therefore HI, HF and HCl does not undergo anti Markovnikov's addition in presence of peroxide.

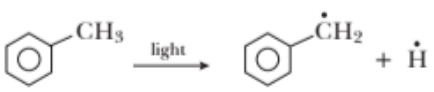
22. (*a*) The reaction



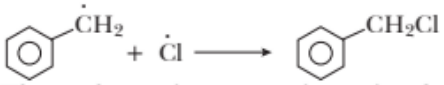
is a free radical substitution reaction. This can be explained as

Step I: $Cl_2 \xrightarrow{\text{Sunlight}} 2\dot{Cl}$

StepII:



Step III:



The other given reactions involves the formation of ions.

23. (*c*) (*i*) As there are no empty *d*-orbitals, nitrogen does not form pentahalide.

(*ii*) In case of Nitrogen, its oxidation number varies from –3 to +5. If Nitrogen has any oxidation number out of +1 to +4 in any compound then it has possibility to increases its oxidation upto +5 and also can decrease upto –3. Hence, all oxidation states from +1 to +4 of Nitrogen tend to disproportionate.

Thus, both the statements are correct.

24. (*a*) Borax and SiO_2 are examples of an acidic flux and $CaCO_3$ is an example of basic flux.

25. (*a*) $Cr_2O_7^{2-} + 14H^+ + 3Sn^{2+} \longrightarrow 2Cr^{3+} + 3Sn^{4+} + 7H_2O$

3 moles of Sn^{2+} reduce 1 mole of $K_2Cr_2O_7$

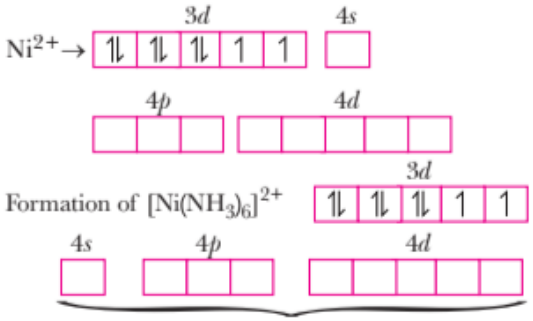
1 moles of Sn^{2+} will reduce $\frac{1}{3}$ moles of $K_2Cr_2O_7$

26. (*b*) Alkyl iodides are most reactive and alkyl fluorides are least reactive. Iodide ion is a good leaving group, as the negative charge is on a larger atom and is dispersed. Moreover, C—I bond is weaker than C—F bond. Therefore,

Reactivity order of halides for dehydrohalogenation is RI > RBr > RCl > RF.

27. (*d*) CN^- is a strong field ligand and therefore forms square planar complex due to pairing of electrons. Since $[PdCl_4]^{2-}$ is diamagnetic 4*d* complex and therefore forms square planar complex. Hence $[NiCl_4]^{2-}$ has tetrahedral geometry due to presence of weak field ligand.

28. (*a*) $Ni_{28} \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^8$



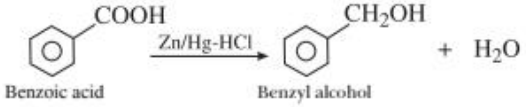
$sp^3\ d^2$ hybridisation

$[Ni(NH_3)_6]^{2+}$ exhibit paramagnetism and is an outer orbital complex. This complex contains unpaired electrons and it utilises outer *d*-orbitals for bonding.

30. (*c*) Interhalogen compounds can be assigned general composition as XX', XX'_3, XX'_5, and XX'_7 where X is halogen of larger size and X' of smaller size and X is more electropositive than X'.

31. (*c*) As we move down the group from S to Se and Te, the bond energy decreases. Out of S—S and O—O, the former has highest energy as it has tendency to form strong covalent bond as compared to oxygen. Also due to small size, the lone pairs of electrons on oxygen atoms repel the bond pair of the O—O bond to a greater extent than the lone pairs of electrons on the sulphur atoms in S—S bond.

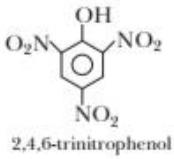
32. (*c*)



33. (*b*) Azo dye test is given by only primary aromatic amines. Thus, aniline gives dye test while ethylamine does not.

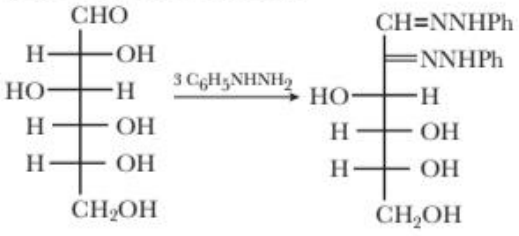
34. (*d*) Artificial sweeteners are used in one of two ways. They may be used directly in commercially processed foods, or they are mixed with one or more starch-based sweeteners before sale to consumers. Artificial sweeteners are so intensely sweet that dextrose or maltodextrin, or both, must be added to dilute their intense sweetness in order to imitate the sweetness of a sugar. Artificial sweeteners can not be sold directly to consumers since only infinitesimally small amounts are required to mimic sugar's sweet taste. All of the given compounds are artificial sweeteners.

35. (*c*) The structure of picric acid is

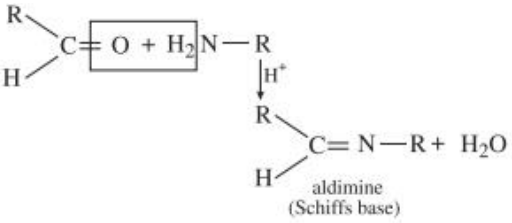


36. (*d*) Polytetrafluoroethylene or Teflon is used to make non-stick cookwares.

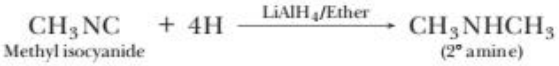
37. (*a*)



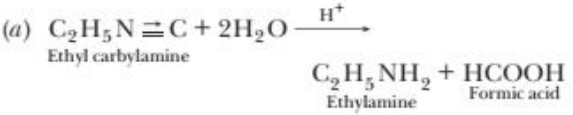
38. (*b*) The reaction between an aldehyde or ketone with a primary amine produces azomethines or imines called as Schiff's base.



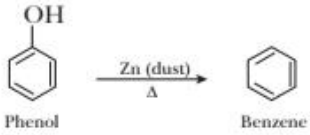
39. (*c*)



40. (*a*)



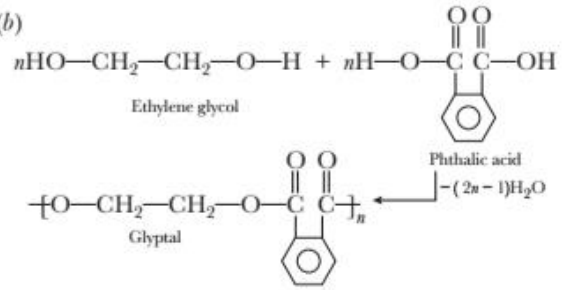
41. (*b*)



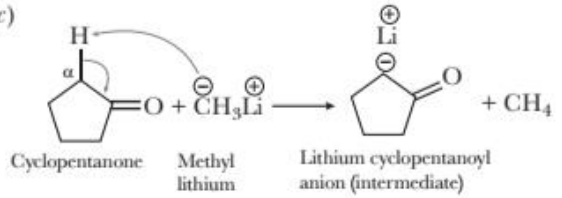
42. (*a*) Nucleotides are joined together by phosphodiester linkage between 5′ and 3′ carbon atoms of the pentose sugar to form dinucleotides.

43. (*d*) Enzymes provide active sites for holding the substrate molecules through a variety of interactions like ionic bonding, hydrogen bonding, Van der Waals forces and dipole-dipole interactions. They also provide such functional groups that will attack the substrate to facilitate the chemical reaction as the reagent attacks.

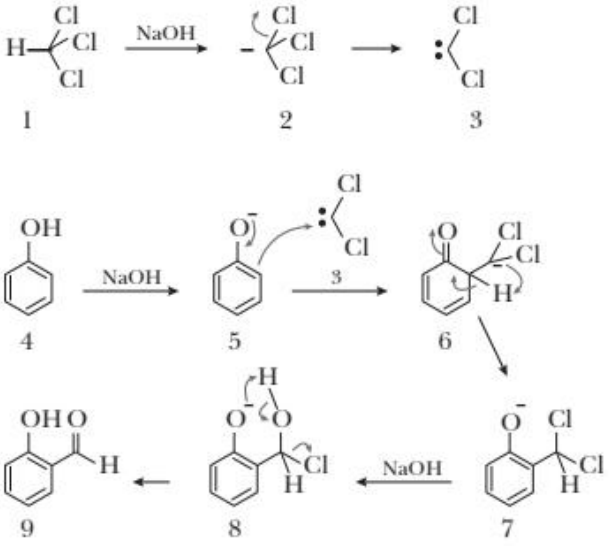
44. (*b*)



45. (*c*)



46. (*b*) In the given reaction, the electrophile involved is dichlorocarbene($:CCl_2$). In Reimer-Tiemann reaction, phenol in presence of NaOH/KOH reacts with chloroform to give salicyladehyde.



47. (*a*) $C_6H_5CHO \xrightarrow[H^+/H_2O]{CH_3MgBr} \underset{2^o \text{ alcohol}}{C_6H_5CH(OH)CH_3}$

48. (*b*) Phenol gives a violet-coloured water soluble complex with ferric chloride while benzyl alcohol does not react with $FeCl_3$.

$$6C_6H_5OH + FeCl_3 \xrightarrow{373\ K} \underset{\text{Violet complex}}{[Fe(OC_6H_5)_6]^{3-}} + 3H^+ + 3HCl$$

Phenol

In general, all compounds containing phenolic group ($=\overset{|}{C}-OH$) respond to this test. However, the colours of complexes are different such as green, blue, violet, etc., and depend upon the structure of phenols.

49. (*d*) Due to the presence of a strong electron withdrawing group at *p*-position, the —CHO group becomes more electron deficient and succeptible to nucleophillic attack.

50. (*b*) Adenine forms hydrogen bonds with thymine whereas cytosine forms hydrogen bonds with guanine.