PRACTICE PAPER

7

CHEMISTRY

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

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

Choose the correct option.

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

Assertion (A) : *o*-Nitrophenol is less soluble in water than the *m*- and *p*-isomers.

Reason (R) : *m*- and *p*- Nitrophenols exist as associated molecules.

(*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.

2. A photochemical reaction is

(*a*) catalysed by light (*b*) initiated by light

(*c*) accompanied with emission of light (*d*) none of these

3. If 'x' is the initial concentration of reactants undergoing chemical change following zero order kinetic, and 'k' is the rate constant, then the time required for the reaction to go completion is

(*a*) $\frac{x}{k}$ (*b*) $\frac{k}{x}$ (*c*) $\frac{k}{2x}$ (*d*) $\frac{2k}{x}$

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

Assertion (A) : If the activation energy of a reaction is zero, temperature will have no effect on the rate constant.

Reason (R) : Lower the activation energy, faster is the reaction.

(*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.

5. The formula of determination of pH value of a solution by using hydrogen electrode is

(*a*) $\text{pH} = \frac{-E}{0.0591}$ (*b*) $E = E^\circ + 0.0591\ \text{pH}$

(*c*) $E_{cell} = E^\circ_{cell} + 0.0591$ (*d*) $\text{pH} = \frac{0.4574 - E_{cell}}{0.0591}$

6. The value of log K_c for the given reaction is

$$\mathbf{Fe}(s) + \mathbf{Cd}^{2+}(aq) \rightleftharpoons \mathbf{Fe}^{2+}(aq) + \mathbf{Cd}(s)$$

[Given, $E^\circ_{Fe^{2+}/Fe} = -0.44$ V, $E^\circ_{Cd^{2+}/Cd} = -0.40$ V]

(*a*) 28.93 (*b*) 1.354 (*c*) 48.32 (*d*) 13.53

7. **At a given temperature, osmotic pressure of a concentrated solution of a substance _____.**

(*a*) is higher than that of a dilute solution

(*b*) is lower than that of a dilute solution

(*c*) is same as that of a dilute solution

(*d*) cannot be compared with osmotic pressure of dilute solution

8. **Molal elevation constant is calculated from the enthalpy of vapourisation ($\Delta_{vap}H$) and boiling point of the pure solvent ($T°$) using the relation:**

(*a*) $K_b = \dfrac{M_A RT^{\circ 2}}{1000\,\Delta_{vap}H}$ (*b*) $K_b = \dfrac{1000\,RT^2}{M_A\Delta_{vap}H}$ (*c*) $K_b = \dfrac{\Delta_{vap}H}{1000\,M_A RT^{\circ 2}}$ (*d*) $K_b = \dfrac{1000\,M_A T^{\circ 2}}{\Delta_{vap}HR}$

9. **In a face centred cubic lattice, atom A occupies the corner positions and atom B occupies the face centre positions. If one atom of B is missing from one of the face centred points, the formula of the compound is:**

(*a*) AB_2 (*b*) A_2B_3 (*c*) A_2B_5 (*d*) A_2B

10. **Which one of the following is an amorphous solid?**

(*a*) Diamond (*b*) Graphite (*c*) Common salt (*d*) Glass

11. **If the specific conductance and conductance of a solution is same, then its cell constant is equal to**

(*a*) 1 (*b*) 0 (*c*) 10 (*d*) 100

12. **Match the cells given in Column I with the information given in Column II.**

Column I	Column II
A. Leclanche cell	(*i*) cell reaction $2H_2 + O_2 \rightarrow 2H_2O$
B. Ni–Cd cell	(*ii*) does not involve any ion in solution and is used in hearing aids.
C. Fuel cell	(*iii*) rechargeable
D. Mercury cell	(*iv*) reaction at anode, $Zn \rightarrow Zn^{2+} + 2e^-$

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

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

13. **The unit of rate constant of a zero order reaction is**

(*a*) litre second^{-1} (*b*) litre mol^{-1} second^{-1}

(*c*) mol litre^{-1} second^{-1} (*d*) mol second^{-1}

14. **The contribution of an atom at the edge centre of a unit cell is**

(*a*) $\frac{1}{8}$ (*b*) $\frac{1}{4}$ (*c*) $\frac{1}{2}$ (*d*) 1

15. **The relative lowering of vapour pressure is equal to the mole fraction of solute. The law is known as**

(*a*) Henry's law (*b*) Raoult's law

(*c*) Ostwald's dilution law (*d*) Van't Hoff law

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

Assertion (A) : Mercury cell does not give steady potential.

Reason (R) : In the cell reaction, ions are not involved in solution.

(*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.

17. **Which of the following ion has the largest radius?**

(*a*) Co^{3+} (*b*) Mn^{3+} (*c*) Fe^{3+} (*d*) Cr^{3+}

18. **Which of the following compounds can show optical isomerism?**

(*a*) *trans*-$[Co(en)_2\,Cl_2]Br$ (*b*) $[Co(en)_3]Cl_3$

(*c*) *trans*-$[Co(NH_3)_4\,Cl_2]Cl$ (*d*) $[Co(NH_3)_5\,Cl]Cl_2$

19. Which of the following is an organometallic compound?

(*a*) $Ti(C_2H_4)_4$ (*b*) $Ti(OC_2H_5)$ (*c*) $Ti(OCOCH_3)_4$ (*d*) $Ti(OC_6H_5)$

20. Slag is formed by the reaction between

(*a*) ore and reducing agent (*b*) ore particles

(*c*) ore and flux (*d*) impurities in the ore and flux

21. Which of the following statement is not true for helium?

(*a*) He is used in gas-cooled nuclear reactors (GCR).

(*b*) He is used as cryogenic agent for carrying out experiments at low temperature.

(*c*) He is used to fill gas balloons instead of hydrogen because it is lighter than hydrogen and non-inflammable.

(*d*) He is used as a diluent for oxygen in modern diving apparatus.

22. When HCl gas is treated with propene in presence of benzoyl peroxide, it gives

(*a*) 2-chloropropane (*b*) allyl chloride

(*c*) no reaction (*d*) *n*-propyl chloride

23. Which reagent will you use for the following reaction?

$$CH_3CH_2CH_2CH_3 \longrightarrow CH_3CH_2CH_2CH_2Cl + CH_3CH_2CHClCH_3$$

(*a*) Cl_2/ UV light (*b*) $NaCl + H_2SO_4$

(*c*) Cl_2 gas in dark (*d*) Cl_2 gas in the presence of iron in dark

24. Elements of group-15 form compounds in +5 oxidation state. However, bismuth forms only one well characterised compound in +5 oxidation state. The compound is

(*a*) Bi_2O_5 (*b*) BiF_5 (*c*) $BiCl_5$ (*d*) Bi_2S_5

25. Which of the following reaction is incorrect?

(*a*) $2Na_2CrO_4 + 2H^+ \longrightarrow Na_2Cr_2O_7 + 2Na^+ + H_2O$

(*b*) $2MnO_2 + 4KOH + O_2 \longrightarrow 4KMnO_4 + 2H_2O$

(*c*) $MnO_4^- + 8H^+ + 5Fe^{2+} \longrightarrow 5Fe^{3+} + Mn^{2+} + 4H_2O$

(*d*) $MnO_4^- + 5C_2O_4^{2-} + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$

26. Transition metals are often paramagnetic owing to

(*a*) high m.p. and b.p. (*b*) the presence of vacant *d*-orbitals.

(*c*) the presence of unpaired electrons. (*d*) malleability and ductility.

27. During the process of electrolytic refining of copper, metals which settle as 'anode mud' is

(*a*) Pb and Zn (*b*) Sn and Ag (*c*) Fe and Ni (*d*) Ag and Au

28. Which of the isomerism is shown by the complex compound $[Co(NH_3)_5 Br]SO_4$ and $[Co(NH_3)_5 SO_4] Br$?

(*a*) Ionisation (*b*) Linkage (*c*) Coordination (*d*) Optical

29. A solution of (+)-2-chloro-2-phenylethane in toluene racemises slowly in the presence of small amount of $SbCl_5$ due to the formation of

(*a*) carbanion (*b*) carbene (*c*) free radical (*d*) carbocation

30. Which one of the following has O—O bond?

(*a*) Sulphurous acid (*b*) Sulphuric acid

(*c*) Peroxodisulphuric acid (*d*) Pyrosulphuric acid

31. In which case, order of acidic strength is not correct?

(*a*) $HClO_4 > HClO_3 > HClO_2$ (*b*) $HI > HBr > HCl$

(*c*) $HF > H_2O > NH_3$ (*d*) $HIO_4 > HBrO_4 > HClO_4$

32. The protein which maintains blood sugar level is :

(*a*) haemoglobin (*b*) oxytocin

(*c*) insulin (*d*) ptylin

33. The linkage between two carbohydrate moiety in amylopectin is :

(*a*) α−D glucose, C_1-C_4 and C_2-C_6 (*b*) β−D glucose, C_1-C_4 and C_2-C_6

(*c*) α −D glucose, C_1-C_4 and C_1-C_6 (*d*) β−D glucose, C_1-C_4 and C_1-C_6

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

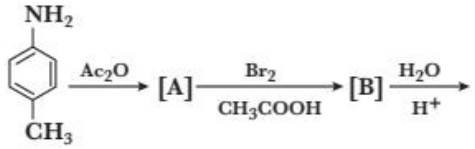
Statement P : Sucrose is a reducing sugar.

Statement Q : The molecule of sucrose is composed of D-glucose and D-fructose units.

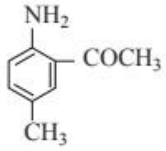
(*a*) P is true, but Q is false (*b*) P is false, but Q is true

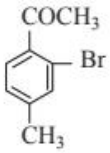
(*c*) Both P and Q are true (*d*) Both P and Q are false

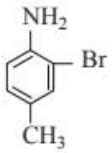
35. In the reaction



The final product [C] is

(*a*) 

(*b*) 

(*c*) 

(*d*) 

36. The IUPAC name of $NH_2—CH_2—CH=CH_2$ is

(*a*) Prop-2-en-1-amine (*b*) Prop-3-en-1-amine

(*c*) Allylmethylamine (*d*) Allylamine

37. The side products formed with primary amine in the Hofmann bromamide degradation reaction is

(*a*) Na_2CO_3 + NaBr (*b*) NaBr + H_2O + NaOH

(*c*) NaBr + H_2O + Na_2CO_3 (*d*) Na_2CO_3 + Br_2 + H_2O

38. An organic compound (X) on treatment with acidified $K_2Cr_2O_7$ gives a compound (Y) which reacts with I_2 and sodium carbonate to form triiodomethane. The compound (X) is

(*a*) CH_3OH (*b*) CH_3COCH_3 (*c*) CH_3CHO (*d*) $CH_3CH(OH)CH_3$

39. Allergy is caused by the production of _____ in the body.

(*a*) Hormones (*b*) Enzymes (*c*) Vitamins (*d*) Histamines

40. Buna-S is a polymer of:

(*a*) Butadiene (*b*) Butadiene and Styrene

(*c*) Styrene (*d*) Butadiene and chloroprene

41. Which of the following reactions is expected to readily give a hydrocarbon product in good yield?

(*a*) $RCOOK \xrightarrow{\text{Electrolysis}}$ (*b*) $RCOOAg \xrightarrow{I_2}$

(*c*) $CH_3CH_3 \xrightarrow{Cl_2,\ h\nu}$ (*d*) $(CH_3)_2CCl_2 \xrightarrow{C_2H_5OH}$

42. Which one of the following aldehdyes gives Cannizzaro reaction when heated with strong alkali?

(*a*) Benzaldehyde (*b*) Acetaldehyde

(*c*) Propionaldehyde (*d*) All the above

43. A narrow spectrum antibiotic is active against_____.

(*a*) gram positive or gram negative bacteria

(*b*) gram negative bacteria only

(*c*) single organism or one disease

(*d*) both gram positive and gram negative bacteria

44. Heating of rubber with sulphur is known as:
(*a*) Galvanisation (*b*) Bessemerisation (*c*) Vulcanisation (*d*) Sulphonation

45. Benzoic acid reacts with conc.HNO_3 and conc.H_2SO_4 to give.
(*a*) *o*-nitrobenzoic acid (*b*) *p*-nitrobenzoic
(*c*) *m*-nitrobenzoic acid (*d*) *o*, *p*-dinitrobenzoic acid

46. Which of the following is most acidic?
(*a*) Phenol (*b*) Benzyl alcohol
(*c*) *o*-chlorophenol (*d*) cyclohexanol

47. The refluxing of $(CH_3)_2$ $NCOCH_3$ with acids gives :
(*a*) $2CH_3NH_2 + CH_3COOH$ (*b*) $2CH_3OH + CH_3CONH_2$
(*c*) $(CH_3)_2$ $NH + CH_3COOH$ (*d*) $(CH_3)_2$ $NCOOH + CH_4$

48. The ionization constant of phenol is higher than ethanol because
(*a*) phenoxide ion is stronger base than ethoxide ion.
(*b*) phenoxide ion is stabilized through delocalization.
(*c*) phenoxide ion is less stable than ethoxide ion.
(*d*) phenoxide ion is bulkier than ethoxide ion.

49. The Cannizzaro reaction given below :

$$2Ph—CHO \xrightarrow{OH^-} Ph—CH_2OH + PhCO_2^-$$

the slowest step is
(*a*) the attack of OH^- at the carbonyl group.
(*b*) the transfer of hydride ion to the carbonyl group.
(*c*) the abstraction of proton from the carboxylic acid.
(*d*) the deprotonation of Ph —CH_2OH.

50. IUPAC name of the compound having the formula Cl_3CCH_2CHO is :
(*a*) 3, 3, 3-Trichloropropanal (*b*) 1, 1, 1-Trichloropropanal
(*c*) 2, 2, 2-Trichloropropanal (*d*) Chloral

Answers

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

Solutions

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1. (*b*) The correct reason is due to intramolecular H–bonding, *o*-nitrophenol is less soluble in water in comparison with *p*-nitrophenol.

2. (*b*) A photochemical reaction is initiated by the absorption of energy in the form of light by a reactant molecule.

3. (*a*) For zero order reaction,

$k = \frac{1}{t}\{[R]_0 - [R]\}$

Here, $[R]_0 = a$

$\therefore [R] = a - x$

Thus, $t = \frac{1}{k}[a - (a - x)]$

$\Rightarrow \quad t = \frac{x}{k}$

4. (*b*) The correct reason is, According to Arrhenius equation

$k = Ae^{-E_a/kt}$

If $E_a = 0, k = Ae^{\circ}$

Now, $e^{\circ} = 1$

Hence, $k = A$ *i.e.*, independent of temperature.

5. (*a*) For hydrogen electrode

$$H^+ + e^- \longrightarrow \frac{1}{2}H_2$$

$$E_{H^+/\frac{1}{2}H_2} = E^{\circ}_{H^+/\frac{1}{2}H_2} - \frac{0.0591}{n}\log\frac{1}{[H^+]}$$

Here, $n = 1$

$$\log\frac{1}{[H^+]} = pH$$

$$\because \quad E^{\circ}_{H^+/\frac{1}{2}H_2} = 0$$

$$\therefore \quad E_{H^+/\frac{1}{2}H_2} = 0 - \frac{0.0591}{1}pH$$

$$pH = -\frac{E_{H^+/\frac{1}{2}H_2}}{0.0591}$$

6. (*b*) $E^{\circ}_{cell} = E^{\circ}_{cathode} - E^{\circ}_{anode}$

$E^{\circ}_{cell} = E^{\circ}_{Cd^{2+}/Cd} - E^{\circ}_{Fe^{2+}/Fe}$

$\Rightarrow E^{\circ}_{cell} = -0.40\text{ V} - (-0.44\text{ V}) = 0.04\text{ V}$

Now, $E_{cell} = E^{\circ}_{cell} - \frac{0.0591}{n}\log K_c$

or, $E^{\circ}_{cell} = \frac{0.0591}{n}\log K_c$

$\log K_c = \frac{2 \times 0.04}{0.0591} = 1.354$

7. (*a*) Osmotic pressure is directly proportional to

10. (*d*) Glass is an amorphous solid due to its short range order and irregular arrangement of constituent particles.

11. (*a*) Conductivity, κ = Conductance (G) × Cell constant (G^*)

Given, $\kappa = G$

$\therefore \quad G^* = \frac{\kappa}{G} = 1$

13. (*c*) The unit of rate constant for nth order is $k = (\text{conc.})^{1-n}\text{ time}^{-1}$

$\therefore$ For zero order reaction,

$k = (\text{mol/l})^{1-0}\text{ sec}^{-1}$

$\therefore k = \text{mol l}^{-1}\text{ sec}^{-1}$

14. (*b*) An atom that lies on the edge of a unit cell is shared by four adjacent unit cells, so the contribution of each edge atom is $\frac{1}{4}$.

15. (*b*) Raoult's law states that the partial pressure of each component of an ideal mixture of liquid is equal to the vapour pressure of the pure component multiplied by its mole fraction in the mixture. On adding non-volatile solute to the volatile, the vapour pressure of the solution decreases. Mathematically, it can be represented as

$$p_A = p^{\circ}_A x_A \quad \text{or} \quad \frac{p^{\circ}_A - p}{p^{\circ}_A} = x_B = \frac{n_B}{n_A + n_B}$$

16. (*d*) The correct assertion is, mercury cell has a constant cell potential throughout its life.

17. (*d*) Ionic radius decreases from left to right in a period. Thus,

the concentration of solution. So, concentrated solution has more osmotic pressure than dilute solution.

9. (*c*) In a face centered cubic lattice, atom (A) occupies the corner positions. There are 8 corner positions and each position contributes one eighth to the unit cell. Hence, total number of (A) atoms per unit cell = 8 × 1/8 = 1. Atom (B) occupied the face centre positions. There are six face centre positions. One atom of (B) is missing from one of the face centered points. Thus, there are 5 face centre positions that are occupied with (B). Each such position contributes one half to the unit cell.

Hence, total number of (B) atoms per unit cell= 5 × 1/2 = 2.5.

Hence the formula of compound is

A	B
1	2.5
A_2	B_5

24. (*b*) F_2 being the strongest oxidising agent, oxidises Bi to its highest oxidation-state of +5 in BiF_5.

[∵ Peroxide effect is not observed with HF, HCl and HI]

25. (*b*) Permanganate ion (MnO_4^-) oxidises Fe^{2+} to Fe^{3+} and oxalate ions to CO_2. Thus (*c*) and (*d*) are correct. Chromates arc converted into dichromates in acidic medium. Thus A is correct.

The correct form of reaction (*b*) is

$$\underset{\text{Pyrolusite ore}}{2MnO_2} + 4KOH + O_2 \longrightarrow \underset{\text{Potassium manganate}}{2KMnO_4} + 2H_2O$$

26. (*c*) Paramagnetism in transition metals is due to the presence of unpaired electrons in their $(n-1)\,d$-subshell.

27. (*d*) The common elements present in the anode mud in electrolytic refining of copper are antimony, selenium, tellurium, silver, gold and platinum. These elements, being less reactive, are not affected by $CuSO_4 + H_2SO_4$ solution and hence settle down under anode as anode mud.

28. (*a*) Ionisation isomerism arises when the counter ion in a complex salt is itself a potential ligand and can displace a ligand which can then become the counter ion.

29. (*d*) Formation of carbocation occurs:

$$Cr^{3+} > Mn^{3+} > Fe^{3+} > Co^{3+}$$

Cr(Z=24), Mn(Z=25), Fe(Z=26), Co(Z= 27)

18. (*b*) $[Co(en)_3]Cl_3$ shows optical isomerism.

This type of isomerism is exhibited by chiral molecules. Optical isomers are mirror images that cannot be superimposed on one another.

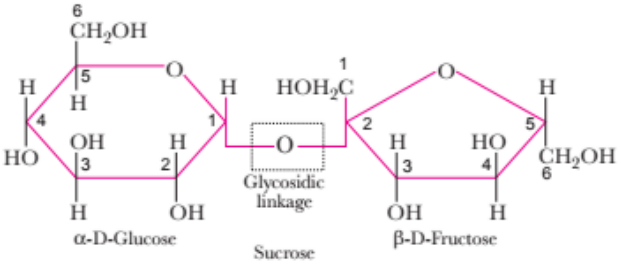
19. (*a*) Organometallic Compounds are those chemical compounds which contain at least one bond between a metallic element and a carbon atom belonging to an organic molecule. Among the given compounds, $Ti(C_2H_4)_4$ is an organometallic compound.

20. (*d*) Slag is an easily fusible material which is formed when gangue still present in the roasted or the calcined ore combines with the flux.

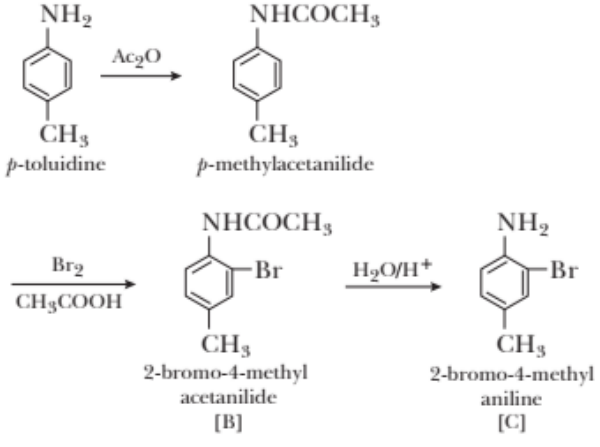
22. (*a*)

$$\underset{\text{Propene}}{CH_3CH{=}CH_2} + Cl \xrightarrow[\text{peroxide}]{\text{Benzoyl}} \underset{\text{2-Chloropropane}}{CH_3\underset{Cl}{\underset{|}{C}}HCH_3}$$

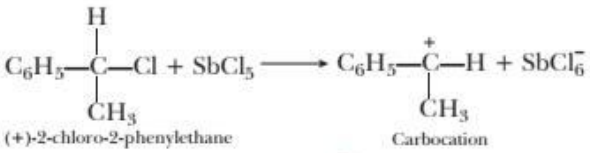
34. (*b*) Sucrose is a non-reducing sugar with limited chemical reactivity.



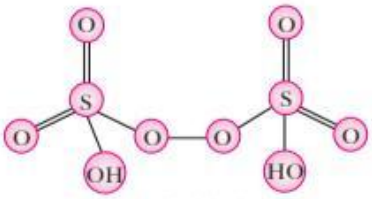
35. (*c*)



36. (*a*) $\underset{\text{Prop-2-en-1-amine}}{NH_2\overset{1}{C}H_2\overset{2}{C}H{=}\overset{3}{C}H_2}$



30. (*c*)



31. (*d*) The correct order will be $HClO_4 > HBrO_4 > HIO_4$.

32. (*c*) Insulin hormone (protein by chemical nature) helps to maintain the balance of biological activities in the body. The role of insulin in keeping the blood glucose level within the narrow limit is an example of this function.

33. (*c*) It is a branched chain polymer of α-D-glucose units in which chain is formed by C1–C4 glycosidic linkage whereas branching occurs by C1–C6 glycosidic linkage.

37. (*c*) In Hofmann bromamide degradation reaction, amine (containing one carbon less than amide) with side products Na_2CO_3, NaBr and H_2O is formed.

$$R{-}\underset{\underset{O}{\|}}{C}{-}NH_2 + Br_2 + 4NaOH \longrightarrow$$

$$R{-}NH_2 + Na_2CO_3 + 2NaBr + 2H_2O$$

38. (*d*) The compound Y must contain $CH_3{-}\underset{\underset{OH}{|}}{CH}{-}$ or $CH_3CO{-}$ as it is responding to iodoform test.

Among the given compounds, $CH_3CHOHCH_3$ (a secondary alcohol) on treatment with acidified $K_2Cr_2O_7$ gives $CH_3{-}\underset{\underset{O}{\|}}{C}{-}CH_3$ (a ketone with $-CH_3CO$ group).

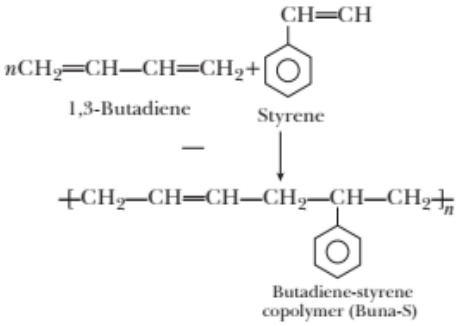
Therefore, X and Y respectively are $CH_3CHOHCH_3$ and CH_3COCH_3.

$$CH_3{-}\underset{\underset{OH}{|}}{CH}{-}CH_3 \xrightarrow[K_2Cr_2O_7]{\text{acidified}} CH_3{-}\underset{\underset{O}{\|}}{C}{-}CH_3$$

Protan-2-ol (X) → Propanone (Y)

39. (*d*) Histamine is involved in the inflammatory response and has a central role as a mediator of itching.

40. (*b*)

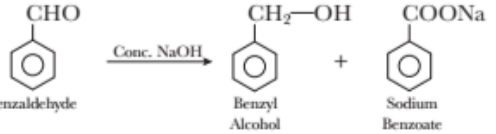


41. (*a*)

$$2\,RCOOK + 2H_2O \xrightarrow{\text{Electrolysis}} R{-}R + 2CO_2 + H_2$$

Kolbe's electrolysis reaction involves the formation of hydrocarbon product in good yield.

42. (*a*) Aldehydes which do not have an α-hydrogen, undergo self oxidation and reduction (disproportionation) reaction on treatment with concentrated alkali. In this reaction, one molecule of the aldehyde is reduced to alcohol while another is oxidised to carboxylic acid salt.



45. (*c*) —COOH group is deactiving *m*-directing group.

46. (*c*) Due to the presence of Chlorine atom in a compound such as *o*-chlorophenol, it is considered as most acidic than phenol, benzyl alcohol, and cyclohexanol.

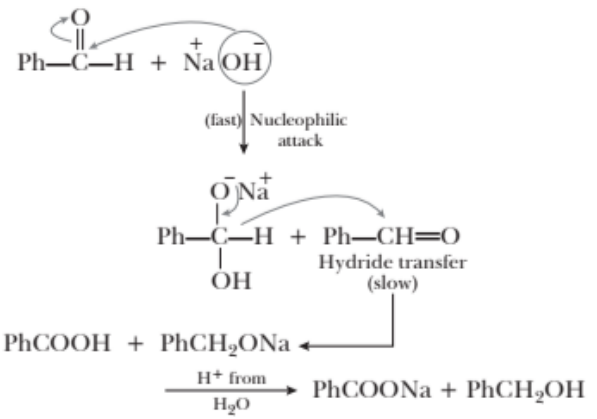
It is because, as chlorine is an electron loving element it facilitates delocalization of negative charge in phenoxide ion.

47. (*c*) The reaction is as follow:

$$CH_3CON\begin{matrix}CH_3\\CH_3\end{matrix} \xrightarrow{HCl/H_2O} CH_3COOH + (CH_3)_2NH$$

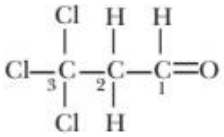
48. (*b*) Phenoxide ion is more stable than ethoxide ion due to resonance. Therefore, the ionisation constant of phenol is higher than ethanol.

49. (*b*) The slowest step in the cannizaro reaction is



i.e., the transfer of hydride ion to the carboxyl group.

44. (*c*) Vulcanisation is a process of heating a mixture of raw rubber with sulphur and an appropriate additive at a temperature range between 373 K to 415 K. On vulcanisation, sulphur forms cross links at the reactive sites of double bonds and thus the rubber gets stiffened.

50. (*a*) 

IUPAC name: 3, 3, 3-Trichloropropanal