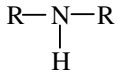
CHEMISTRY - CET 2022 - VERSION CODE – A-2
Solution

1. Which of the following is correctly matched?
   (A) Teflon - copralactum
   (B) Bakelite - Novolac
   (C) Polyster - tetrafluoroethene
   (D) Nylon - acrylonitrile
   Ans (B)
   Bakelite is cross link polymer of novolac.

2. Which institute has approved the emergency use of 2-deoxy-D-Glucose as additive therapy for COVID-19 patients?
   (A) World Health Organisation
   (B) Ministry of Health and Family Welfare
   (C) Drug Controller General of India
   (D) Indian Council of Medical Research
   Ans (C)
   DCGI

3. A Nucleic acid, whether DNA or RNA gives on complete hydrolysis, two purine bases, two pyrimidine bases, a pentose sugar and phosphoric acid. Nucleotides which are intermediate products in the hydrolysis contain
   (A) a purine base, pentose sugar and ortho-phosphoric acid
   (B) purine or pyrimidine base and ortho-phosphoric acid
   (C) purine or pyrimidine base, a pentose sugar and ortho-phosphoric acid
   (D) purine or pyrimidine base and pentose sugar
   Ans (C)
   Nucleotide consists of base, sugar and ortho phosphoric acid group.

4. A secondary amine is
   (A) a compound with two carbon atom and an NH_2 group
   (B) a compound with an NH_2 group on the carbon atom in number 2 position
   (C) a compound in which 2 of the hydrogen of NH_3 have been replaced by organic groups
   (D) an organic compound with two NH_2 group
   Ans (C)



5. The volume of 2.8 g of CO at 27 °C and 0.821 atm pressure is (R = 0.08210 lit. atm. K^{-1} mol^{-1})
   (A) 1.5 litres
   (B) 3 litres
   (C) 30 litres
   (D) 0.3 litres
   Ans (B)

$$PV = \frac{w_2}{M_2}RT$$

$$V = \frac{2.8 \times 0.0821 \times 300}{28 \times 0.821} = 3L$$

6. The work done when 2 moles of an ideal gas expands reversibly and isothermally from a volume of 1 L to 10 L at 300 K is (R = 0.0083 kJ K mol^{-1})
   (A) 5.8 kJ
   (B) 0.115 kJ
   (C) 58.5 kJ
   (D) 11.5 kJ

Ans (D)

$$w = -2.303\,nRT\log\frac{V_2}{V_1}$$

$$= -2.303\times 2\times 0.0083\times 300\,\log\frac{10}{1}$$

$$= -2.303\times 2\times 0.0083\times 300 = 11.46\ \text{kJ}$$

7. An aqueous solution of alcohol contains 18 g of water and 414 g of ethyl alcohol. The mole fraction of water is

(A) 0.4 (B) 0.7 (C) 0.9 (D) 0.1

Ans (D)

$$x_{H_2O} = \frac{n_{H_2O}}{n_{H_2O} + n_{C_2H_5OH}} = \frac{\frac{18}{18}}{\frac{18}{18}+\frac{414}{46}}$$

$$= \frac{1}{1+9} = \frac{1}{10} = 0.1$$

8. If wavelength of photon is 2.2×10^{-11} m and h = 6.6×10^{-34} J s, then momentum of photon

(A) 3.33×10^{-22} kg m s^{-1} (B) 1.452×10^{-44} kg m s^{-1}

(C) $6.89\times10^{+43}$ kg m s^{-1} (D) 3×10^{-23} kg m s^{-1}

Ans (D)

$$p = \frac{h}{\lambda} = \frac{6.6\times10^{-34}\ \text{kg m}^2\text{s}^{-1}}{2.2\times10^{-11}\ \text{m}}$$

$$= 3\times10^{-23}\ \text{kg m s}^{-1}$$

9. Elements X, Y and Z have atomic numbers 19, 37 and 55 respectively. Which of the following statements is true about them?

(A) Y would have an ionization potential between those of X and Z

(B) Z would have the highest ionization potential

(C) Y would have the highest ionization potential

(D) Their ionization potential would increase with increasing atomic number

Ans (A)

Down the group, ionization enthalpy decreases.

10. In oxygen and carbon molecule the bonding is

(A) O_2 : 2σ, 0π ; C_2 : 0σ, 2π (B) O_2 : 1σ, 1π ; C_2 : 0σ, 2π

(C) O_2 : 0σ, 2π ; C_2 : 2σ, 0π (D) O_2 : 1σ, 1π ; C_2 : 1σ, 1π

Ans (B)

11. Which is most VISCOUS?

(A) Ethanol (B) Ethylene glycol (C) Glycerol (D) Methanol

Ans (C)

Due to presence of three –OH groups in glycerol.

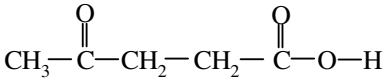
12. Which property of CO_2 makes it biologically and geo-chemically important?

(A) Its colourless and odourless nature (B) Its low solubility in water

(C) Its high compressibility (D) Its acidic nature

Ans (B)

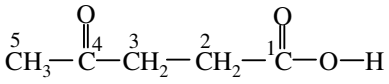
13. The IUPAC name for



(A) 1,4-dioxopentanol (B) 1-carboxybutan-3-one

(C) 4-oxopentanoic acid (D) 1-hydroxy pentane-1, 4-dione

Ans (C)



4-Oxopentanoic acid

14. 1 mole of HI is heated in a closed container of capacity of 2 L. At equilibrium half a mole of HI is dissociated. The equilibrium constant of the reaction is

(A) 0.5 (B) 0.25 (C) 0.35 (D) 1

Ans (B)

$$2HI \rightleftharpoons H_2 + I_2$$

Number of moles			
Initial:	1	-	-
Dissociated:	0.5	-	-
Formed:	–	0.25	0.25
At equilibrium:	0.5	0.25	0.25

$$[HI] = \frac{0.5}{2} = 0.25$$

$$[H_2] = [I_2] = \frac{0.25}{2} = 0.125$$

$$K_c = \frac{[H_2][I_2]}{[HI]^2}$$

$$= \frac{0.125 \times 0.125}{(0.25)^2} = \frac{0.015625}{0.0625} = 0.25$$

15. Which among the following has highest pH?

(A) 1 M NaOH (B) 1 M H_2SO_4 (C) 0.1 M NaOH (D) 1 M HCl

Ans (A)

Strong base and higher concentration of NaOH

16. In which of the following compounds, an element exhibits two different oxidation states?

(A) NH_4NO_3 (B) N_2H_4 (C) N_3H (D) NH_2CONH_2

Ans (A)

$NH_4NO_3 \rightarrow NH_4^+ + NO_3^-$

NH_4^+	NO_3^-
$x + 4(+1) = +1$	$x + 3(-2) = -1$
$x + 4 = +1$	$x - 6 = -1$
$x = -3$	$x = +5$

17. Which of the following hydrides is electron deficient?

(A) CaH_2 (B) CH_4 (C) B_2H_6 (D) NaH

Ans (C)

Hydrides of group 13 elements are electron deficient due to incomplete octet.

18. Amphoteric oxide among the following:

(A) CO_2 (B) Ag_2O (C) SnO_2 (D) BeO

Ans (C), (D)

19. Vacant space in body centered cubic lattice unit cell is about

(A) 10% (B) 23% (C) 46% (D) 32%

Ans (D)

In BCC, packing efficiency = 68%

$\therefore$ Vacant space = 100 – 68

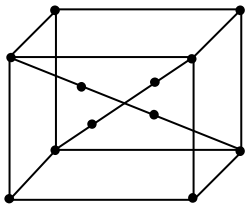
= 32%

20. How many number of atoms are there in a cube based unit cell, having one atom on each corner and 2 atom on each body diagonal of cube?

(A) 6 (B) 4 (C) 9 (D) 8

Ans (C)

Contribution of corner particles per unit cell $= \frac{1}{8} \times 8 = 1$



Number of body diagonal = 4

Contribution of body diagonal particles per unit cell = 4×2

= 8

$\therefore$ Total number of particles = 9

21. Which of the following is <u>NOT</u> true about the amorphous solids?

(A) They may become crystalline on keeping for long time.

(B) Amorphous solids can be moulded by heating.

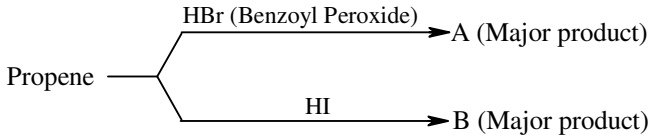
(C) They are anisotropic in nature.

(D) On heating they may become crystalline at certain temperature.

Ans (C)

Amorphous solids are isotropic.

22. Identify A and B in the reaction



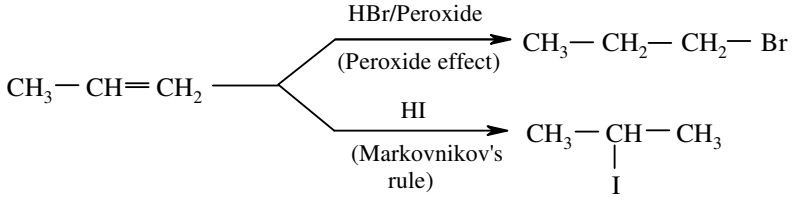
(A) A : $CH_3-CH_2-CH_2-Br$,
B : $CH_3-\underset{\underset{I}{|}}{CH}-CH_3$

(B) A : $CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$,
B : $CH_3-CH_2-CH_2-I$

(C) A : $CH_3-\underset{\underset{Br}{|}}{CH}-CH_3$,
B : $CH_3-\underset{\underset{I}{|}}{CH}-CH_3$

(D) A : $CH_3-CH_2-CH_2-Br$,
B : $CH_3-CH_2-CH_2-I$

Ans (A)



23. In Fuel cells _____ are used as catalysts

(A) Nickel - Cadmium (B) Zinc - Mercury (C) Lead - Manganese (D) Platinum - Palladium

Ans (D)

Finely divided Pt or Pd metals are incorporated into the electrodes for increasing the rate of electrode reactions

24. The molar conductivity is maximum for the solution of concentration

(A) 0.002 M (B) 0.005 M (C) 0.001 M (D) 0.004 M

Ans (C)

Molar conductivity increases with dilution.

25. Alkali halides <u>do not</u> show dislocation defect because

(A) Anions cannot be accommodated in vacant spaces.

(B) Cations and anions have almost equal size.

(C) There is large difference in size of cations and anions.

(D) Cations and anions have low co-ordination number.

Ans (B)

Cation and anions have almost equal size, so cation cannot occupy the interstitial sites.

26. Solubility of a gas in a liquid increases with

(A) decrease of P and increase of T (B) increase of P and decrease of T

(C) decrease of P and decrease of T (D) increase of P and increase of T

Ans (B)

27. The rise in boiling point of a solution containing 1.8 g of glucose in 100 g of solvent is 0.1 °C. The molal elevation constant of the liquid is

(A) 1 K kg/mol (B) 2 K kg/mol (C) 10 K kg/mol (D) 0.1 K kg/mol

Ans (A)

$$\Delta T_b = K_b \times m$$

$$0.1 = \frac{K_b \times 1.8 \times 1000}{180 \times 100}$$

$$0.1 = K_b \times 0.1$$

$$K_b = 1 \text{ K kg/mol}$$

28. If 3 g of glucose (molar mass = 180 g) is dissolved in 60 g of water at 15 °C, the osmotic pressure of the solution will be

(A) 0.65 atm (B) 6.57 atm (C) 5.57 atm (D) 0.34 atm

Ans (B)

$$\pi = \frac{w_2 RT\ 1000}{M_2 V}$$

$$= \frac{3 \times 0.0821 \times 288 \times 1000}{180 \times 60}$$

$$= 6.57 \text{ atm}$$

29. Which of the following colligative properties can provide molar mass of proteins, polymers, and colloids with greater precision?

(A) Elevation in boiling point (B) Depression in freezing point

(C) Osmotic pressure (D) Relative lowering of vapour pressure

Ans (C)

Since osmotic pressure can be measured at room temperature with greater accuracy.

30. The rate of the reaction:

$CH_3COOC_2H_5 + NaOH \rightarrow CH_3COONa + C_2H_5OH$ is given by the equation,

Rate = K $[CH_3COOC_2H_5]$ [NaOH]. If concentration is expressed in mol L^{-1}, the unit of K is

(A) mol L^{-1} s^{-1} (B) L mol^{-1} s^{-1} (C) s^{-1} (D) mol^{-2} L^2 s^{-1}

Ans (B)

$$\frac{dx}{dt} = k[A]^2$$

$$\frac{conc}{time} = k[conc]^2$$

$$\frac{mol\ L^{-1}}{s} = k\ mol\ L^{-1} \times mol\ L^{-1}$$

$$k = L\ mol^{-1}\ s^{-1}$$

31. Colloidal solution commonly used in the treatment of skin disease is

(A) Colloidal Silver (B) Colloidal Gold

(C) Colloidal Antimony (D) Colloidal Sulphur

Ans (D)

Colloidal sulphur is hydrophilic and is capable of adsorbing water and has large surface area.

32. Specific conductance of 0.1 M HNO_3 is 6.3×10^{-2} ohm^{-1} cm^{-1}. The molar conductance of the solution is

(A) 315 ohm^{-1} cm^2 mol^{-1} (B) 6.300 ohm^{-1} cm^2 mol^{-1}

(C) 63.0 ohm^{-1} cm^2 mol^{-1} (D) 630 ohm^{-1} cm^2 mol^{-1}

Ans (D)

In c.g.s

$$\Lambda_m = \frac{k}{C} \times 1000$$

$$= \frac{6.3 \times 10^{-2}}{0.1} \times 1000$$

$$= 630 \text{ ohm}^{-1} \text{ cm}^2 \text{ mol}^{-1}$$

33. For spontaneity of a cell, which is correct?

(A) $\Delta G = -$ ve, $\Delta E = 0$ (B) $\Delta G = +$ ve, $\Delta E = +$ ve

(C) $\Delta G = -$ ve (D) $\Delta G = 0$, $\Delta E = 0$

Ans (C)

For any spontaneously working cell $\Delta G = -$ ve

34. For n^{th} order of reaction, Half-life period is directly proportional to

(A) $\frac{1}{a^{1-n}}$ (B) a^{n-1} (C) a^{1-n} (D) $\frac{1}{a^{n-1}}$

Ans (D)

$$t_{1/2} \alpha \frac{1}{a^{n-1}}$$

35. Half-life of a reaction is found to be inversely proportional to the fifth power of its initial concentration, the order of reaction is

(A) 4 (B) 5 (C) 6 (D) 3

Ans (C)

$$t_{1/2} \alpha \frac{1}{a^5}$$

Since $t_{1/2} \alpha \frac{1}{a^{n-1}}$

$n - 1 = 5$

$n = 6$

36. A first order reaction is half completed in 45 min. How long does it need 99.9 % of the reaction to be completed?

(A) 7.5 Hours (B) 10 Hours (C) 20 Hours (D) 5 Hours

Ans (A)

$$t_{1/2} = \frac{0.693}{k}$$

$$k = \frac{0.693}{45}$$

$k = 0.0154 \text{ min}^{-1}$

$$k = \frac{2.303}{t} \log\left(\frac{100}{100 - 99.9}\right)$$ **OR** $t_{99.9\%} \approx 10\, t_{1/2}$

$= \frac{2.303}{t}\log(1000)$ $\approx 10 \times 45$

$t = \frac{2.303}{0.015} \times 3$ = 450 min or 7.5 Hours

t = 448.63 min or 7.5 Hours

37. A transition metal exists in its highest oxidation state. It is expected to behave as

(A) a central metal in a co-ordination compound (B) an oxidizing agent

(C) a reducing agent (D) a chelating agent

Ans (B)

At highest oxidation state, it can easily undergo reduction.

$\therefore$ It is oxidizing agent.

38. What will be the value of x in $Fe^{x+,}$ if the magnetic moment $\mu = \sqrt{24}$ BM?

(A) + 3 (B) 0 (C) + 1 (D) + 2

Ans (D)

$\mu = \sqrt{24}$

$\mu = \sqrt{n(n+2)}$

n = 4

39. Which can adsorb larger volume of hydrogen gas?

(A) Colloidal solution of palladium (B) Finely divided platinum

(C) Colloidal $Fe(OH)_3$ (D) Finely divided nickel

Ans (A)

40. The property of halogens which is <u>not</u> correctly matched is

(A) F > Cl > Br > I (electronegativity) (B) I > Br > Cl > F (density)

(C) F > Cl > Br > I (electron gain enthalpy) (D) F > Cl > Br > 1 (ionization enthalpy)

Ans (C)

Cl > F > Br > I

41. Which noble gas has least tendency to form compounds?

(A) Ne (B) Ar (C) Kr (D) He

Ans (D)

Because of its less reactivity

(high ionization enthalpy)

42. $(NH_4)_2 Cr_2O_7$ on heating liberates a gas. The same gas will be obtained by

(A) heating NH_4NO_2 (B) treating H_2O_2 with $NaNO_2$

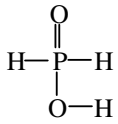
(C) treating Mg_3N_2 with H_2O (D) heating NH_4NO_3

Ans (A)

$(NH_4)_2 Cr_2O_7 \xrightarrow{\Delta} N_2 + Cr_2O_3 + 4H_2O$

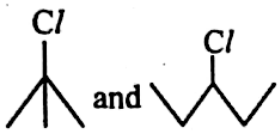
$\underset{\text{Ammonium nitrite}}{NH_4NO_2} \xrightarrow{\Delta} \underset{\text{Nitrogen gas}}{N_2} + \underset{\text{Water}}{H_2O}$

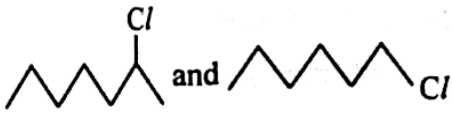
43. The strong reducing property of hypophosphorous acid is due to
(A) the positive valency of phosphorus
(B) two P–H bonds
(C) presence of phosphorus in its highest oxidation state
(D) its concentration
Ans (B)

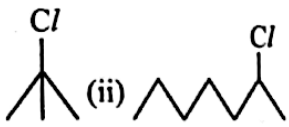


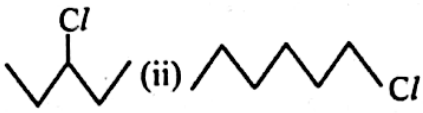
Presence of only one ionizable hydrogen.

44. In the following pairs of halogen compounds, which compound undergoes faster SN^1 reaction?

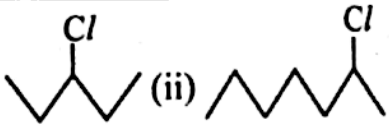
(i) 

(ii) 

(A) (i) 

(B) (i) 

(C) (i) 

(D) (i) 

Ans (A)
S_N^1 mechanism
Order of reactivity 3° > 2° > 1°

45. The only Lanthanoid which is radioactive
(A) Cerium
(B) Promethium
(C) Praseodymium
(D) Lanthanum
Ans (B)

46. All Cu(II) halides are known, except the iodide, the reason for it is that
(A) Cu^{+2} oxidises iodide to iodine.
(B) Cu^{+2} has much more negative hydration enthalpy
(C) Cu^{+2} ion has smaller size.
(D) Iodide is bulky ion.
Ans (A)
$2\ Cu^{2+} + 4I^- \rightarrow 2\ Cu\ I + I_2$

47. The correct IUPAC name of cis-platin is
(A) diammine dichlorido platinum (IV)
(B) diammine dichlorido platinum (O)
(C) dichlorido diammine platinum (IV)
(D) diammine dichlorido platinum (II)
Ans (D)

$[Pt(NH_3)_2Cl_2]$

Diamminedichlorido platinum (II)

48. Crystal Field Splitting Energy (CFSE) for $[CoCl_6]^{4-}$ is 18000 cm^{-1}. The Crystal Field Splitting Energy (CFSE) for $[CoCl_4]^{2-}$ will be

(A) 16000 cm^{-1} (B) 8000 cm^{-1} (C) 10,000 cm^{-1} (D) 18000 cm^{-1}

Ans (B)

Given CFSE for $[CoCl_6]^{4-}$ i $\times$ 18000 cm^{-1}

CFSE for $[CoCl_4]^{2-}$ = ? WKT $\Delta_t = \frac{4}{9}\Delta_o$ $\Delta_t = \frac{4}{9} \times 18000\ cm^1 = 8000\ cm^{-1}$

49. The complex hexaamine platinum (IV) chloride will give ____ number of ions on ionization.

(A) 4 (B) 3 (C) 2 (D) 5

Ans (D)

$$\left[Pt(NH_3)_6\right]Cl_4 \longrightarrow \left[Pt(NH_3)_6\right]^{4+} + 4Cl^-$$

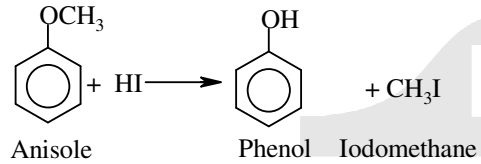
$1 + 4 = 5$ ions

50. Among the following, the products formed by the reaction of anisole with HI are :

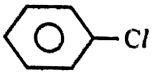
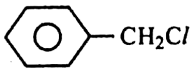
(A) Sodium phenate + Methanol (B) Benzene + Methanol

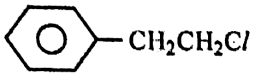
(C) Phenol + Methane (D) Phenol + Iodomethane

Ans (D)



51. Which one of the following Chlorohydrocarbon readily undergoes solvolysis?

(A)  (B) 

(C)  (D) $CH_2 = CHCl$

Ans (B)

Solvolysis follows S_N^1 mechanism, as benzyl carbocation is stabilized by resonance it undergoes solvolysis readily.

52. Identify the products A and B in the reactions:

$R - X + AgCN \rightarrow A + Ag\ X$

$R - X + KCN \rightarrow B + KX$

(A) A = RCN ; B = RNC (B) A = RNC ; B = RCN

(C) A = RNC ; B = RNC (D) A = R – CN ; B = RCN

Ans (B)

$$RX + AgCN \longrightarrow \underset{\text{isocyanide}}{RNC} + AgX$$

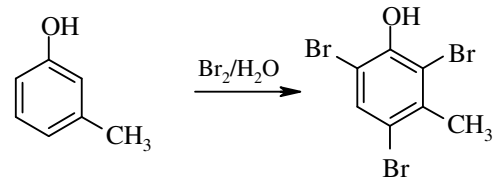
$$RX + KCN \longrightarrow \underset{\text{Cyanide}}{RCN} + KX$$

53. An organic compound with molecular formula C_7H_8O dissolves in NaOH and gives a characteristic colour with $FeCl_3$. On treatment with bromine, it gives a tribromo derivative $C_7H_5OBr_3$. The compound is

(A) o – Cresol (B) m – Cresol (C) p – Cresol (D) Benzyl alcohol

Ans (B)

Tribromo derivative suggests ortho and para positions are occupied, CH_3 has to be present at meta position.

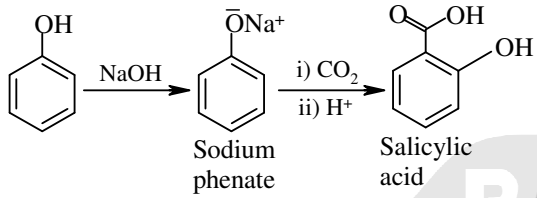


54. In Kolbes reaction the reacting substances are

(A) Phenol and CCl_4 (B) Sodium phenate and CCl_4

(C) Phenol and $CHCl_3$ (D) Sodium phenate and CO_2

Ans (D)



55. The major product obtained when ethanol is heated with excess of conc. H_2SO_4 at 443 K is

(A) ethyne (B) ethane (C) methane (D) ethene

Ans (D)

$$CH_3CH_2OH \xrightarrow[443\ K]{\text{Conc } H_2SO_4} \underset{\text{Ethene}}{CH_2=CH_2} + H_2O$$

56. Ethanoic acid undergoes Hell-Volhard Zelinsky reaction but Methanoic acid does not, because of

(A) presence of α – H atom in ethanoic acid

(B) absence of α – H atom in ethanoic acid

(C) higher acidic strength of ethanoic acid than methanoic acid

(D) presence of α – H atom in methanoic acid

Ans (A)

Ethanoic acid undergoes HVZ reaction because it has α – hydrogen atom.

Methanoic acid does not undergoes HVZ reaction because of the absence of α – hydrogen atom.

57. The general name of the compound formed by the reaction between aldehyde and alcohol is

(A) Acetal (B) Glycol

(C) Acetate (D) Ester

Ans (A)

Cyclic acetals are formed by the acid-catalysed reaction between aldehyde and alcohol

58. Reaction by which benzaldehyde can not be prepared is

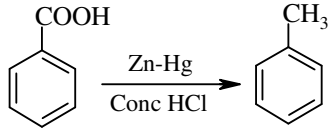
(A) Benzoic acid $\xrightarrow{\text{Zn-Hg and con.HCl}}$

(B) Toluene $\xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } CrO_2Cl_2 \text{ in } CS_2}$

(C) Benzoyl chloride + H_2 $\xrightarrow[\Delta]{\text{Pd - BaSO}_4}$

(D) Benzene + CO + HCl $\xrightarrow{\text{anhydrous AlCl}_3}$

Ans (A)



[Clemmensen's reduction]

So benzaldehyde cannot be prepared by this reaction.

59. The test to differentiate between pentan-2-one and pentan-3-one is

(A) Benedict's test (B) Fehling's test (C) Iodoform test (D) Baeyer's test

Ans (C)

Pentan-2-one have $\overset{O}{\overset{\|}{C}}-CH_3$ group and forms a yellow precipitate of Iodoform.

$$CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH_2-CH_3 \xrightarrow{NaOI} CH_3-CH_2-CH_2-COONa + CHI_3$$

pentan-2-one

Pentan-3-one does not have $\overset{O}{\overset{\|}{C}}-CH_3$ group and does not form a yellow precipitate of iodoform

60. In Carbylamine test for primary amines the resulting foul smelling product is

(A) CH_3CN (B) CH_3NC

(C) $COCl_2$ (D) CH_3NCl_2

Ans (B)

$$CH_3-NH_2 + CHCl_3 + 3KOH \xrightarrow[\text{ethanol}]{\text{heat}} CH_3-NC + 3KCl + 3H_2O$$

* * *