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NEET 2021

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651

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625

TNMC, MUMBAI



YASH S.

625

GMC, MUMBAI



CHIRAG D.

624

TNMC, MUMBAI



AKSHAT K.

604

GMC, NAGPUR



NIKITA P.

598

IGMC, NAGPUR



KATHA M.

593

GMC, ALIBAUG



AKSHIT P.

584

GMC, KOLHAPUR



SIYA M.

580

GMC, DHULE



ANURADHA S.

579

GMC, AKOLA



SAHER S.

573

GMC, CHANDRAPUR



CHINTAN T.

572

GMC, YAVATMAL



MAHEK B.

570



DEECHA P.

559

GMC, GONDIA

S6

# NEET 2022\_Detailed Solution

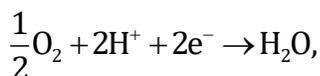
## CHEMISTRY

### Section – A (Compulsory)

51. Given below are half cell reaction



$$E_{\text{Mn}^{2+}/\text{MnO}_4^-} = -1.510\text{V}$$



$$E_{\text{O}_2/\text{H}_2\text{O}} = +1.233\text{V}$$

Will the permanganate ion,  $\text{MnO}_4^-$  liberate  $\text{O}_2$  from water in the presence of an acid

(1) Yes, because  $E^\circ_{\text{cell}} = +2.733\text{V}$

(2) No, because  $E^\circ_{\text{cell}} = -2.733\text{V}$

(3) Yes, because  $E^\circ_{\text{cell}} = +0.287\text{V}$

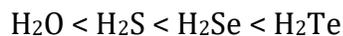
(4) No, because  $E^\circ_{\text{cell}} = -0.287\text{V}$

Ans: (3)

$$\begin{aligned} \text{Soln: } E_{\text{cell}}^0 &= E_{\text{red C}}^0 - E_{\text{red A}}^0 \\ &= (+1.510) - 1.223 \\ &= +0.287\text{V} \end{aligned}$$

52. Given below are two statements:

**Statement I :** The boiling points of the following hydrides of group 16 elements increases in the order



**Statement II :** The boiling points of these hydrides increase with increase in molar mass

In the light of the above statements, choose the most appropriate answer from the options given below

(1) Statement I is correct but statement II is incorrect

(2) Statement I is incorrect but statement II is correct

(3) Both statement I and statement II are correct

(4) Both statement I and statement II are incorrect

Ans: (2)

Soln: Statement I : Incorrect/Statement II - correct

Correct B.pt order  $\text{H}_2\text{S} < \text{H}_2\text{Se} < \text{H}_2\text{Te} < \text{H}_2\text{O}$   
 $\text{H}_2\text{O}$  has higher B.pt due to intermolecular H-bonding.

53. Choose the correct statement

(1) Diamond is  $\text{sp}^3$  hybridised and graphite is  $\text{sp}^2$  hybridized

(2) Both diamond and graphite are used as dry lubricants

(3) Diamond and graphite have two dimensional network

(4) Diamond is covalent and graphite is ionic

Ans: (1)

Soln: Diamond is  $\text{sp}^3$   
 Graphite is  $\text{sp}^2$

54. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R)

**Assertion :** In a particular point defect, an ionic solid is electrically neutral, even if few of its cations are missing from its unit cells.

**Reason (R) :** In an ionic solid, Frankel defect arises due to dislocation of cation from its lattice site to interstitial site, maintaining overall electrical neutrality.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) (A) is correct but (R) is not correct
- (2) (A) is not correct but (R) is correct
- (3) Both (A) and (R) are correct and (R) is the correct explanation of (A)
- (4) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

**Ans: (3)**

**Soln:** Frenkel defect cation leaves slit & move to other site only.  
Hence electrical neutrality is maintained.

55. Given below are two statements:

**Statement I:** The acidic strength of monosubstituted nitrophenol is higher than phenol because of electron withdrawing nitro group.

**Statement II:** o-nitrophenol, m-nitrophenol and p-nitrophenol will have same acidic strength as they have one nitro group attached to the phenolic ring.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement I is correct but Statement II is incorrect.
- (2) Statement I is incorrect but Statement II is correct.
- (3) Both Statement I and Statement II are correct
- (4) Both Statement I and Statement II are incorrect.

**Ans: (1)**

**Soln:** Nitro is EWG, hence will increase the acidity of phenol, O, P, M nitro will have different acidity

S-I: correct

S-II: incorrect

56. The incorrect statement regarding enzymes is:

- (1) Enzymes are polysaccharides.
- (2) Enzymes are very specific for a particular reaction and substrate.
- (3) Enzymes are biocatalysts.

- (4) Like chemical catalysts enzymes reduce the activation energy of bio processes.

**Ans: (1)**

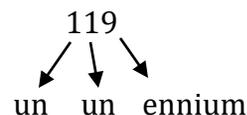
**Soln:** Enzymes are polysaccharide is incorrect

57. The IUPAC name of an element with atomic number 119 is

- (1) unununnium
- (2) ununoctium
- (3) ununennium
- (4) unnilennium

**Ans: (3)**

**Soln:**



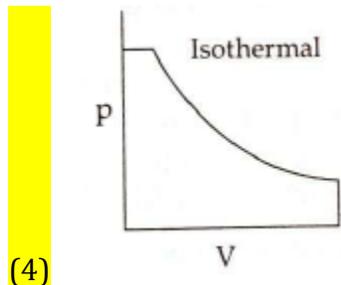
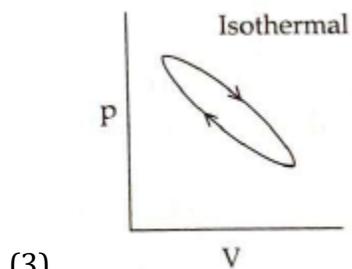
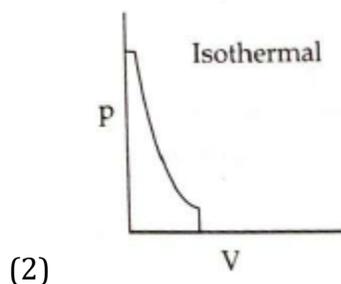
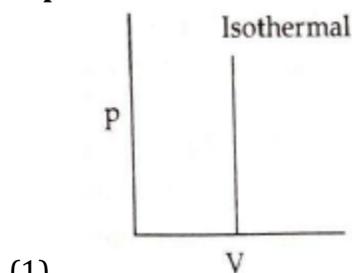
58. The IUPAC name of the complex- $[\text{Ag}(\text{H}_2\text{O})_2][\text{Ag}(\text{CN})_2]$  is:

- (1) dicyanosilver(I) diaquaargentate(I)
- (2) diaquasilver(I) dicyanidoargentate(I)
- (3) dicyanosilver (II) diaquaargentate(II)
- (4) diaquasilver (II) dicyanidoargentate(II)

**Ans: (2)**

**Soln:**  $[\text{Ag}(\text{H}_2\text{O})_2] [\text{Ag}(\text{CN})_2]$   
Diaquasilver (I)  
Diaynidoargentate (I)

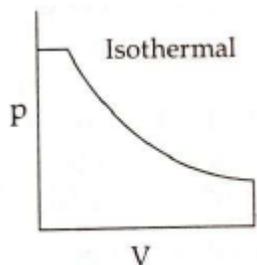
59. Which of the following p-V curve represents maximum work done ?



Ans: (4)

Soln: In Isotnermal process

Work done is max when area under the curve is max



60. Given below are two statements:

**Statement I:** In the coagulation of a negative sol, the flocculating power of the three given ions is in the order -



**Statement II:** In the coagulation of a positive sol, the flocculating power of the three given salts is in the order -



In the light of the above statements, choose the most appropriate answer from the options given below :

- (1) Statement I is correct but Statement II is incorrect.
- (2) Statement I is incorrect but Statement II is correct.
- (3) Both Statement I and Statement II are correct.
- (4) Both Statement I and Statement II are incorrect.

Ans: (1)

Soln: Schulz-Hardy Rule

Sol will be coagulated maximum by maximum opposite charge

(S-I) :  $\text{Al}^{+3} > \text{Ba}^{+2} > \text{Na}^{+}$  : It is correct order

(S : II)  $\text{NaCl} > \text{Na}_2\text{SO}_4 > \text{Na}_3\text{PO}_4$  : It is incorrect order

61. Match List I with list II

	Column I (Hydrides)		Column II (Nature)
(a)	MgH <sub>2</sub>	(i)	Electron precise
(b)	GeH <sub>4</sub>	(ii)	Electron deficient
(c)	B <sub>2</sub> H <sub>6</sub>	(iii)	Electron rich
(d)	HF	(iv)	Ionic

Choose the correct answer from the options given below

- (1) a-i; b-ii; c-iv; d-iii
- (2) a-ii; b-iii; c-iv; d-i
- (3) a-iv; b-i; c-ii; d-iii
- (4) a-iii; b-i; c-ii; d-iv

Ans: (3)

Soln:  $MgH_2 \rightarrow$  Ionic

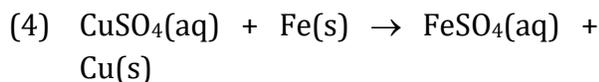
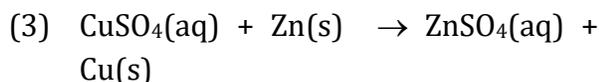
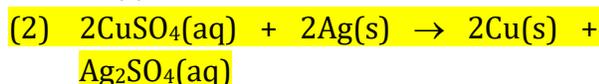
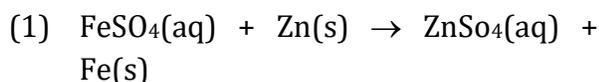
$GeH_4 \rightarrow$  Electron precise

$B_2H_6 \rightarrow$  Electron deficient

$HF \rightarrow$  Electron Rich

62. At 298K, the standard electrode potentials of  $Cu^{2+}/Cu$ ,  $Zn^{2+}/Zn$ ,  $Fe^{2+}/Fe$  and  $Ag^+/Ag$  are 0.34V, - 0.76V, - 0.44V and 0.80V, respectively

On the basis of standard electrode potential, predict which of the following reaction can not occur ?



Ans: (2)

Soln:

(a)  $E_{cell}^{\circ} = E_C^{\circ} - E_A^{\circ}$   
 $= -0.44 - (-0.76)$   
 $= 0.76 - 0.44$   
 $= 0.32V$

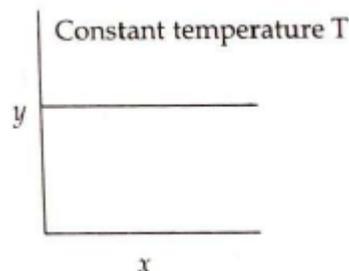
(b)  $E_{cell}^{\circ} = E_C^{\circ} - E_A^{\circ}$   
 $= 0.34 - 0.8$   
 $= -0.46V$

(c)  $E_{cell}^{\circ} = E_C^{\circ} - E_A^{\circ}$   
 $= 0.34 - (0.76)$   
 $= 0.34 + 0.76$   
 $= 1.10V$

(d)  $E_{cell}^{\circ} = E_C^{\circ} - E_A^{\circ}$   
 $= 0.34 - (-0.44)$   
 $= 0.34 + 0.44$   
 $= 0.78V$

$\therefore$  in (b)  $E_{cell}^{\circ}$  is -ve reaction cannot occur

63. The given graph is a representation of kinetics of a reaction.



The y and x axes for zero and first order reactions, respectively are

- (1) zero order (y = rate and x = concentration), first order (y =  $t_{1/2}$ , and x = concentration)
- (2) zero order (y = rate and x = concentration), first order (y = rate and x =  $t_{1/2}$ )
- (3) zero order (y = concentration and X = time), first order (y =  $t_{1/2}$ , and x = concentration)
- (4) zero order (y = concentration and z = time), first order (y = rate constant and x = concentration)

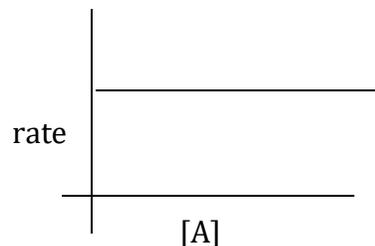
Ans: (1)

Soln: For zero order reaction rate is independent of its initial conc.

$$\text{Rate} = K[A]^0 \therefore \text{Rate} = K$$

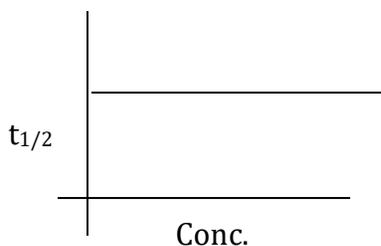
y = rate

n = concentrated



For 1<sup>st</sup> order reaction  $t_{1/2}$  is independent of its initial conc.

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



64. Match List I with list II

	Column I (Products formed)		Column II (Reaction of carbonyl compound with)
(a)	Cyanohydrin	(i)	NH <sub>2</sub> OH
(b)	Acetal	(ii)	RNH <sub>2</sub>
(c)	Schiff's base	(iii)	alcohol
(d)	Oxime	(iv)	HCN

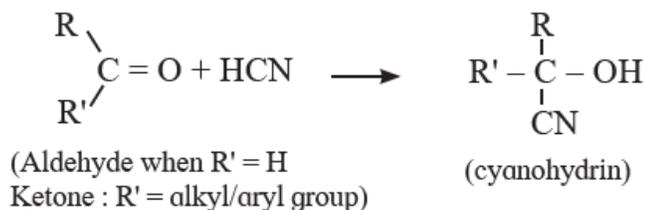
Choose the correct answer from the options given below

- (1) a-i; b-iii; c-ii; d-iv
- (2) a-iv; b-iii; c-ii; d-i
- (3) a-iii; b-iv; c-ii; d-i
- (4) a-ii; b-iii; c-iv; d-i

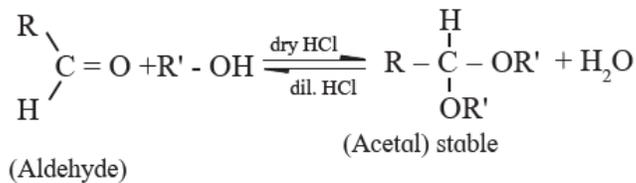
Ans: (2)

Soln:

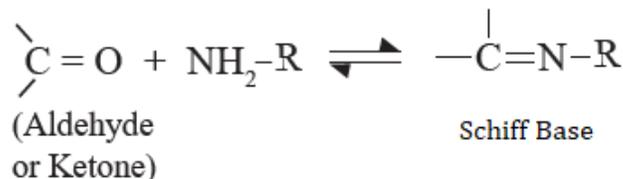
(a) Cyanohydrin → HCN



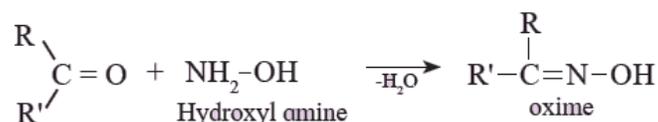
(b) Acetal → Alcohol



(c) Schiff base → R-NH<sub>2</sub>



(d) Oxime → NH<sub>2</sub>-OH



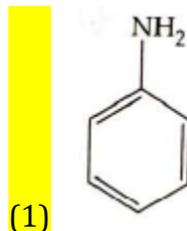
65. Gadolinium has a low value of third ionisation enthalpy because of

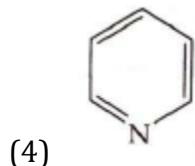
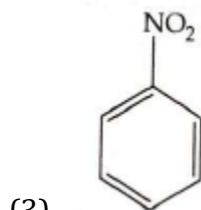
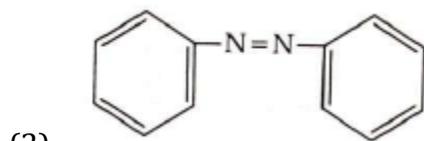
- (1) high electronegativity
- (2) high basic character
- (3) small size
- (4) high exchange enthalpy

Ans: (4)

Soln: Gd has a low value of 3<sup>rd</sup> IE due to high exchange enthalpy

66. The Kjeldahl's method for the estimation of nitrogen can be used to estimate the amount of nitrogen in which one of the following compounds ?





**Ans: (1)**

**Soln:** Kjeldahl's method is not useful for diazonium group, nitrogroup or if the 'N' is present in ring.

**67. Match List I with list II**

	Column I (Drug class)		Column II (Drug molecule)
(a)	Antacids	(i)	Salvarsan
(b)	Antihistamines	(ii)	Morphine
(c)	Analgesics	(iii)	Cimetidine
(d)	Antimicrobials	(iv)	Seldane

**Choose the correct answer from the options given below**

- (1) a-i; b-iv; c-ii; d-iii
- (2) a-iv; b-iii; c-i; d-ii
- (3) a-iii; b-ii; c-iv; d-i
- (4) a-iii; b-iv; c-ii; d-i

**Ans: (4)**

**Soln:** Antacid → cimetidine  
 Antihistamines → Seldane  
 Analgesics → Morphine  
 Antimicrobials → Salvarsan

**68. Identify the incorrect statement from the following.**

- (1) In an atom, all the five 3d orbitals are equal in energy in free state.
- (2) The shapes of  $d_{xy}$ ,  $d_{yz}$ , and  $d_{zx}$  orbitals are similar to each other ; and  $d_{x^2-y^2}$  and  $d_{z^2}$  are similar to each other.
- (3) All the five 5d orbitals are different in size when compared to the respective 4d orbitals.
- (4) All the five 4d orbitals have shapes similar to the respective 3d orbitals.

**Ans: (2)**

**Soln:** Shapes of  $d_{x^2-y^2}$  and  $d_{z^2}$  are different

**69. Match List I with list II**

	Column I		Column II
(a)	Li	(i)	absorbent for carbon dioxide
(b)	Na	(ii)	electrochemical cells
(c)	KOH	(iii)	coolant in fast breeder reactors
(d)	Cs	(iv)	photoelectric cell

**Choose the correct answer from the options given below**

- (1) a-i; b-iii; c-iv; d-ii
- (2) a-ii; b-iii; c-i; d-iv
- (3) a-iv; b-i; c-iii; d-ii
- (4) a-iii; b-iv; c-ii; d-i

**Ans: (2)**

**Soln:** Li → absorbent for carbon dioxide  
 Na → coolant in fast breeder reactors  
 KOH → absorbent for carbon dioxide  
 Cs → photoelectric cell

70. Given below are two statements:

**Statement I:** The boiling points of aldehydes and ketones are higher than hydrocarbons of comparable molecular masses because of weak molecular association in aldehydes and ketones due to dipole - dipole interactions.

**Statement II:** The boiling points of aldehydes and ketones are lower than the alcohols of similar molecular masses due to the absence of H-bonding.

In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) Statement I is correct but Statement II is incorrect.
- (2) Statement I is incorrect but Statement II is correct.
- (3) Both Statement I and Statement II are correct
- (4) Both Statement I and Statement II are incorrect.

Ans: (3)

**Soln:** Ald. & ketone have higher boiling point as compared to hydrocarbons hence statement 1 is correct

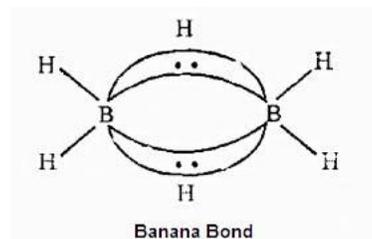
Ald. & ketone have lower boiling point as compared to alcohols hence statement 2 is correct

71. Which of the following statement is not correct about diborane ?

- (1) The four terminal Hydrogen atoms and the two Boron atoms lie in one plane.
- (2) Both the Boron atoms are  $sp^2$  hybridised.
- (3) There are two 3-centre-2-electron bonds.
- (4) The four terminal B-H bonds are two centre two electron bonds.

Ans: (2)

Soln:



In diborane both boron are  $sp^3$  hybridized

72. Given below are two statements: one is labelled as Assertion (1) and the other is labelled as Reason (R).

**Assertion (A):** ICl is more reactive than  $I_2$

**Reason (R):** I-Cl bond is weaker than I-I bond.

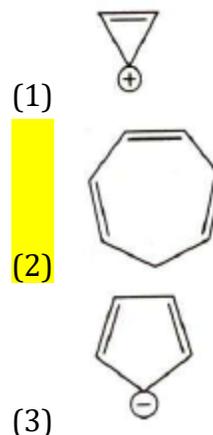
In the light of the above statements, choose the most appropriate answer from the options given below:

- (1) (A) is correct but (R) is not correct.
- (2) (A) is not correct but (R) is correct.
- (3) Both (A) and (R) are correct and (R) is the correct explanation of (A).
- (4) Both (A) and (R) are correct but (R) is not the correct explanation of (A).

Ans: (3)

**Soln:** Inter halogen compounds are more reactive due to weaker bonds  
Hence both A & R are correct & with correct explanation

73. Which compound amongst the following is not an aromatic compound ?





(4)

Ans: (2)

Soln:



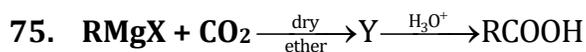
This is not an aromatic compound

74. The incorrect statement regarding chirality is:

- (1) Enantiomers are superimposable mirror images on each other.
- (2) A racemic mixture shows zero optical rotation.
- (3)  $S_N1$  reaction yields 1 : 1 mixture of both enantiomers.
- (4) The product obtained by  $S_N2$  reaction of haloalkane having chirality at the reactive site shows inversion of configuration.

Ans: (1)

Soln: Enantiomers are non-superimposable mirror image

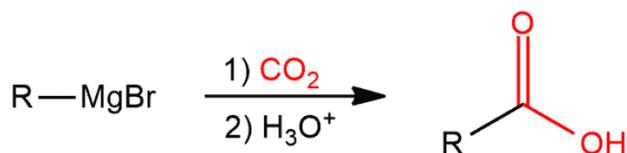


What is Y in the above reaction ?

- (1)  $RCOO^-X^+$
- (2)  $(RCOO)_2Mg$
- (3)  $RCOO^-Mg^+X$
- (4)  $R_3CO^-Mg^+X$

Ans: (3)

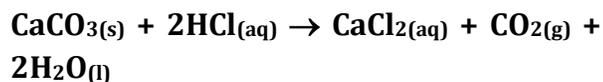
Soln:



Grignard reagent

Carboxylic acid

76. What mass of 95% pure  $CaCO_3$  will be required to neutralise 50 mL of 0.5 M HCl solution according to the following reaction ?



[Calculate upto second place of decimal point]

- (1) 3.65g
- (2) 9.50g
- (3) 1.25g
- (4) 1.32g

Ans: (4)

Soln:  $C = \frac{n}{V} \therefore$  for HCl

$$0.5M = \frac{n}{50 \text{ mL}} \times 1000$$

$$\therefore n = \frac{0.5 \times 50}{1000}$$

$$n = 25 \times 10^{-3} \text{ mole}$$

Now 1 mole  $CaCO_3 \equiv$  2 mole HCl

$$\therefore ? \equiv 25 \times 10^{-3} \text{ mole HCl}$$

$$\therefore x = \frac{25 \times 10^{-3} \times 1}{2}$$

$$x = 12.5 \times 10^{-3} \text{ mole}$$

$$\text{No. of moles of } CaCO_3 = \frac{W}{M}$$

$$12.5 \times 10^{-3} = \frac{W}{100}$$

$$\therefore W = 1.25g$$

Now 95% pure sample, 100g will contain 95g  $CaCO_3$

?, Will contain 1.25g  $CaCO_3$

$$\therefore x = 1.25 \times 100/95 = 125/95 = 1.32g$$

77. The pH of the solution containing 50 mL each of 0.10 M sodium acetate and 0.01 M acetic acid is [Given  $pK_a$  of  $CH_3COOH = 4.57$ ]

- (1) 4.57
- (2) 2.57
- (3) 5.57
- (4) 3.57

Ans: (3)

Soln: For Buffer solution,

$$pH = pK_a + \log \frac{\text{Salt}}{\text{Acid}}$$

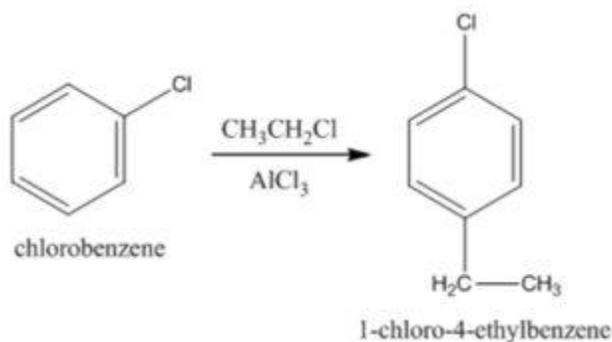
$$\begin{aligned} \text{pH} &= 4.57 + \log \frac{0.1}{0.01} \\ &= 4.57 + \log 10 \\ \text{pH} &= 5.57 \end{aligned}$$

78. Which of the following Sequence of reactions is suitable to synthesize chlorobenzene ?

- (1)  , HCl
- (2)  , HCl, Heating
- (3) Benzene, Cl<sub>2</sub>, anhydrous FeCl<sub>3</sub>
- (4) Phenol, NaNO<sub>2</sub>, HCl, CuCl

Ans: (3)

Soln:



79. In one molal solution that contains 0.5 mole of a solute, there is

- Aa 100 mL of solvent
- (2) 1000 g of solvent
- (3) 500 mL of solvent
- (4) 500 g of solvent

Ans: (4)

Soln: molarity (m) =  $\frac{n}{W_1(\text{kg})}$

$$1 = \frac{0.5}{W_1}$$

$\therefore W_1 = 0.5 \text{ kg solvent}$   
= 500 g

80. Which one is not correct mathematical equation for Dalton's Law of partial pressure ? Here p = total pressure of gaseous mixture

- (1)  $p_i = x_i p$ , where  $p_i$  = partial pressure of  $i^{\text{th}}$  gas  
 $x_i$  = mole fraction of  $i^{\text{th}}$  gas in gaseous mixture

(2)  $p_i = x_i p_i^0$ , where  $x_i$  = mole fraction of  $i^{\text{th}}$  gas in gaseous mixture

$p_i^0$  = pressure of  $i^{\text{th}}$  gas in pure state

(3)  $p = p_1 + p_2 + p_3$

(4)  $p = n_1 \frac{RT}{V} + n_2 \frac{RT}{V} + n_3 \frac{RT}{V}$

Ans: (2)

Soln:  $p_1 = x_1 p_1^0$  this is Rault's law

$P_1^0 = V.p$  of pure component

81. Which amongst the following is incorrect statement ?

(1)  $\text{H}_2^+$  ion has one electron.

(2)  $\text{O}_2^+$  ion is diamagnetic

(3) The bond orders of  $\text{O}_2^+$ ,  $\text{O}_2$ ,  $\text{O}_2^-$  and  $\text{O}_2^{2-}$  are 2.5, 2, 1.5 and 1, respectively.

(4)  $\text{C}_2$  molecule has four electrons in its two degenerate  $\pi$  molecular orbitals.

Ans: (2)

Soln:  $\text{O}_2^+$  is paramagnetic

as it contain 1-unpaired  $e^-$

82. Amongst the following which one will have maximum 'lone pair - lone pair' electron repulsions ?

(1)  $\text{SF}_4$

(2)  $\text{XeF}_2$

(3)  $\text{ClF}_3$

(4)  $\text{IF}_5$

Ans: (2)

Soln:  $\text{XeF}_2$  contain maximum lone pairs

$\text{SF}_4 \rightarrow 1 \text{ LP}$

$\text{XeF}_2 \rightarrow 3 \text{ LP}$

$\text{ClF}_3 \rightarrow 2 \text{ LP}$

$\text{IF}_5 \rightarrow 1 \text{ LP}$

83. Identify the incorrect statement from the following

- (1) Ionisation enthalpy of alkali metals decreases from top to bottom in the group.
- (2) Lithium is the strongest reducing agent among the alkali metals.
- (3) Alkali metals react with water to form their hydroxides.
- (4) The oxidation number of K in  $KO_2$  is + 4.

Ans: (4)

Soln: In  $KO_2$  oxidation state of K is +1 not + 4

84. Which statement regarding polymers is not correct ?

- (1) Thermoplastic polymers are capable of repeatedly softening and hardening on heating and cooling respectively.
- (2) Thermosetting polymers are reusable.
- (3) Elastomers have polymer chains held together by weak intermolecular forces.
- (4) Fibers possess high tensile strength.

Ans: (2)

Soln: Thermosetting polymers are not reversible

85. Given below are two statements ;

**Statement I:** Primary aliphatic amines react with  $HNO_2$  to give unstable diazonium salts.

**Statement II:** Primary aromatic amines react with  $HNO_2$  to form diazonium salts which are stable even above 300K.

In the light of the above statements, choose the most appropriate answer from the options given below

- (1) Statement I is correct but Statement II is incorrect
- (2) Statement I is incorrect but Statement II is correct.

(3) Both Statement I and Statement II are correct

(4) Both Statement I and Statement II are incorrect.

Ans: (1)

Soln:  $R-NH_2 + HNO_2 \xrightarrow{HCl} RN_2^+Cl^- \longrightarrow N_2 \uparrow$

Primary amine forms diazonium salt which are unstable at room temperature

Hence S-I is correct

S-II is incorrect

### Section – B (Attempt Any 10)

86. Given below are two statements;

**Statement I:** In Lucas test, primary, secondary and tertiary alcohols are distinguished on the basis of their reactivity with conc.  $HCl + ZnCl_2$ , known as Lucas Reagent.

**Statement II:** Primary alcohols are most reactive and immediately produce turbidity at room temperature on reaction with Lucas Reagent.

In the light of the above statements, choose the most appropriate answer from the options given below .

- (1) Statement I is correct but Statement II is incorrect.
- (2) Statement I is incorrect but Statement II is correct.
- (3) Both Statement I and Statement II are correct
- (4) Both Statement I and Statement II are incorrect.

Ans: (1)

Soln: Lucas reagent test is for alcohol,  $3^\circ$  gives fastest turbidity  $3^\circ > 2^\circ > 1^\circ$

Hence, S-I is correct & S-II is incorrect.

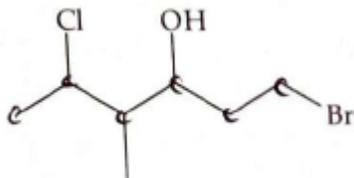
87. In the neutral or faintly alkaline medium,  $\text{KMnO}_4$  oxidises iodide into iodate. The change in oxidation state of manganese in this reaction is from

- (1) +7 to +3      (2) +6 to +5  
 (3) +7 to +4      (4) +6 to +4

Ans: (3)

Soln: In alkaline medium  $\text{KMnO}_4$ , changes to +4 from +7

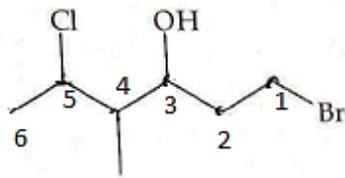
88. The correct IUPAC name of the following compound is:



- (1) 1-bromo-4-methyl-5-chlorohexan-3-ol  
 (2) 6-bromo-4-methyl-2-chlorohexan-4-ol  
 (3) 1-bromo-5-chloro-4-methylhexan-3-ol  
 (4) 6-bromo-2-chloro-4-methylhexan-4-ol

Ans: (3)

Soln:



OH is main functional group which is at position - 3 from right side

∴ 1-bromo-5-chloro-4-methylhexan-3-ol

89. Find the emf of the cell in which the following reaction takes place at 298 K  
 $\text{Ni(s)} + 2 \text{Ag}^+ (0.001 \text{ M}) \rightarrow \text{Ni}^{2+} (0.001 \text{ M}) + 2 \text{Ag(s)}$

(Given that  $E^\circ_{\text{cell}} = 10.5\text{V}$ ,  
 $\frac{2.303RT}{F} = 0.059$  at 298K)

- (1) 0.9615V      (2) 1.05V  
 (3) 1.0385V      (4) 1.385V

Ans: (ERROR)

$$\begin{aligned} \text{Soln: } E_{\text{cell}} &= E^\circ_{\text{cell}} - \frac{0.059}{n} \log \frac{P}{R} \\ &= 10.5 - \frac{0.059}{2} \log \frac{[\text{Ni}^{2+}]}{[\text{Ag}^+]^2} \\ &= 10.5 - \frac{0.059}{2} \log \frac{10^{-3}}{(10^{-3})^2} \\ &= 10.5 - \frac{0.059}{2} \log 10^3 \\ &\approx 10.5 - \frac{0.06}{2} \times 3 \\ &= 10.5 - 0.09 \\ &= \text{ERROR [404]} \end{aligned}$$

90. The order of energy absorbed which is responsible for the color of complexes

- (A)  $[\text{Ni}(\text{H}_2\text{O})_2(\text{en})_2]^{2+}$   
 (B)  $[\text{Ni}(\text{H}_2\text{O})_4(\text{en})]^{2+}$  and  
 (C)  $[\text{Ni}(\text{en})_3]^{2+}$

is

- (1) (C) > (A) > (B)  
 (2) (B) < (A) > (C)  
 (3) (A) > (B) > (C)  
 (4) (C) > (B) > (A)

Ans: (1)

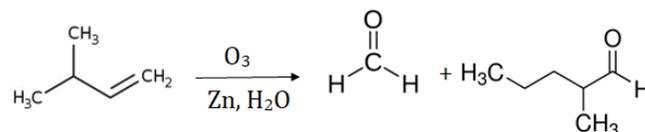
Soln: Order of energy absorbed more chelated complex will have more splitting  
 Hence  $C > A > B$

91. Compound X on reaction with  $\text{O}_3$  followed by  $\text{Zn}/\text{H}_2\text{O}$  gives formaldehyde and 2-methyl propanal as products. The compound X is:

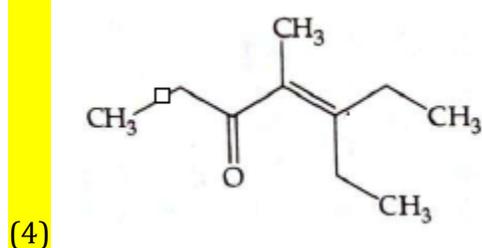
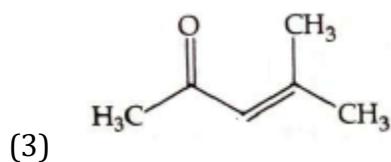
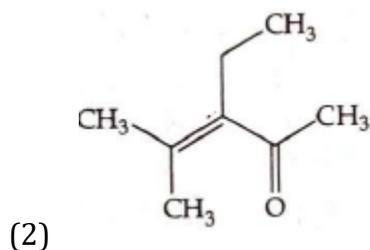
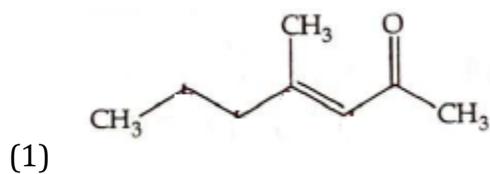
- (1) 2-Methylbut-2-ene  
 (2) Pent-2-ene  
 (3) 3-Methylbut-1-ene  
 (4) 2-Methylbut-1-ene

Ans: (3)

Soln:



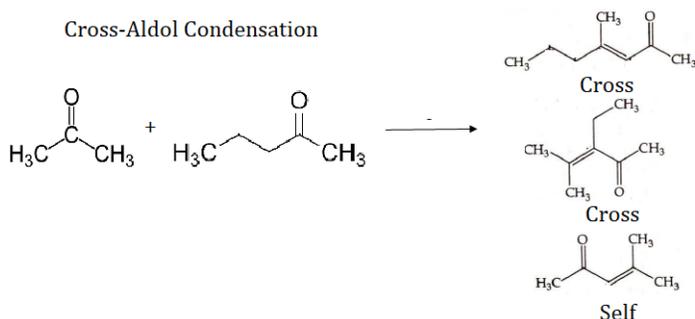
92. Which one of the following is not formed when acetone reacts with 2-pentanone in the presence of dilute NaOH followed by heating ?



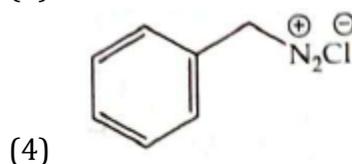
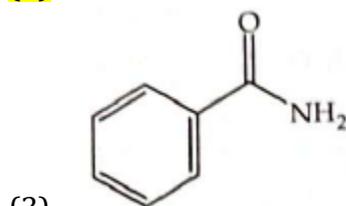
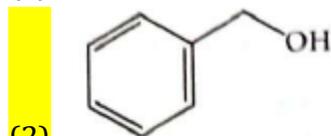
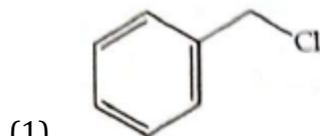
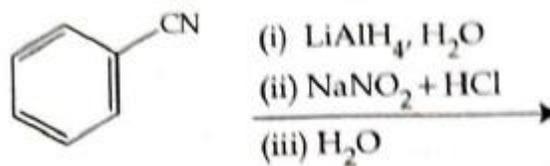
**Ans: (4)**

**Soln:**

Cross-Aldol Condensation

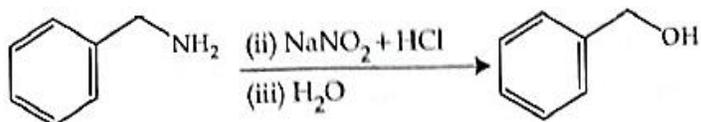
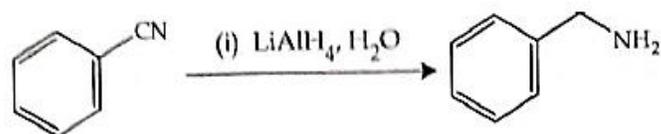


93. The product formed the following reaction sequence is



**Ans: (2)**

**Soln:**



94.  $3O_2(g) \rightleftharpoons 2O_3(g)$

for the above reaction at 298 K,  $K_c$  is found to be  $3.0 \times 10^{-59}$ . If the concentration of  $O_2$  at equilibrium is 0.040 M then concentration of  $O_3$  in M is

- (1)  $2.4 \times 10^{31}$       (2)  $1.2 \times 10^{21}$   
 (3)  $4.38 \times 10^{-32}$       (4)  $1.9 \times 10^{-63}$

**Ans: (3)**

Soln:



$$K_C = \frac{[O_3]^2}{[O_2]^3} \quad [O_2] = 0.04$$

$$[O_3]^2 = K_C [O_2]^3$$

$$= 3 \times 10^{-59} \times (4 \times 10^{-2})^3$$

$$= 3 \times 10^{-59} \times 64 \times 10^{-6}$$

$$[O_3]^2 = 192 \times 10^{-65}$$

$$[O_3] = \sqrt{192 \times 10^{-65}}$$

$$= \sqrt{19.2 \times 10^{-64}}$$

$$[O_3] = 4.38 \times 10^{-32}$$

95. A 10.0 L flask contains 64 g of oxygen at 27°C. (Assume O<sub>2</sub> gas is behaving ideally). The pressure inside the flask in bar is (Given R = 0.0831 L bar K<sup>-1</sup> mol<sup>-1</sup>)

- (1) 49.8                      (2) 4.9  
(3) 2.5                      (4) 498.6

Ans: (2)

Soln: V = 10L

$$W = 64g O_2$$

$$T = 300K \quad n = \frac{W}{m} = \frac{64}{32} = 2 \text{ moles}$$

$$P = ?$$

$$R = 0.0831$$

$$PV = nRT$$

$$P = \frac{nRT}{V} = \frac{2 \times 0.0831 \times 300}{10}$$

$$= 6 \times 0.0831 \times 10$$

$$P = 4.986 \text{ bar}$$

96. Copper crystallises in fcc unit cell with cell edge length of  $3.608 \times 10^{-8}$  cm. The density of copper is 8.92 g cm<sup>-3</sup>. Calculate the atomic mass of copper.

- (1) 60u                      (2) 65u  
(3) 63.1u                      (4) 31.55

Ans: (3)

Soln: Z = 4 atoms

$$a = 3.608 \times 10^{-8} \text{ cm}$$

$$d = 8.92 \text{ g/cm}^3$$

$$d = \frac{z \times m}{N_A \times a^3}$$

$$m = \frac{d \times N_A \times a^3}{z}$$

$$= \frac{8.92 \times 6.022 \times 10^{23} \times (3.608)^3 \times 10^{-24}}{4}$$

$$m = 630.7 \times 10^{-1}$$

$$m = 63.07$$

$$m = 63.14$$

97. Match List I with list II

	Column I (Ores)		Column II (Composition)
(a)	Haematite	(i)	Fe <sub>3</sub> O <sub>4</sub>
(b)	Magnetite	(ii)	ZnCO <sub>3</sub>
(c)	Calamine	(iii)	Fe <sub>2</sub> O <sub>3</sub>
(d)	Kaolinite	(iv)	[Al <sub>2</sub> (OH) <sub>4</sub> Si <sub>2</sub> O <sub>5</sub> ]

Choose the correct answer from the options given below

- (1) a-iii; b-i; c-iv; d-ii  
(2) a-i; b-iii; c-ii; d-iv  
(3) a-i; b-ii; c-iii; d-iv  
(4) a-iii; b-i; c-ii; d-iv

Ans: (4)

Soln: Haematite → Fe<sub>2</sub>O<sub>3</sub>

Magnetite → Fe<sub>3</sub>O<sub>4</sub>

Calamine → ZnCO<sub>3</sub>

Kaolinite → [Al<sub>2</sub>(OH)<sub>4</sub>Si<sub>2</sub>O<sub>5</sub>]

98. For a first order reaction A → Products, initial concentration of A is 0.1 M, which becomes 0.001 M after 5 minutes. Rate constant for the reaction in min<sup>-1</sup> is

- (1) 0.4606                      (2) 0.2303  
(3) 1.3818                      (4) 0.9212

Ans: (4)

Soln: [A]<sub>0</sub> = 0.1M

$$[A]_t = 0.001$$

$$t = 5 \text{ min}$$

$$K = \frac{2.303}{t} \log \left[ \frac{10^{-1}}{10^{-3}} \right]$$

$$= \frac{2.303}{5} \log[10^2]$$

$$= \frac{2.303}{5} \times 2(\log 10)$$

$$K = 0.9212 \text{ min}^{-1}$$

99. If radius of second Bohr orbit of the He<sup>+</sup> ion is 105.8 pm, what is the radius of third Bohr orbit of Li<sup>2+</sup> ion ?

- (1) 15.87pm      (2) 158.7 Å  
**(3) 158.7pm**      (4) 15.87pm

Ans: (3)

Soln:  $r = \frac{h^2 \epsilon_0 n^2}{\pi m e^2 Z}$

$$\frac{r_{\text{He}^+}}{r_{\text{Li}^{2+}}} = \left( \frac{n_1}{n_2} \right)^2 \times \frac{Z_2}{Z_1} = \left( \frac{2}{3} \right)^2 \times \frac{3}{2}$$

$$= \frac{4}{9} \times \frac{3}{2} = \frac{2}{3}$$

$$105.8 \times \frac{3}{2} = r_{\text{Li}^{2+}} = 158.7 \text{ pm}$$

100. The pollution due to oxides of sulphur gets enhanced due to the presence of:

- (a) particulate matter  
 (b) ozone  
 (c) hydrocarbons  
 (d) hydrogen peroxide

Choose the most appropriate answer from the options given below.

- (1) (b), (c), (d) only  
 (2) (a), (c), (d) only  
 (3) (a), (d) only  
**(4) (a), (b), (d) only**

Ans: (4)

