CHEMISTRY TEST PAPER WITH ANSWER & SOLUTIONS
FINAL NEET(UG)–2022 (EXAMINATION)
Held On Sunday 17th JULY, 2023
CODE – T2

SECTION-A

51. 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 -

$$Al^{3+} > Ba^{2+} > Na^{+}$$

Statement II :

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

$$NaCl > Na_2SO_4 > Na_3PO_4$$

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

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

Ans. (2)

Sol. According to Hardy Schulze Rule statement 1 is correct. (Generally, the greater the valence of the flocculating ion added, the greater is its power to cause precipitation)
According to Hardy Schulze Rule statement 2 is incorrect

52. Which statement regarding polymers is not correct ?
(1) Fibers possess high tensile strength.
(2) Thermoplastic polymers are capable of repeatedly softening and hardening on heating and cooling respectively.
(3) Thermosetting polymers are reusable.
(4) Elastomers have polymer chains held together by weak intermolecular forces.

Ans. (3)

Sol. Thermosetting polymers are NOT reusable.

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

Ans. (2)

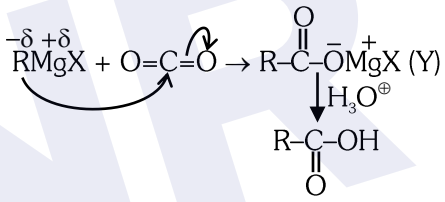
Sol. Enantiomers are non-superimposable mirror images of each other.

54. $RMgX + CO_2 \xrightarrow[ether]{dry} Y \xrightarrow{H_3O^+} RCOOH$

What is Y in the above reaction :
(1) $R_3CO^-Mg^+X$
(2) $RCOO^-X^+$
(3) $(RCOO)_2Mg$
(4) $RCOO^-Mg^+X$

Ans. (4)

Sol.



55. In one molal solution that contains 0.5 mole of a solute, there is
(1) 500 g of solvent
(2) 100 mL of solvent
(3) 1000 g of solvent
(4) 500 mL of solvent

Ans. (1)

Sol. $$m = \frac{\text{Moles of solute}}{\text{Weight of solvent (g)}} \times 1000$$

$$1 = \frac{0.5}{\text{Weight of solvent (g)}} \times 1000$$

Weight of solvent (g) = 500 g

56. Match **List-I** with **List-II**

List- I (Hydrides)	**List-II (Nature)**
(a) MgH_2	(i) Electron precise
(b) GeH_4	(ii) Electron deficient
(c) B_2H_6	(iii) Electron rich
(d) HF	(iv) Ionic

Choose the correct answer from the options given below :
(1) (a)-(iii), (b) - (i), (c) - (ii), (d)- (iv)
(2) (a)-(i), (b) - (ii), (c) - (iv), (d)- (iii)
(3) (a)-(ii), (b) - (iii), (c) - (iv), (d)- (i)
(4) (a) -(iv), (b) - (i), (c) - (ii), (d)- (iii)

Ans. (4)

Sol. Electron deficient hydride → Less than $8e^-$ (B_2H_6)
Electron precise hydride → having $8e^-$ without l.p. (GeH_4)
Electron rich hydride → having $8e^-$ with l.p. (HF)

57. 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.

Statements II :

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

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

(1) Both statements I and statements II are incorrect.

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

(3) Statements I is incorrect but statements II is correct.

(4) Both statements I and statements Ii are correct.

Ans. (4)

Sol. Boiling point of comparable molecular mass molecules

R – OH > Aldehyde – Ketone > Alkane

H-bonding (strong molecular association) | Dipole-dipole interaction (weak molecular association) | Non-polar

58. Match **List-I** with **List -II**.

List-I (Products formed)	**List-II (Reaction of carbonyl compound with)**
(a) Cyanohydrin	(i) NH_2OH
(b) Acetal	(ii) RNH_2
(c) Schiff's base	(iii) alcohol
(d) Oxime	(iv) HCN

Choose the correct answer from the options given below :

(1) (a)-(ii), (b) - (iii), (c) - (iv), (d)- (i)

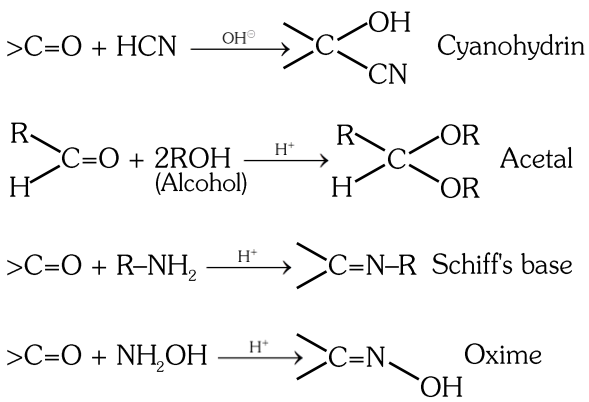
(2) (a)-(i), (b) - (iii), (c) - (ii), (d)- (iv)

(3) (a)-(iv), (b) - (iii), (c) - (ii), (d)- (i)

(4) (a) -(iii), (b) - (iv), (c) - (ii), (d)- (i)

Ans. (3)

Sol.



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

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

(2) $p_i = \chi_i p$, where p_i=partial pressure of i^{th} gas, χ_i=mole fraction of i^{th} gas in gaseous mixture

(3) $p_i = \chi_i p_i^{\circ}$, where χ_i, = mole fraction of i^{th} gas in gaseous mixture, p_i° = pressure of i^{th} gas in pure state

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

Ans. (3)

Sol. Dalton's law of partial pressure :

Partial pressure of gas = mole fraction of gas in gaseous mixture × Total pressure of gaseous mixture.

$$p_1 = X_1 p$$
$$p_2 = X_2 p$$
$$p_3 = X_3 p$$

Total pressure,

$$p = p_1 + p_2 + p_3$$

Therefore, statement-3 is incorrect.

60. Match **List-I** with **List-II.**

	List-I (Drug class)		**List-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)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

(2) (a)-(i), (b)-(iv), (c)-(ii), (d)- (iii)

(3) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

(4) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

Ans. (1)

Sol. Antacid – Cimetidine

Antihistamine – Seldane

Analgesic – Morphine

Antimicrobials - Salvarsan

61. Given below are two statements:

Statement I :

The boiling points of the following hydrides of group 16 elements increases in the order -

$H_2O < H_2S < H_2Se < H_2Te$.

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) Both **Statement I** and **Statement II** are incorrect

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

(3) **Statement I** is incorrect but **Statement II** is correct

(4) Both **Statement I** and **Statement II** are correct

Ans. (1)

Sol. Hydrides of group 16th

$\underset{\text{H-bond}}{H_2O}$ $\underbrace{H_2S \quad H_2Se \quad H_2Te}_{\text{VWA} \propto \text{mol.wt.}}$

B.P. $\rightarrow H_2S < H_2Se < H_2Te < H_2O$

62. The IUPAC name of the complex -

$[Ag(H_2O)_2][Ag(CN)_2]$ is:

(1) diaquasilver(II) dicyanidoargentate(II)

(2) dicyanidosilver(I) diaquaargentate(I)

(3) diaquasilver(I) dicyanidoargentate(I)

(4) dicyanidosilver(II) diaquaargentate(II)

Ans. (3)

Sol. IUPAC

$[Ag(H_2O)_2]$ $[Ag(CN)_2]$

Coordination number = 2,

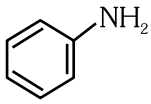
Oxidation state = Ag^{+1}

Diaquasilver(I) dicyanidoargentate(I)

63. Which of the following is suitable to synthesize chlorobenzene ?

(1) Phenol, $NaNO_2$, HCl, CuCl

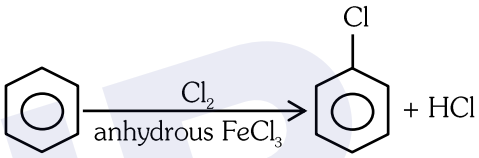
(2)  , HCl

(3)  , HCl, Heating

(4) Benzene, Cl_2, anhydrous $FeCl_3$

Ans. (4)

Sol.



64. Given below are two statements; one is labelled as **Assertion (A)** 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) Both **(A)** and **(R)** are correct but **(R)** is not the correct explanation of **(A).**

(2) **(A)** is correct but **(R)** is not correct.

(3) **(A)** is not correct but **(R)** is correct.

(4) Both **(A)** and **(R)** are correct and **(R)** is the correct explanation of **(A).**

Ans. (4)

Sol. Interhalogen compound group 17th

ICl is more reactive due to polar bonds.

From NCERT - X–X' bond is weaker than X–X bond except F_2

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

(1) unnilennium

(2) ununnunnium

(3) ununoctium

(4) ununennium

Ans. (4)

Sol. IUPAC nomenclature

119 $\rightarrow$ Ununennium $\rightarrow$ Uue

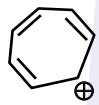
66. At 298 K, the standard electrode potentials of Cu^{2+}/Cu, Zn^{2+}/Zn, Fe^{2+}/Fe and Ag^{+}/Ag are 0.34V, – 0.76 V, – 0.44 V and 0.80 V, respectively.
On the basis of standard electrode potential, predict which of the following reaction can not occur ?
(1) $CuSO_4(aq) + Fe(s) \rightarrow FeSO_4(aq) + Cu(s)$
(2) $FeSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Fe(s)$
(3) $2CuSO_4(aq) + 2Ag(s) \rightarrow 2Cu(s) + Ag_2SO_4(aq)$
(4) $CuSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Cu(s)$

Ans. (3)

Sol. SRP : $E^{\circ}_{Zn^{2+}/Zn} < E^{\circ}_{Fe^{2+}/Fe} < E^{\circ}_{Cu^{2+}/Cu} < E^{\circ}_{Ag^{+}/Ag}$

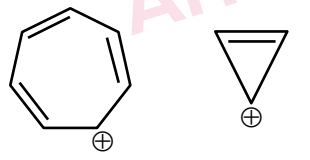
Reactivity order : Zn > Fe > Cu > Ag
In case of displacement reaction, more reactive metals (lower SRP) can displace less reactive metals (higher SRP) from their salt solution.
$CuSO_{4(aq.)} + 2Ag_{(s)} \rightarrow Cu_{(s)} + Ag_2SO_{4(aq.)}$
Option (3)
Reaction is not possible
as Ag is less reactive metal compare to Cu.

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

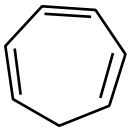
(1) 
(2) 
(3) 
(4) 

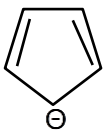
Ans. (3)

Sol.


Aromatic

Aromatic


Non-Aromatic


Aromatic

68. Choose the correct statement :
(1) Diamond is covalent and graphite is ionic.
(2) Diamond is sp^3 hybridised and graphite is sp^2 hybridized.
(3) Both diamond and graphite are used as dry lubricants.
(4) Diamond and graphite have two dimensional network.

Ans. (2)

Sol. In diamond each carbon is bonded with four other carbon atoms. So hybridisation of carbon atom is sp^3.
In graphite each carbon is bonded with three other carbon atoms. So hybridisation of carbon atom is sp^2.

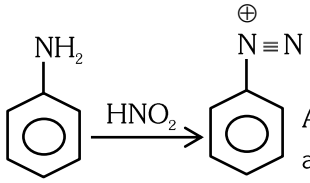
69. Given below are two statements :
Statement I :
Primary aliphatic amines react with HNO_2 to give unstable diazonium salts.
Statement II :
Primary aromatic amines react with HNO_2 to form diazonium salts which are stable even above 300 K.
In the light of the above statements, choose the **most appropriate** answer from the options given below :
(1) Both **Statement-I** and **Statement-II** are incorrect.
(2) **Statement-I** is correct but **Statement-II** is incorrect.
(3) **Statement-I** is incorrect but **Statement-II** is correct.
(4) Both **Statement-I** and **Statement-II** are correct.

Ans. (2)

Sol.

$$R-NH_2 \xrightarrow{HNO_2} R-N_2^{\oplus}$$

Alkyl diazonium ion
(unstable)



Aryl diazonium ion stable at low temperature (0–5°C)

70. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A) :
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, Frenkel 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) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(2) (A) is correct but (R) is not correct
(3) (A) is not correct but (R) is correct.
(4) Both (A) and (R) are correct and (R) is the correct explanation of (A)

Ans. (1)

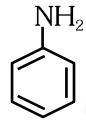
Sol. (i) Statement-1 is correct because in point defects of ionic solid electrical neutrality is essential condition (given question is example of metal deficiency defect)

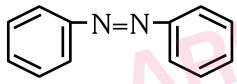
(ii) Statement-2 is correct because In Frenkel defect cation dislocate from lattice site to interstitial position.

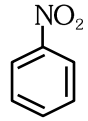
(iii) Both statement are correct but statement-2 is not correct explanation of statement-1

71. 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 ?

(1) 

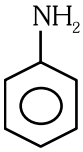
(2) 

(3) 

(4) 

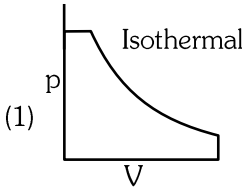
Ans. (2)

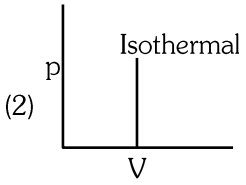
Sol.

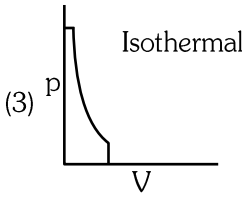


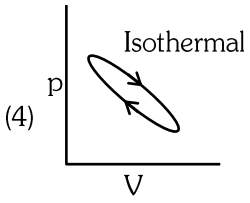
Kjeldahl's method is not applicable to the compounds containing nitrogen having nitro and azo group and nitrogen present in the ring (pyridine), as nitrogen of these compounds does not change to ammonium sulphate under these conditions.

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

(1) 

(2) 

(3) 

(4) 

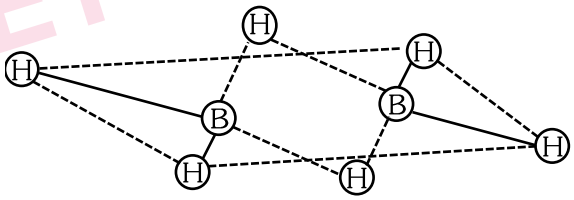
Ans. (1)

Sol. In P-V graph area under the curve represent magnitude of work.
As it is maximum in graph-1
So correct answer is (1)

73. Which of the following statement is **not** correct about diborane ?
(1) The four terminal B-H bonds are two centre two electron bonds.
(2) The four terminal Hydrogen atoms and the two Boron atoms lie in one plane.
(3) Both the Boron atoms are sp^2 hybridised
(4) There are two 3-centre-2-electron bonds.

Ans. (3)

Sol.



B has sp^3 Hybridisation
Non- planar

74. 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) 3.57 (2) 4.57
(3) 2.57 (4) 5.57

Ans. (4)

Sol. Weak acid (CH_3COOH) and salt of weak acid-strong base (CH_3COONa) form an acidic buffer.
Sodium acetate (CH_3COONa) = 0.10 M;
Acetic acid (CH_3COOH) = 0.01 M;
pH of acidic buffer solution is given by

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

$$= 4.57 + \log\left(\frac{0.1}{0.01}\right)$$

$$= 5.57$$

75. Which amongst following is **incorrect** statement ?
(1) C_2 molecule has four electrons in its two degenerate π molecular orbitals.
(2) H_2^+ ion has one electron
(3) O_2^+ ion has diamagnetic.
(4) The bond orders of O_2^+, O_2, O_2^- and O_2^{2-} are 2.5, 2, 1.5 and 1, respectively.

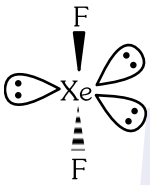
Ans. **(3)**

Sol. O_2^+ ion is having 15 electrons, so it contain one unpaired electron. Hence it is paramagnetic in nature.

76. Amongst the following which one will have maximum 'lone pair-lone pair' electron repulsions ?
(1) IF_5 (2) SF_4
(3) XeF_2 (4) ClF_3

Ans. **(3)**

Sol. XeF_2



XeF_2 has maximum 3 lone-pair – lone-pair repulsions

77. 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 ?
$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)} + H_2O_{(l)}$
[Calculate upto second place of decimal point]
(1) 1.32 g
(2) 3.65 g
(3) 9.50 g
(4) 1.25 g

Ans. **(1)**

Sol. $CaCO_{3(s)} + 2HCl_{(aq.)} \rightarrow CaCl_{2(aq.)} + CO_{2(g)} + H_2O_{(l)}$

$$\text{no. of moles of } CaCO_3 \text{ (pure)} = \frac{1}{2} \times \text{mole of HCl}$$

[Mole = molarity × volume(in ltr.)]

$$= \frac{1}{2} \times 0.5 \times \frac{50}{1000} = 0.0125$$

weight of $CaCO_3$ (pure) = mole × mol. wt
= 0.0125 × 100 = 1.25 g

$$\% \text{ purity} = \frac{\text{wt. of pure substance}}{\text{wt. of impure sample}} \times 100$$

$$95 = \frac{1.25}{\text{wt. of impure sample}} \times 100$$

$$\text{wt. of impure sample} = \frac{1.25 \times 100}{95} = 1.32\,\text{g}$$

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

Ans. **(1)**

Sol. KO_2

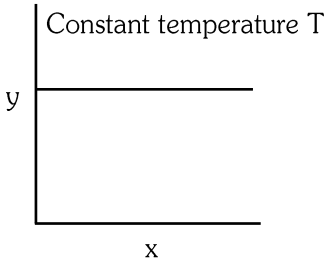
$K^+ \; O_2^-$ (O_2^- – superoxide ion)

79. Gadolinium has a low value of third ionisation enthalpy because of
(1) high exchange enthalpy
(2) high electronegativity
(3) high basic character
(4) small size

Ans. **(1)**

Sol. $_{64}Gd$ = [Xe] $6s^2\ 4f^7\ 5d^1$
Gd^{+2} = [Xe] $4f^7\ 5d^1$
After losing 5d electron 4f has maximum exchange energy so Gd has low value of Third Ionisation energy

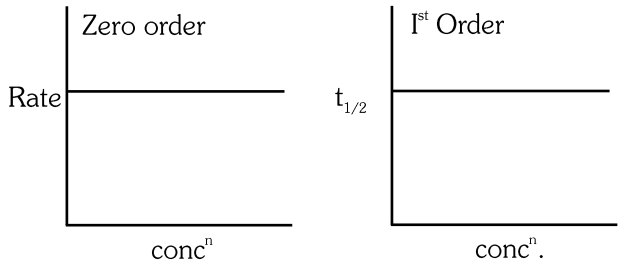
80. The given graph is a representation of kinetics of a reaction.



The y and x axes for zero and first order reactions, respectively are
(1) zero order (y=concentration and x = time), first order (y = rate constant and x = concentration)
(2) zero order (y = rate and x=concentration), first order (y = $t_{1/2}$ and x=concentration)
(3) zero order (y= rate and x = concentration), first order (y = rate and x = $t_{1/2}$)
(4) zero order (y=concentration and x = time), first order (y = $t_{1/2}$ and x = concentration)

Ans. **(2)**

Sol.



(I) curve is suitable for zero order if y = rate and x = concentration because in case of zero order reaction rate is constant and does not depend on conc^n.

(II) curve is suitable for first order if y = $t_{1/2}$ and x = conc^n because in case of first order $t_{1/2}$ does not depend on conc^n.

81. The incorrect statement regarding enzymes is:

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

(2) Enzymes are polysaccharides.

(3) Enzymes are very specific for a particular reaction and substrate.

(4) Enzymes are biocatalysts.

Ans. (2)

Sol. Which is incorrect statement regarding enzymes

(1) Like chemical catalysts enzymes reduce the activation energy of bio process ⇒ This is correct statement.

(2) Enzymes are polysaccharides ⇒ This is incorrect statement because enzymes are protein in nature

(3) Enzymes are very specific for a particular reaction and substrate ⇒ This is correct statement.

(4) Enzymes are biocatalyst ⇒ This is correct statement.

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

(1) All the five 4d orbitals have shapes similar to the respective 3d orbitals.

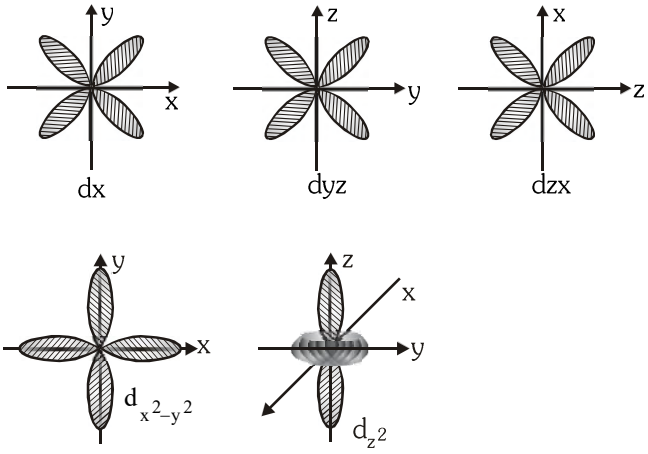
(2) In an atom, all the five 3d orbitals are equal in energy in free state.

(3) 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.

(4) All the five 5d orbitals are different in size when compared to the respective 4d orbitals

Ans. (3)

Sol.



83. Given below are half cell reactions :

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{2+} + 4H_2O$,

$E^\circ_{Mn^{2+}/MnO_4^-} = -1.510V$

$\frac{1}{2}O_2 + 2H^+ + 2e^- \rightarrow H_2O$,

$E^\circ_{O_2/H_2O} = +1.223V$

Will the permanganate ion, MNO_4^- liberate O_2 from water in the presence of an acid ?

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

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

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

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

Ans. (4)

Sol.

Reduction

$MnO_4^- + 8H^+ + 5e^- \rightarrow Mn^{+2} + 4H_2O$; $E^\circ_{MnO_4^-/Mn^{+2}} = 1.510V$

$\frac{1}{2}O_2 + 2H^+ + 2e^- \rightarrow H_2O$; $E^\circ_{O_2/H_2O} = 1.223V$

Reduction

Cathode :

$2MnO_4^- + 16H^+ + 10e^- \rightarrow 2Mn^{+2} + 8H_2O$;

$E^\circ_{RP} = 1.510V$

Anode :

$5H_2O \rightarrow \frac{5}{2}O_2 + 10H^+ + 10e^-$;

$E^\circ_{OP} = -1.223V$

Target reaction :

$2MnO_4^- + 6H^+ \rightarrow 2Mn^{+2} + \frac{5}{2}O_2 + 3H_2O$;

$E^\circ_{cell} = (SRP)_{Cathode} - (SRP)_{Anode}$

$E^\circ_{Cell} = 1.510V - 1.223$ V

$= 0.287$ V

Yes the given cell reaction is possible.

84. Match **List-I** with **List-II.**

List-I	**List-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)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

(2) (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

(3) (a)-(ii), (b)-(iii), (c)-(i), (d)-(iv)

(4) (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

Ans. (3)

Sol. Li - Electrochemical cells

Na - Coolant in fast breeder reactors

KOH - absorbent for CO_2

Cs - Photoelectric cell.

85. 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) Both **Statement I** and **Statement II** are incorrect.

(2) **Statement I** is correct but **Statement II** is incorrect.

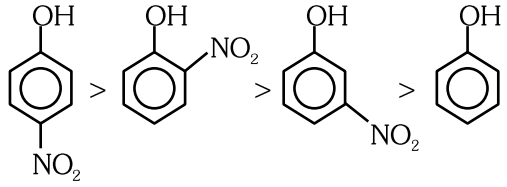
(3) **Statement I** is incorrect but **Statement II** is correct

(4) Both **Statement I** and **Statement II** are correct

Ans. (2)

Sol. Acidic strength of phenolic group increases due to electron withdrawing groups.

Order of acidic strength



SECTION-B

86. 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) (a),(b),(d)only

(2) (b),(c),(d)only

(3) (a), (c),(d) only

(4) (a), (d) only

Ans. (1)

Sol. The presence of particulate matter in polluted air catalyses the oxidation of sulphurdioxide to sulphur trioxide.

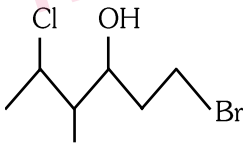
$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

The reaction can also be promoted by ozone and hydrogen peroxide.

$SO_2(g) + O_3(g) \rightarrow SO_3(g) + O_2(g)$

$SO_2(g) + H_2O_2(l) \rightarrow H_2SO_4(aq)$

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



(1) 6-bromo-2-chloro-4-methylhexan-4-ol

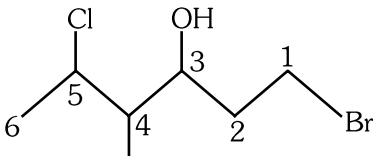
(2) 1-bromo-4-methyl-5-chlorohexan-3-ol

(3) 6-bromo-4-methyl-2-chlorohexan-4-ol

(4) 1-bromo-5-chloro-4-methylhexan-3-ol

Ans. (4)

Sol.



1-Bromo-5-chloro-4-methylhexan-3-ol

88. $3O_2(g) \rightleftharpoons 2O_3(g)$

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

(1) 1.9×10^{-63} (2) 2.4×10^{31}

(3) 1.2×10^{21} (4) 4.38×10^{-32}

Ans. (4)

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

$$K_c = \frac{[O_3]^2}{[O_2]^3}$$

$$3 \times 10^{-59} = \frac{[O_3]^2}{(4 \times 10^{-2})^3}$$

$$[O_3]^2 = 3 \times 10^{-59} \times 64 \times 10^{-6}$$

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

$$= 4.38 \times 10^{-32} \text{ M}$$

89. Match **List-I** with **List-II.**

List-I (Ores)	**List-II (Composition)**
(a) Haematite	(i) Fe_3O_4
(b) Magnetite	(ii) $ZnCO_3$
(c) Calamine	(iii) Fe_2O_3
(d) Kaolinite	(iv) $[Al_2(OH)_4Si_2O_5]$

Choose the correct answer from the options given below :

(1) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)

(2) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

(3) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

(4) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

Ans. (1)

Sol. Haematite Fe_2O_3

Magnetite Fe_3O_4

Calamine $ZnCO_3$

Kaolinite $[Al_2(OH)_4Si_2O_5]$

90. Given below are two statements :

Statement I:

In Lucas test, primary, secondary and tertiary alcohols are distinguished on the basis of their reactivity with cone. 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) Both **Statement I** and **Statement II** are incorrect.

(2) **Statement I** is correct but **Statement II** is incorrect.

(3) **Statement I** is incorrect but **Statement II** is correct

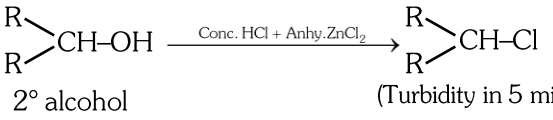
(4) Both **Statement I** and **Statement II** are correct

Ans. (2)

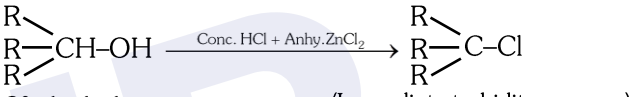
Sol. 1°,2°,3° Alcohol are distinguished by Lucas test on the basis of the time taken for turbidity to appear

$$R\text{–}CH_2\text{–}OH \xrightarrow{\text{Conc. HCl + Anhy.}ZnCl_2} R\text{–}CH_2\text{–}Cl$$

1° alcohol (Turbidity in 30 min.)



2° alcohol (Turbidity in 5 min.)



3° alcohol (Immediate turbidity appears)

Reactivity of alcohol towards Lucas reagent

$\Rightarrow 3° > 2° > 1°$ Alcohol

91. In the neutral or faintly alkaline medium, $KMnO_4$ oxidses iodide into iodate. The change in oxidation state of manganese in this reaction is from

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

(3) +6 to +5 (4) +7 to +4

Ans. (4)

Sol. $\underset{+7}{KMnO_4} + I^- \xrightarrow[\text{or weak alkaline medium}]{\text{Neutral}} \underset{+4}{MnO_2} + IO_3^-$

Change +7 to +4

92. 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 $min^{-1}$is

(1) 0.9212

(2) 0.4606

(3) 0.2303

(4) 1.3818

Ans. (1)

Sol. A → Products

Initial conc. A_o = 0.1 M

Conc. After 5 min A_t = 0.001 M

t = 5 min.

For first order reaction

$$K = \frac{2.303}{t}\log\left(\frac{A_o}{A_t}\right)$$

$$= \frac{2.303}{5}\log\left(\frac{0.1}{0.001}\right)$$

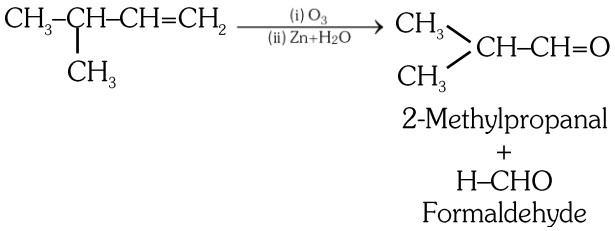
$K = 0.9212 \text{ min}^{-1}$

93. Compound X on reaction with O_3 followed by Zn/H_2O gives formaldehyde and 2-methyl propanal as products. The compound X is :

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

Ans. (4)

Sol.



94. A 10.0 L flask contains 64 g of oxygen at 27°C. (Assume O_2 gas is behaving ideally). The pressure inside the flask in bar is

(Given R = 0.0831 L bar K^{-1} mol^{-1})

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

Ans. (3)

Sol. V = 10 L W_{O_2} = 64 g

T = 27 °C n_{O_2} = 2

R = 0.083. L bar K^{-1} mol^{-1}

Ideal gas equation PV = nRT

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

P = 4.9 bar

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

(A) $[Ni(H_2O)_2(en)_2]^{2+}$
(B) $[Ni(H_2O)_4(en)]^{2+}$ and
(C) $[Ni(en)_3]^{2+}$
(1) (C)>(B)>(A)
(2) (C)>(A)>(B)
(3) (B)>(A)>(C)
(4) (A)>(B)>(C)

Ans. (2)

Sol. (A) $[Ni(H_2O)_2(en)_2]^{2+}$
(B) $[Ni(H_2O)_4(en)]^{2+}$
(C) $[Ni(en)_3]^{2+}$

en is SFL (strong field ligand)

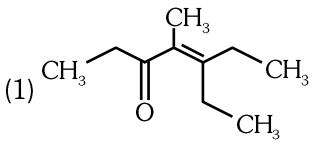
As the number of en (strong ligand) increase splitting also increases.

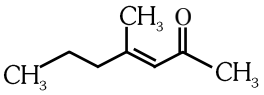
So, Δ_0 increases.

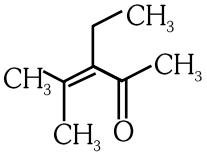
i.e. maximum energy will be absorbed in case of option C.

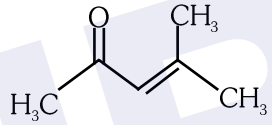
So the order is C > A > B

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

(1) 

(2) 

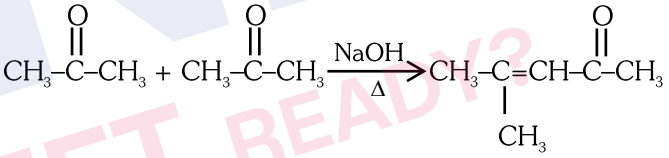
(3) 

(4) 

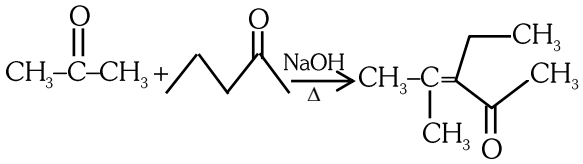
Ans. (1)

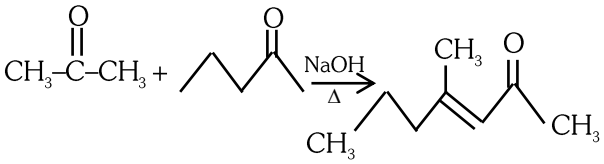
Sol.

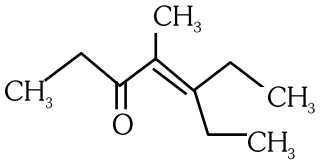
Self aldol



Cross Aldol







will not form

97. Find the emf of the cell in which the following reaction takes place at 298 K

$Ni(s) + 2Ag^+ (0.001\ M) \rightarrow Ni^2 + (0.001\ M) + 2Ag(s)$

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

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

Ans. (Bonus)

Sol. $Ni(s) + 2Ag^{+}(0.001\ M) \rightarrow Ni^{+2}(0.001M) + 2Ag(s)$

$$E_{cell} = E^{o}_{cell} - \frac{0.059}{n}\log\frac{[Ni^{+2}]^1}{[Ag^{+}]^2}$$

$$E_{cell} = 10.5 - \frac{0.059}{2}\log\frac{10^{-3}}{(10^{-3})^2}$$

$$= 10.5 - \frac{0.059}{2}\log 10^{+3}$$

$$= 10.5 - \frac{0.059}{2}\times 3$$

$$= 10.4115\ V$$

(Calculated answer is not given in options)

98. If radius of second Bohr orbit of the He^{+} ion is 105.8 pm, what is the radius of third Bohr orbit of Li^{2+} ion?

(1) 15.87 pm

(2) 1.587 pm

(3) 158.7 Å

(4) 158.7 pm

Ans. (4)

Sol. Acc. to Bohr's atomic model

$r \propto \frac{n^2}{z}$

3^{rd} orbit of Li^{+2} $n_1 = 3$, $Z_1 = 3$

$\Rightarrow$ 2^{nd} orbit of He^{+} $n_2 = 2$, $Z_2 = 2$

$$\frac{(r_3)_{Li^{+2}}}{(r_2)_{He^{+}}} = \frac{n_1^2}{n_2^2}\times\frac{Z_2}{Z_1}$$

$$\frac{(r_3)_{Li^{+2}}}{105.8pm} = \frac{3\times 3}{2\times 2}\times\frac{2}{3}$$

$$(r_3)_{Li^{+2}} = 158.7\ pm$$

99. Copper crystallises in fcc unit cell with cell edge length of 3.608×10^{-8} cm. The density of copper is 8.92 g cm^{-3}. Calculate the atomic mass of copper.

(1) 31.55 u (2) 60 u

(3) 65 u (4) 63.1 u

Ans. (4)

Sol. $$d = \frac{Z\times M}{N_A \times a^3}$$

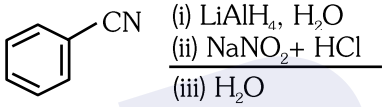
$$8.92 = \frac{4\times M}{6.022\times 10^{23}\times(3.608\times 10^{-8})^3}$$

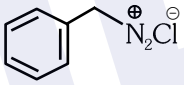
$$M = \frac{8.92\times 6.022\times 10^{23}}{4}\times 46.96\times 10^{-24}$$

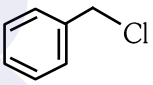
M = 63.1 g/mol (Molar Atomic Mass)

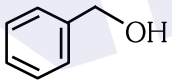
M = 63.1 u (Atomic Mass)

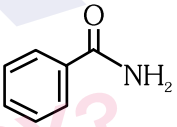
100. The product formed from the following reaction sequence is



(1) 

(2) 

(3) 

(4) 

Ans. (3)

Sol.