SOLVED PAPER	NEET (UG) 17th July 2022	Code Q3

Important Instructions :

1. *The test is of **3 hours 20 minutes** duration and Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** Questions in each subject are divided into two **Section (A and B)** as per details given below:*
   - *(a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos- 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All questions are compulsory.*
   - *(b) **Section B** shall consist of **15 (Fifteen)** Questions in each subject (Question Nos- 36 to 50, 86 to 100, 136 to 150 and 80 to 200). In Section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.*

   Candidates are advised to read all 15 questions in each subject of Section B** before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.
2. *Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, one mark will be deducted from the total scores. **The maximum marks are 720.***
3. *Use **Blue/Black Ball Point Pen only** for writing particulars on this page/marking responses on Answer Sheet.*
4. *Use of Electronic/Manual Calculator is prohibited.*
5. ***No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.***
6. *The candidates will write the Correct Test Booklet Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.*
7. *Compensatory time of one hour five minutes will be provided for the examination of three hours and 20 minutes duration, whether such candidate (having a physical limitation to write) uses the facility of scribe or not.*

CHEMISTRY

Section A

Q. 51. Choose the correct statement :

(1) Diamond and graphite have two dimensional network.

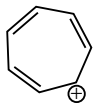
(2) Diamond is covalent and graphite is ionic.

(3) Diamond is sp^3 hybridized and graphite is sp^2 hybridized.

(4) Both diamond and graphite are used as dry lubricants.

Q. 52. Which compound amongst the following is not an aromatic compound?

(1) 

(2) 

(3) 

(4) 

Q. 53. In one molal solution that contains 0.5 mole of a solute, there is

(1) 500 mL of solvent

(2) 500 g of solvent

(3) 100 mL of solvent

(4) 1000 g of solvent

Q. 54. The IUPAC name of an element with atomic number 119 is :

(1) unununnium

(2) unnilennium

(3) ununennium

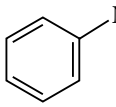
(4) unoctium

Q. 55. Which of the following is suitable to synthesize chlorobenzene ?

(1) Benzene, Cl_2, anhydrous $FeCl_3$

(2) Phenol, $NaNO_2$, HC, CuCl

(3)  , HCl

(4)  , HCl, Heating

Q. 56. Given below are two statements :

Statements I :

Primary aliphatic amines react with HNO_2 to give unstable diazonium salts.

Statements 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 correct

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

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

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

Q. 57. Gadolinium has a low value of third ionization enthalpy because of

(1) small size

(2) high exchange enthalpy

(3) high electronegativity

(4) high basic character.

Q. 58. Identify the **incorrect** statement from the following :

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

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

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

(4) The shapes of d_{yx}, 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.

Q. 59. Given below are two statements :

Statements I :

The acidic strength of monosubstituted nitro-phenol 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 correct.

(2) Both **Statement I** and **Statement II** are incorrect.

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

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

Q. 60. At 298 K, the standard electrode potentials of Cu^{2+}/Cu, Zn^{2+}/Zn, Fe^{2+}/Fe and Ag^{+}/Ag are 0.34 V, – 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) $CuSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Cu(s)$

(2) $CuSO_4(aq) + Fe(s) \rightarrow FeSO_4(aq) + Cu(s)$

(3) $FeSO_4(aq) + Zn(s) \rightarrow ZnSO_4(aq) + Fe(s)$

(4) $2CuSO_4(aq) + 2Ag(s) \rightarrow 2Cu(s) + Ag_2SO_4(aq)$

Q. 61. 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 correct

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

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

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

Q. 62. Which statement regarding polymers is not correct ?

(1) Elastomers have polymer chains held together by weak intermolecular forces.

(2) Fibers possess high tensile strength.

(3) Thermoplastic polymers are capable of repeatedly softening and hardening on heating and cooling respectively.

(4) Thermosetting polymers are reusable.

Q. 63. 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)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

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

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

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

Q. 64. 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 units 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 and (R) is the correct explanation of (A)

(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)

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

(4) (A) is not correct but (R) is correct

Q. 65. Which one is **not** correct mathematical equation for Dalton's Law of partial pressure ? Here p = total pressure of gaseous mixture:

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

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

(3) $p_i = x_i p_i$ where p_i = partial pressure of i^{th} gas
x_i = mole fraction of i^{th} gas in gaseous mixture

(4) $p_i = x_i p_i^o$, where x_i = mole fraction of gas in gaseous mixture
p_i^o = pressure of i^{th} gas in pure state

Q. 66. Given below are two statements :

Statements 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 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) Both **Statement I** and **Statement II** are correct

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

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

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

Q. 67. $RMgX + CO_2 \xrightarrow[ether]{dry} Y \xrightarrow{H_3O^+} RCOOH$

What is Y in the above reaction ?

(1) $RCOO^-Mg^+X$

(2) $R_3CO^-Mg^+X$

(3) $RCOO^-X^+$

(4) $(RCOO)_2Mg$

Q. 68. The incorrect statement regarding enzymes is :

(1) Enzymes are bio-catalysts.

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

(3) Enzymes are polysaccharides.

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

Q. 69. Given below are two statements :

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

$H_2O < H_2S < H_2Se < H_2Te$

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

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

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

Q. 70. 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 below :

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

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

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

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

Q. 71. 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 :

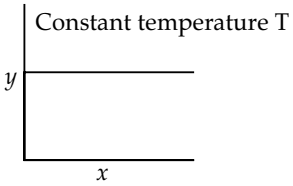
(1) (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

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

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

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

Q. 72. The given graph is 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 ($y = t_{1/2}$ and x = concentration)

(2) zero order (y concentration and x = time), first order (y = rate constant and x = concentration)

(3) zero order (y = rate and x = concentration), first order ($y = t_{1/2}$ and x = concentration)

(4) zero order (y = rate and concentration), first order (y = rate and $x = t_{1/2}$)

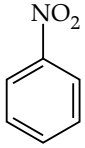
Q. 73. The pH of the solution containing 50 mL each of 0.10 M sodium acetate and 0.01 M acetic acid is

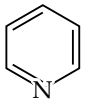
[Given pK_a of CH_3COOH = 4.57]

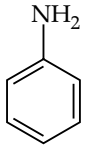
(1) 5.57 **(2)** 3.57

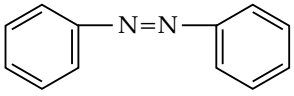
(3) 4.57 **(4)** 2.57

Q. 74. 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) 

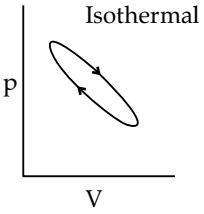
(4) 

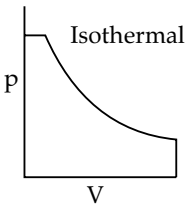
Q. 75. Amongst the following which one will have maximum 'lone pair-lone pair' electron repulsions ?

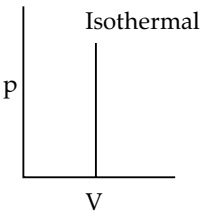
(1) ClF_3 **(2)** IF_5

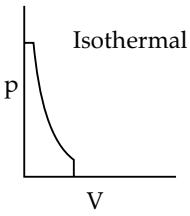
(3) SF_4 **(4)** XeF_2

Q. 76. Which of the following p-V curve represents maximum work done ?

(1) 

(2) 

(3) 

(4) 

Q. 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?

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

[Calculate upto second place of decimal point]

(1) 1.25 g **(2)** 1.32 g

(3) 3.65 g **(4)** 9.50 g

Q. 78. Given below are half cell reactions :

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

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

Will the permanganate ion, MnO_4^- liberate O_2 from water in the presence of an acid ?

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

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

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

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

Q. 79. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R).**

Assertion (A) I-Cl 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 and (R) is not the correct explanation of (A).

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

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

(4) (A) is not correct but (R) is correct.

Q. 80. Which amongst the following is incorrect statement ?

(1) The bond orders of O_2^+, O_2, O_2^- and O_2^{2-} are 2.5, 2, 1.5 and 1, respectively.

(2) C_2 molecules has four electrons in its two degenerate π molecular orbitals.

(3) H_2^+ ion has one electron.

(4) O_2^+ ion is diamagnetic.

Q. 81. The **incorrect** statement regarding chirality is :

(1) S_N1 reaction yields 1 : 1 mixture of both enantiomers.

(2) The product obtained by S_N2 reaction of haloalkane having chirality at the reactive site shows inversion of configuration.

(3) Enantiomers are superimposable mirror images on each other.

(4) A racemic mixture shows zero optical rotation.

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

(1) Alkali metals react with water to form their hydroxides.

(2) The oxidation number of K in KO_2 is +4.

(3) Ionisation enthalpy of alkali metals decreases from top to bottom in the group.

(4) Lithium is the strongest reducing agent among the alkali metals.

Q. 83. Which of the following statement is not correct about diborane ?

(1) There are two 3-centre-2-electron bonds.

(2) The four terminal B-H bonds are two centre two electron bonds.

(3) The four terminal Hydrogen atoms and the two Boron atoms lie in one plane.

(4) Both the Boron atoms are sp^2 hybridised.

Q. 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)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

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

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

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

Q. 85. The IUPAC name of the complex : $[Ag(H_2O)_2][Ag(CN)_2]$ is :

(1) dicyanidosilver (II), diaquaargentate (II)
(2) diaquasilver(II) dicyanidoargentate(II)
(3) dicyanidolosilver(I) diaquaargentate (I)
(4) diaquasilver(I) discyanidoargentate (I)

Section B

Q. 86. $3O_2(g) \rightleftharpoons 2O_3(g)$
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_2 at equilibrium is 0.040 M then concentration of O_3 in M is :

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

Q. 87. 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 option given below :

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

Q. 88. Given below are two statement :

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.

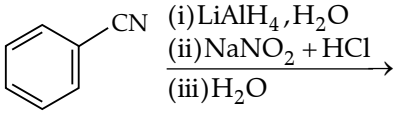
In the light of the above statements, choose the **most appropriate** answer from the options given below :

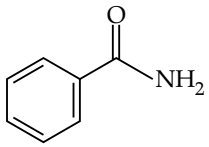
(1) Both **Statement I** and **Statement II** are correct.
(2) Both **Statement I** and **Statement II** are incorrect
(3) **Statement I** is correct but **Statement II** is incorrect
(4) **Statement I** is incorrect but **Statement II** is correct.

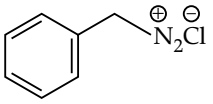
Q. 89. If radius of second Bohr orbit of the He^+ ion ion is 105.8 pm, what is the radius of third Bohr orbit of Li^{2+} ion ?

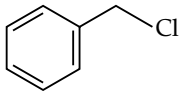
(1) 1.587 pm **(2)** 15.87 pm
(3) 1.587 pm **(4)** 158.7 Å

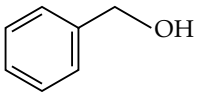
Q. 90. The product formed from the following reaction sequence is



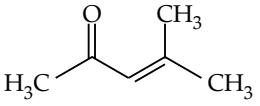
(1) 

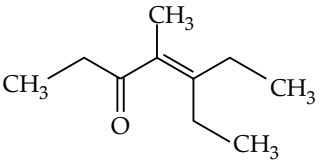
(2) 

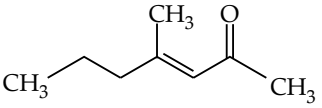
(3) 

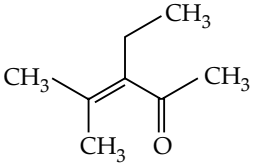
(4) 

Q. 91. Which one of the following is **not** formed when acetone with 2-pentanone in the presence of dilute NaOH followed by heating?

(1) 

(2) 

(3) 

(4) 

Q. 92. Compound X on reaction with O_3 followed by Zn/H_2O formaldehyde and 2-methyl propanal as products. The compound X is :

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

Q. 93. In the neutral of faintly alkaline medium, $KMnO_4$ oxidizes iodide into iodate. The change in oxidation state of manganese in this reaction is from

(1) + 7 to + 4

(2) + 6 to + 4

(3) + 7 to + 3

(4) + 6 to + 5

Q. 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) 2.5 **(2)** 498.6

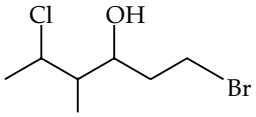
(3) 49.8 **(4)** 4.9

Q. 95. 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) 1.3818 **(2)** 0.9212

(3) 0.4606 **(4)** 0.2303

Q. 96. The correct IUPAC name of the following compound is :



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

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

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

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

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

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

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

(1) 1.0385 V

(2) 1.385 V

(3) 0.9615 V

(4) 1.05 V

Q. 98. 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) $[Ni(en)_2]^{2+}$

(1) (A) > (B) > (C)

(2) (C) > (B) > (A)

(3) (C) > (A) > (B)

(4) (B) > (A) > (C)

Q. 99. Copper crystallizes 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) 63.1 u **(2)** 31.55 u

(3) 60 u **(4)** 65 u

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

(a) particulate matter

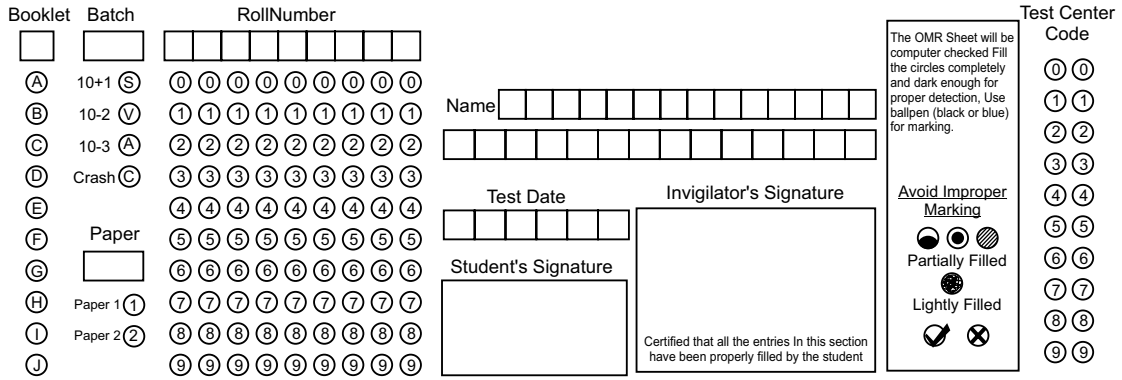
(b) ozone

(c) hydrocarbons

(d) hydrogen peroxide

(1) (a), (d) only **(2)** (a), (b), (d) only

(3) (b), (c), (d) only **(4)** (a), (c), (d) only



51	①	②	③	④
52	①	②	③	④
53	①	②	③	④
54	①	②	③	④
55	①	②	③	④

56	①	②	③	④
57	①	②	③	④
58	①	②	③	④
59	①	②	③	④
60	①	②	③	④

61	①	②	③	④
62	①	②	③	④
63	①	②	③	④
64	①	②	③	④
65	①	②	③	④

66	①	②	③	④
67	①	②	③	④
68	①	②	③	④
69	①	②	③	④
70	①	②	③	④

71	①	②	③	④
72	①	②	③	④
73	①	②	③	④
74	①	②	③	④
75	①	②	③	④

76	①	②	③	④
77	①	②	③	④
78	①	②	③	④
79	①	②	③	④
80	①	②	③	④

81	①	②	③	④
82	①	②	③	④
83	①	②	③	④
84	①	②	③	④
85	①	②	③	④

86	①	②	③	④
87	①	②	③	④
88	①	②	③	④
89	①	②	③	④
90	①	②	③	④

91	①	②	③	④
92	①	②	③	④
93	①	②	③	④
94	①	②	③	④
95	①	②	③	④

96	①	②	③	④
97	①	②	③	④
98	①	②	③	④
99	①	②	③	④
100	①	②	③	④

Q. No.	Answer Key	Topic's Name	Chapter Name
		(SECTION-A)	
51	3	Classification of solids	Solid state
52	4	Aromaticity	Organic Chemistry Some Basic Principles and Techniques
53	2	Molality	Some basic concepts of chemistry
54	1	IUPAC name of elements of periodic table	Classification of elements and periodicity in properties
55	1	Chlorination	Organic Chemistry Some Basic Principles and Techniques
56	3	Amines	Organic Compounds Containing Nitrogen
57	2	Properties of *f*-Block elements	*d*- and *f*-Block elements
58	4	Shapes of molecular orbitals	Structure of atom
59	3	Acidic strength of substituted phenols	Alcohols, Phenols and Ethers
60	4	Reactivity series	Electrochemistry
61	3	Hardy - Schulze rule	Surface Chemistry
62	4	Polymers	Polymers
63	4	Chemical reactions of carbonyl group	Aldehydes, ketones and carboxylic acids
64	2	Defects in solids	Solid state
65	3	Dalton's law of partial pressure	States of Matter : Gases and Liquids
66	1	Physical properties of aldehydes and ketones	Aldehydes, ketones and carboxylic acids
67	1	Preparation of carboxylic acids	Aldehydes, ketones and carboxylic acids
68	3	Enzymes	Surface Chemistry
69	2	Properties of *p*-block elements	*p*-Block elements
70	1	*p*-block elements	*p*-Block elements
71	2	Types of drugs	Chemistry in everyday life
72	3	Order of a chemical reaction	Chemical Kinetics
73	1	pH	Equilibrium
74	3	Quantitative estimation of nitrogen	Organic Chemistry Some Basic Principles and Techniques
75	4	Chemical bonding	Chemical Bonding and Molecular Structure
76	2	Work	Thermodynamics
77	2	Equilibrium	Equilibrium
78	1	Electrochemistry	Electrochemistry
79	1	Interhalogen compounds	p-block elements
80	4	Magnetic property	Chemical Bonding and Molecular Structure
81	3	Stereochemistry	Haloalkanes and haloarenes
82	2	Properties of *s*-block elements	*s*-Block Elements (Alkali and Alkaline Earth Metals)
83	4	Properties of *p*-block elements	*p*-block elements
84	4	Uses of *s*-block elements	*s*-Block Elements (Alkali and Alkaline Earth Metals)
85	4	IUPAC name of elements of complexes	Coordination compounds

Q. No.	Answer Key	Topic's Name	Chapter Name
		SECTION-B	
86	1	Equilibrium	Equilibrium
87	2	Ores of metals	General Principles and Processes of Isolation of Elements
88	3	Lucas test for alcohols	Alcohols, Phenols and Ethers
89	1	Structure of atom	Structure of atom
90	4	Chemical reactions of alcohols	Alcohols, Phenols and Ethers
91	2	Aldol Condensation	Aldehydes, ketones and carboxylic acids
92	1	Ozonolysis	Organic Chemistry Some Basic Principles and Techniques
93	1	Chemical reactions of $KMnO_4$	*d*- and *f*-Block elements
94	4	Ideal gas equation	States of Matter : Gases and Liquids
95	2	First order reaction	Chemical Kinetics
96	1	IUPAC name of organic compounds	Organic Chemistry Some Basic Principles and Techniques
97	No correct Option	Nernst equation	Electrochemistry
98	3	Properties of complexes	Coordination compounds
99	1	Density of solids	Solid state
100	2	Pollutants	Environmental Chemistry

NEET (UG)
July 2022 Paper

ANSWERS WITH EXPLANATION

CHEMISTRY

Section A

51. Option (3) is correct.

Explanation: In diamond, carbon atoms have tetrahedral arrangement, so hybridization is sp^3.

The shape of graphite is trigonal planner and the hybridization possessed by it is sp^2.

52. Option (4) is correct.

Explanation:  does not follows Huckel rule as it has $8\pi e^-$ which violates $(4n+2)\pi e^-$ rule.

53. Option (2) is correct.

Explanation:

$$\text{Molality} = \frac{\text{Moles of solute}}{\text{Weight of solvent (in kg)}}$$

$$\text{Weight} = \frac{\text{Moles of solute}}{\text{Molality}}$$

$$\text{Wight} = \frac{0.5}{1}\text{ kg}$$

$$\text{Wight} = 0.5 \times 1000\text{ g}$$

$$\text{Weight} = 500\text{ g}$$

54. Option (1) is correct.

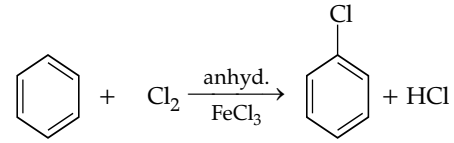
Explanation: As per IUPAC, notation for 1 is '*un*' and g is '*enn*' and the roots are put together in order of digits which make up the atomic number and '*ium*' is added at the end.

So, 119 = un +un + enn + ium

= ununennium

55. Option (1) is correct.

Explanation: Chlorobenzene is obtained by the chlorination of benzene.



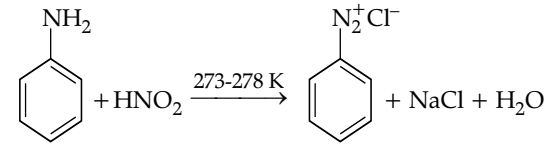
Benzene — Chloro-benzene

56. Option (3) is correct.

Explanation: Primary aliphatic amines reacts with nitrous acid to produce aliphatic diazonium salts which are unstable and liberates nitrogen gas and produces alcohols.

$$R\text{–}NH_2 + HNO_2 \xrightarrow{NaNO_2 + HCl} [R\text{–}N_2^+Cl^-] \xrightarrow{H_2O} ROH + N_2\uparrow + HCl$$

While, primary aromatic amines react with nitrous acid to form diazonium salts which are unstable.



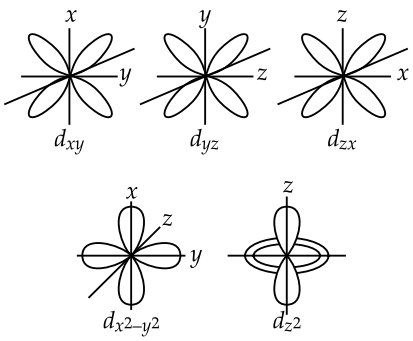
Aniline — Benzene diazonium chloride (unstable)

57. Option (2) is correct.

Explanation: The electronic configuration of Gadolinium (Gd) is [Xe] $4f^7 5d^1 6s^2$. In its Gd^{3+} state it acquires extra stability due to half-filled $4f$ sub-shell, i.e., [Xe] $4f^7$, and due to the high exchange enthalpy, it has low third ionization enthalpy.

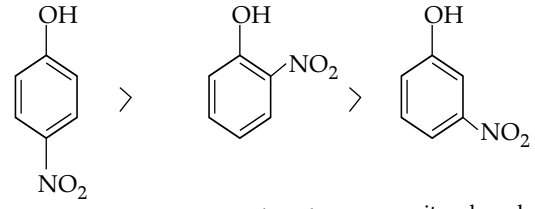
58. Option (4) is correct.

Explanation: The shapes of d_{xy}, d_{yz}, d_{zx} orbitals are similar to each other but the shapes of $d_{x^2-y^2}$ and d_{z^2} are different from each other.



59. Option (3) is correct.

Explanation: The acidic strength of monosubstituted nitrophenol is higher than phenol because of electron withdrawing group. But, *o*-nitrophenol, *m*-nitrophenol and *p*-nitrophenol have different acidic strength because of different distance of —NO_2 group from the —OH group and also at *ortho* and *para* positions, —NO_2 group withdraws electrons of the O—H bond towards itself by the stronger —R effect while the —NO_2 group of *meta* position withdraws electrons of the —OH bond by the weaker —I effect. So, acidic strength of *ortho* and *para*-nitrophenol is greater than that of *meta* nitrophenol.



p-nitrophenol *o*-nitrophenol *m*-nitrophenol

Acidic strength ⟶

60. Option (4) is correct.

Explanation:

$E^0_{Cu^{2+}/Cu} = 0.39$ V, $E^0_{Zn^{2+}/Zn} = -0.76$ V,

$E^0_{Fe^{2+}/Fe} = -0.44$ V, $E^0_{Ag^{2+}/Ag} = 0.80$ V

Considering the E^0 values, Ag cannot displace Cu from the solution.

So, the reaction :

$2CuSO_4(aq) + 2Ag(s) \rightarrow 2Cu(s) + Ag_2SO_4(aq)$

cannot occur.

61. Option (3) is correct.

Explanation: According ot Hardy Schulze Rule, Statement I is correct, since the greater the valence of the flocculating ion added, greater is its power to coagulate. But in statement II, Hardy-Schulze rule is not followed, hence statement II is incorrect.

62. Option (4) is correct.

Explanation: Thermosetting polymers are not reusable.

63. Option (4) is correct.

Explanation: When carbonyl group is reacted with HCN, cyanohydrin is formed as a product.

$$>C=O + HCN \xrightarrow{OH^{\ominus}} >C(OH)(CN)$$

Cyanonydrin

When carbonyl group is reacted with alcohol, it leads in the formation of an acetal.

$$>C=O + R\text{–}OH \xrightarrow{H^+} R(H)C(OR)(OR)$$

Acetal

On reaction with RNH_2, carbonyl compound leads to the formation of Schiff's base.

$$>C=O + R\text{—}NH_2 \xrightarrow{H^+} >C=N\text{—}R$$

Schiff's base

When carbonly compound is treated with hydroxyl amine, oxime is formed.

$$>C=O + NH_2OH \xrightarrow{H^+} >C=N(OH)$$

Oxime

64. Option (2) is correct.

Explanation: In point defects, electrical neutrality is not disturbed. Ether dislocation takes place or equal number of cation and anion gets missed.

65. Option (3) is correct.

Explanation: According to Dalton's law of particle pressure, the total pressure exerted by a mixture of gases is equal to the sum of the partial pressure exerted by each individual gas in the mixture.

Mathematically, $P_{total} = P_1 + P_2 + P_3 + ...$

So, option (3), i.e., the expression $p_i = x_i p$ is incorrect mathematical equation for Dalton's law of partial pressure.

66. Option (1) is correct.

67. Option (1) is correct.

$$\overset{-\delta\ +\delta}{R\,MgX} + O{=}C{=}O \rightarrow \underset{[Y]}{R\text{–}\overset{O}{\overset{\|}{C}}\text{–}O^-Mg^+X} \xrightarrow{H_3O^+} R\text{–}\overset{O}{\overset{\|}{C}}\text{–}OH$$

68. Option (3) is correct.

Explanation: Enzymes are not polysaccharides, they are protein in nature.

69. Option (2) is correct.

Explanation: Because of hydrogen bonding in water molecule, H_2O has highest boiling point. For the hydrides of S, Se and Te, boiling point increases with increase in molar mass.

So, correct order of boiling point is:

$H_2O > H_2Te > H_2Se > H_2S$

70. Option (1) is correct.

Explanation: MgH_2 is ionic in nature.

GeH_4 is electron precise as it have $8e^-$ without any lone pair.

B_2H_6 is an electron deficient compound as it has less then $8e^-$.

HF is electron rich hydride as it has 8 electrons with lone pair.

71. Option (2) is correct.

Explanation: Cimetidine is an antacid.

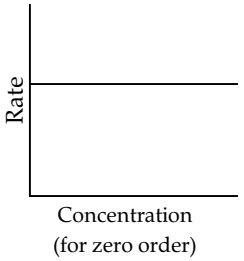
Seledane is an antihistamine.

Morphine is an analgesic.

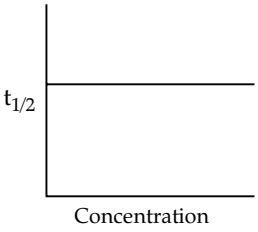
Salvarsan is an antimicrobials.

72. Option (3) is correct.

Explanation: Since, rate of a zero order reaction does not depends on concentration, so for zero order reaction, y = rate and x = concentration.



While in first order reaction, $t_{1/2} = \frac{0.693}{k}$, so half life of reaction does not depends on concentration, so graph for first order reaction is:



73. Option (1) is correct.

Explanation: Concentration of salt = 0.10 M

Concentration of acetic acid = 0.01 M

pK_a of acetic acid = 4.57

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

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

$$pH = 4.57 + \log\left(\frac{100}{10}\right)$$

$$pH = 4.57 + \log 10$$

$$pH = 4.57 + 1 \quad [\because \log 10 = 1]$$

$$pH = 5.5$$

74. Option (3) is correct.

Explanation: The Kjeldahl's method for the estimation of nitrogen is not applicable for the compounds having azo group, nitro group or the compounds having nitrogen present in ring, i.e., heterocylic (pyridine) as these compounds does not gets converted into $(NH_4)SO_4$, i.e., ammonium sulphtate. So, only aniline can be used to estimate the amount of nitrogen.

75. Option (4) is correct.

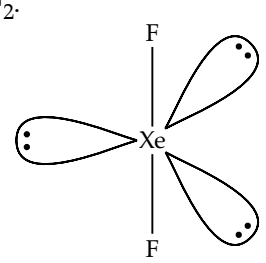
Explanation: In ClF_3, there are 2 lone pairs

In IF_5, there is 1 lone pair.

In SF_4, there is 1 lone pair, and

In XeF_2, there are 3 lone pairs.

So, lone pair-lone pair repulsion is maximum in XeF_2.



76. Option (2) is correct.

Explanation: Since, area under the p-V curve represents the work done and area uner the curve in graph (2) is maximum, so maximum work done is represented by curve (2).

77. Option (2) is correct.

Explanation:

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + 2H_2O(l)$$

Molarity of HCl (M) = 0.5 M

$$\text{Molarity} = \frac{\text{No. of moles}}{\text{Volume}}$$

$$\text{No. of moles} = \text{Molarity} \times \text{Volume}$$

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

Number of moles of $CaCO_3$

$$= \frac{1}{2} \times \text{Numbers of moles of HCl}$$

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

So, number of moles of $CaCO_3$ = 0.0125

For $CaCO_3$, number of moles

$$= \frac{\text{Weight}}{\text{Molecular weight}}$$

$$0.0125 = \frac{w}{100}$$

$$w = 0.0125 \times 100 = 1.25 \text{ g}$$

So, weight of pure $CaCO_3$ = 1.25 g

$$\% \text{ Purity} = \frac{\text{Weight of pure } CaCO_3}{\text{Weight of impure } CaCO_3} \times 100$$

Weight of impure $CaCO_3$

$$= \frac{1.25 \times 100}{95}$$

$$= 1.32 \text{ g}$$

78. Option (1) is correct.

Explanation:

$\overset{+7}{MnO_4^-} + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O$; $E^\circ_{Mn^{2+}/MnO_4^-} = -1.510V$ ...(1)

(Reduction)

$\frac{1}{2}\overset{0}{O_2} + 2H^+ + 2e^- \longrightarrow \overset{-2}{H_2O}$; $E^\circ_{O_2/H_2O} = +1.223V$ ...(2)

(Reduction)

Reversing equation (2), we get

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

At cathode:

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

i.e., $2MnO_4^- + 16H^+ + 10e^- \rightarrow 2Mn^{2+} + 8H_2O$ ...(3)

At anode:

$$H_2O \rightarrow \frac{1}{2}O_2 + 2H^+ + 2e^-] \times 5$$

$$5H_2O \rightarrow \frac{5}{2}O_2 + 10H^+ + 10e^- \quad ...(4)$$

Overall reaction:

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

$$E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{anode}$$

$$= -1.510 - (-1.223)$$

$$= -1.510 + 1.223$$

$$= 0.287 \text{ V}$$

Since $E^\circ_{cell} > 0$, so MnO_4^- will liberate O_2 from water in the presence of an acid.

79. Option (1) is correct.

Explanation: ICl is more reactive than I_2 because I-Cl bond is weaker than I-I bond.

Since, in interhalogen compounds, X-X bond is stronger than X-X' bond (X=Cl, Br, I)

80. Option (4) is correct.

Explanation: Molecular orbital electronic configuration of O_2 is

$\square 1s^2 \square^* 1s^2, \square 2s^2 \square^* 2s^2, \square 2p_z^2, \square 2p_x^2 = \square 2p_y^2, \square^* 2p_x^1 = \square^* 2p_y^1$

In O_2^+, the electronic configuration is:

$\square 1s^2 \square^* 1s^2, \square 2s^2 \square^* 2s^2, \square 2p_z^2, \square 2p_x^2 = \square 2p_y^2, \square^* 2p_x^1 = \square^* 2p_y^1$

Since, there is one unpaired electron in O_2^+, so it is paramagnetic in nature.

81. Option (3) is correct.

Explanation: Enantiomers are non-superimposable mirror images of each other.

82. Option (2) is correct.

Explanation: Since, O_2^- is superoxide ion, so, its oxidation state is – 1.

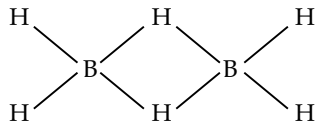
So, oxidation number of KO_2 is:

$$x + (-1) = 0$$

$$x = +1$$

83. Option (4) is correct.

Explanation:



In diborane (B_2H_6), hybridization of both the boron atoms is sp^3.

84. Option (4) is correct.

Explanation: Lithium is used in electro-chemical cells.

Sodium is used as coolant in fast breeder reactors.

KOH is used to absorb CO_2 gas.

Cs is used in photoelectric cells.

85. Option (4) is correct.

Explanation: IUPAC name of

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

diaquailver (I) dicyanidoargentate (I)

Section B

86. Option (1) is correct.

Explanation:

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

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

$$3 \times 10^{-59} = \frac{[O_3]^2}{(0.040)^3}$$

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

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

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

$$[O_3]^2 = 19.2 \times 10^{-64}$$

$$[O_3] = \sqrt{19.2 \times 10^{-64}}$$

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

87. Option (2) is correct.

Explanation: Haematite - Fe_2O_3

Magnetite - Fe_3O_4

Calamine - $ZnCO_3$

Kaolinite - $[Al_2(OH)_4Si_2O_5]$

88. Option (3) is correct.

Explanation: Tertiary alcohols are most reactive and immediately produce turbidity at room temperature on reaction with Lucas reagent.

89. Option (1) is correct.

Explanation:

Since, $r \propto \frac{n^2}{Z}$ (From Bohr's atomic model)

For third Bohr orbit of Li^{2+}, $n_{Li^{3+}} = 3$, $Z_{Li} = 3$

For second Bohr orbit of He^+, $n_{He^+} = 2$,

$Z_{He} = 2$

$$(r_3)_{Li^{3+}} = \frac{(3)^2}{3}, (r_2)_{He^+} = \frac{(2)^2}{2}$$

$$\frac{(r_3)_{Li^{3+}}}{(r_2)_{He^+}} = \frac{(3)^2 \times 2}{3 \times (2)^2} = \frac{3}{2}$$

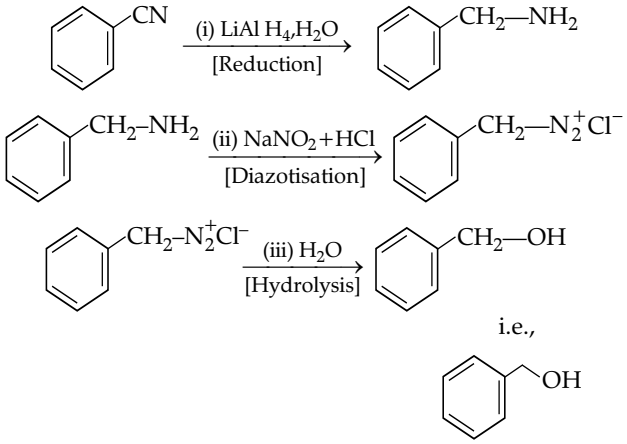
$$\frac{(r_3)_{Li^{3+}}}{105.8} = \frac{3}{2}$$

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

$$(r_3)_{Li^{3+}} = 158.7\ pm$$

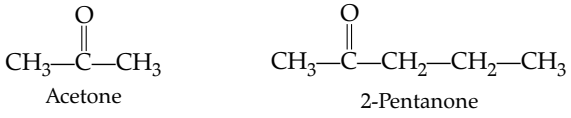
90. Option (4) is correct.

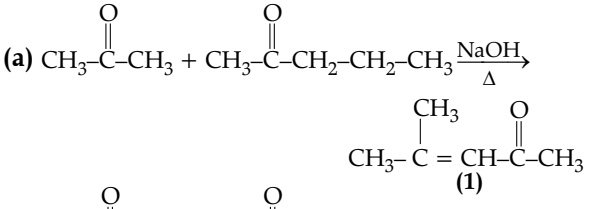
Explanation:

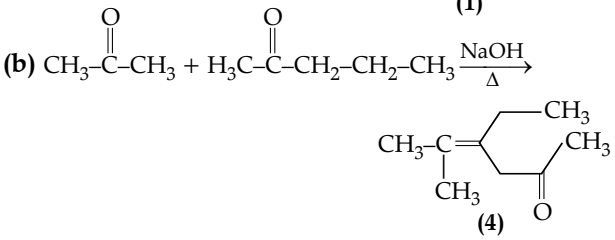


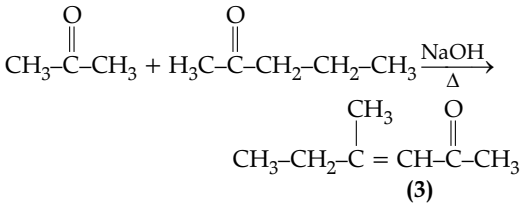
91. Option (2) is correct.

Explanation:



(a) 

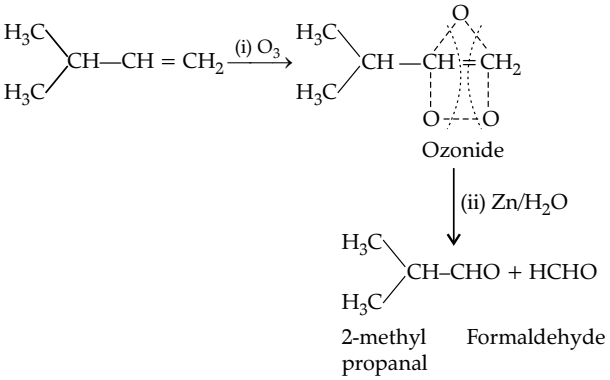
(b) 

(c) 

So, product (2) is not formed.

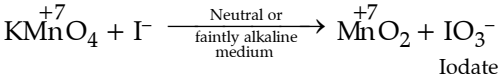
92. Option (1) is correct.

Explanation:



93. Option (1) is correct.

Explanation: Reaction of $KMnO_4$ with iodide ion in neutral or faintly alkaline medium:



So, the oxidation state of Mn changes from +7 to +4.

94. Option (4) is correct.

Explanation: V = 10 L, w_{O_2} = 64 g

T = 27°C = 27 +273 K = 300 K

1 mole of O_2 contains 32 g of O_2

So 64 g of O_2 will contain 2 moles of oxygen.

So, number of moles (n) = 2

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

Applying ideal gas equation,

$$PV = nRT$$

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

$$P = 4.9 \text{ bar}$$

95. Option (2) is correct.

Explanation: $A \rightarrow$ Products (given)

$[A]_\circ = 0.1$ M

$[A] = 0.001$ M

$t = 5$ min

For first order reaction,

$$k = \frac{2.303}{t} \log \frac{[A_\circ]}{[A]}$$

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

$$k = \frac{2.303}{5} \log (100)$$

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

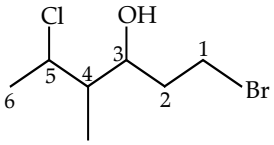
$$k = \frac{2.303}{5} \times 2 \log 10$$

$$k = \frac{2.303}{5} \times 2 = \frac{4.606}{5}$$

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

96. Option (1) is correct.

Explanation:



IUPAC name : 1-bromo-5-chloro-4 methyl hexan-3-ol

97. None of the option is correct.

Explanation:

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

Oxidation half reaction:

$$Ni \rightarrow Ni^{2+} + 2e^-$$

Reduction half reaction:

$$Ag^+ + e^- \rightarrow Ag] \times 2$$

Nernst equation:

$$E_{cell} = E^\circ_{cell} - \frac{2.303\,RT}{nF} \log \frac{[Ni^{2+}]}{[Ag^+]^2}$$

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

$$E_{cell} = 10.5 - \frac{0.59}{2} \log 10^3$$

$$E_{cell} = 10.5 - \frac{0.59}{2} \times 3$$

$$E_{cell} = 10.5 - 0.0885$$

$$E_{cell} = 10.4115 \text{ V}$$

This will be the benefits, if attempted.

98. Option (3) is correct.

Explanation: More the strong field ligands present in the compound, greater is the spliting.

Since, en is a strong field ligand.

So, order or energy absorbed is:

$[Ni(en)_3]^{2+} > [Ni(H_2O)_2(en)_2]^{2+} > [Ni(H_2O)_4(en)]^{2+}$

(C) (A) (B)

99. Option (1) is correct.

Explanation: $a = 3.608 \times 10^{-8}$ cm (given)

$d = 8.92$ g cm^{-3}

For FCC unit cell, Z = 4

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

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

$$M = 630.73 \times 10^{-1}$$

$$M = 63.07 \text{ u}$$

$$M = 63.1 \text{ u}$$

100. Option (2) is correct.

Explanation: The pollution due to oxides of sulphur gets enhanced due to the presence of particulate matter, ozone and hydrogen peroxide.

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

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

$$SO_2(g) \xrightarrow[\text{Matter}]{\text{Particulate}} SO_3(g)$$

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