

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(MPH/PHD/URS-EE-2019)  
CHEMISTRY

Code **D**

Sr. No. 10012

**SET-"X"**

Time : 1½ Hours

Total Questions : 100

Max. Marks : 100

Roll No. \_\_\_\_\_ (in figure) \_\_\_\_\_ (in words)

Name : \_\_\_\_\_ Father's Name : \_\_\_\_\_

Mother's Name : \_\_\_\_\_ Date of Examination : \_\_\_\_\_

(Signature of the candidate)

(Signature of the Invigilator)

**CANDIDATES MUST READ THE FOLLOWING INFORMATION/  
INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.**

1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / misbehaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A,B,C and D code will be got uploaded on the university website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet/Answer Key, the same may be brought to the notice of the Controller of Examination in writing/through E. Mail within 24 hours of uploading the same on the University Website. Thereafter, no complaint in any case, will be considered.
5. The candidate MUST NOT do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question book-let itself. Answers MUST NOT be ticked in the Question book-let.
6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
7. Use only Black or Blue **BALL POINT PEN** of good quality in the OMR Answer-Sheet.
8. **BEFORE ANSWERING THE QUESTIONS, THE CANDIDATES SHOULD ENSURE THAT THEY HAVE BEEN SUPPLIED CORRECT AND COMPLETE BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.**



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Code-D

Question No.	Questions
5.	<p><math>C_{60}</math> has</p> <p>(1) 14 pentagon rings and 18 Hexagon rings (2) 12 pentagon rings and 20 Hexagon rings (3) 12 pentagon rings and 18 Hexagon rings (4) 14 pentagon rings and 20 Hexagon rings</p>
6.	<p>In 'carbon-dating' application of radioisotopes, <math>^{14}C</math> emits</p> <p>(1) Positron (2) <math>\gamma</math> particle (3) <math>\beta</math> particle (4) <math>\alpha</math> particle</p>
7.	<p>The product of the reaction of propene, CO and <math>H_2</math> in the presence of <math>Co_2(CO)_8</math> as catalyst is</p> <p>(1) butanoic acid (2) butanal (3) 2-butanone (4) methylpropanoate</p>
8.	<p>Reductive elimination step in hydrogenation of alkenes by Wilkinson catalyst results in (neglecting solvent in coordination sphere of Rh)</p> <p>(1) T-shaped <math>[Rh(PPh_3)_2Cl]</math> (2) Trigonal-planar <math>[Rh(PPh_3)_2Cl]</math> (3) T-shaped <math>[Rh(H)(PPh_3)_2]</math> (4) Trigonal-planar <math>[Rh(H)(PPh_3)_2]</math></p>
9.	<p>The correct statement with respect to the bonding of the ligands, <math>Me_3N</math> and <math>Me_3P</math> with the metal ions <math>Be^{2+}</math> and <math>Pd^{2+}</math> is,</p> <p>(1) the ligands bind equally strong with both the metal ions as they are dicationic (2) the ligands bind equally strong with both the metal ions as both the ligands are pyramidal (3) the binding is stronger for <math>Me_3N</math> with <math>Be^{2+}</math> and <math>Me_3P</math> with <math>Pd^{2+}</math> (4) the binding is stronger for <math>Me_3N</math> with <math>Pd^{2+}</math> and <math>Me_3P</math> with <math>Be^{2+}</math></p>

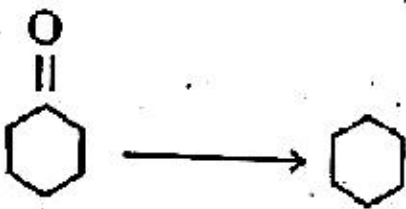
PHD/URS-EE-2019-Chemistry-Code-D (2)

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Question No.	Questions
10. ✓	In the iodometric titration of sodium thiosulfate ( $\text{Na}_2\text{S}_2\text{O}_3$ ) with acidic dichromate solution, 25 mL of 0.1 M dichromate requires 50 mL of 'x' M thiosulfate. The value of 'x' is  (1) 0.6 (2) 0.3 (3) 0.1 (4) 0.4
11. ✓	What is meant by a reaction going in 94% enantiomeric excess? (1) The product contains 94% of one enantiomer and 6% of other enantiomer (2) The product contains an enantiomer which is 94% pure (3) The product contains 94% of one enantiomer and 6% of the products (4) The product contains 97% of one enantiomer and 3% of other enantiomer
12.	Which of the following functional group is <u>not</u> reduced by sodium borohydride ( $\text{NaBH}_4$ )  (1) $\text{>C=O}$ (2) $\begin{array}{c} \text{-C-Cl} \\    \\ \text{O} \end{array}$ (3) $\begin{array}{c} \text{-C-H} \\    \\ \text{O} \end{array}$ (4) $\begin{array}{c} \text{-C-OH} \\    \\ \text{O} \end{array}$
13.	The given reaction is the example of: $\text{//} \backslash \backslash + = \rightarrow \text{Cyclohexene}$ (1) 2 + 4 cycloaddition (2) 2 + 2 cycloaddition (3) 2 + 2 + 2 cycloaddition (4) 2S + 2S cycloaddition
14.	A photo chemical reaction is: (1) catalysed by light (2) Initiated by light (3) accompanied with the emission of light (4) used to convert heat energy into light



Question No.	Questions
15.	Which of the following solvents is unacceptable on large scale ? (1) Dimethoxy ethane                      (2) Xylene (3) Diethyl ether                            (4) Heptane
16.	For the reaction given below, which reaction condition are not suitable ? <div style="text-align: center;">  </div> (1) $\text{LiAlH}_4 / \text{Et}_2\text{O}$ (2) $\text{H}_2\text{N NH}_2 / \text{NaOH}$ (3) $\text{Zn (Hg) / HCl}$ (4) $\text{HSCH}_2\text{CH}_2\text{CH}_2\text{SH} / \text{H}^+, \text{H}_2 / \text{Ni}$
17.	Which of the following statements is <u>not</u> correct ? (1) The molecule to be synthesised is a target molecule (2) Synthetic equivalent is a real chemical compound resulting from disconnection (3) Regioselective reaction does not produce one of several possible structural isomers (4) Synthone is an idealised fragment (usually cation or anion) resulting from a disconnection.
18.	How many oxygen atoms lined up in a row would fit in a one nanomaterial space ? (1) Seventy                                      (2) One (3) Seven                                         (4) None
19.	The role of catalyst in chemical reaction is (1) Lowers the activation energy (2) Alters the amount of products (3) Increases $\Delta H$ of Forward reaction (4) Decreases of $\Delta H$ of Forward reaction
20.	Secondary pollutant is (1) $\text{SO}_2$ (2) CO (3) PAN    (4) Aerosol



Question No.	Questions
21.	<p>Which of the following is a correct name for the following compound ?</p> $\begin{array}{c} \text{Cl} \quad \quad \text{CH}_2\text{CH}_3 \\ \diagdown \quad \diagup \\ \text{C} = \text{C} \\ \diagup \quad \diagdown \\ \text{H}_3\text{C} \quad \quad \text{I} \end{array}$ <p>(1) cis-2-chloro-3-iodo-2-pentene  (2) trans-2-chloro-3-ido-2-pentene  (3) trans-3-iodo-4chloro-3-pentene  (4) cis-3-iodo-4-chloro-3-pentene</p>
22.	<p>Keto-enol tautomerism is observed in :</p> <p>(1) <math>\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3</math>      (2) <math>\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{C}_6\text{H}_5</math>  (3) <math>\text{CH}_3\text{CH}_2-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}</math>      (4) <math>\text{C}_6\text{H}_5-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}</math></p>
23.	<p>Which of the following gases is mainly responsible for acid rain ?</p> <p>(1) <math>\text{NO}_2</math> and <math>\text{CO}_2</math>      (2) <math>\text{CO}_2</math> and <math>\text{SO}_2</math>  (3) <math>\text{SO}_2</math> and <math>\text{NO}_2</math>      (4) None of these</p>
24.	<p>Which of the following compound displays two singlets at <math>\delta_{2.3}</math> and 7.1 ppm.</p> <p>(1) 1, 2-dimethylbenzene      (2) 1, 3-dimethyl benzene  (3) 1, 4-dimethyl benzene      (4) methyl benzene</p>
25.	<p>A single strong and sharp absorption near <math>1650 \text{ cm}^{-1}</math> in IR spectra indicates the presence of</p> <p>(1) Acid chlorides      (2) Amides  (3) Anhydrides      (4) Aldehydes</p>





Question No.	Questions
31.	The number of the lines in the ESR spectrum of $CD_3$ is (the spin of D is 1) (1) 1 (2) 3 (3) 4 (4) 7
32.	Colligative properties are used for the determination of (1) molar mass (2) equivalent weight (3) arrangement of molecules (4) melting and boiling point
33.	Which of the following does not contain a $C_3$ axis? (1) $POCl_3$ (2) $NH_4^+$ (3) $H_3O^+$ (4) $ClF_3$
34.	Franck Condon principle is related to (1) time required for electronic transition to occur (2) absorption of light (3) time of electronic transition and change in internuclear distance (4) symmetry of molecules
35.	Which pairing of molecule and point group is correct? (1) $BCl_3, C_{3v}$ (2) $SiCl_4, D_{4h}$ (3) $H_2S, C_{2v}$ (4) $SF_4, C_{4v}$
36.	The symmetric stretching mode of the $SiF_4$ molecule : (1) IR active (2) IR inactive (3) generates a change in molecular dipole moment (4) gives rise to a strong absorption in IR spectrum







Question No.	Questions
41.	<p>The complex <math>[\text{Fe}(\text{Phen})_2(\text{NCS})_2]</math> (Phen - 1, 10-phenanthroline) shows spin crossover behaviour. CFSE and <math>\mu_{\text{eff}}</math> at 250 and 150 K, respectively will be :</p> <p>(1) <math>0.4 \Delta_0</math>, 4.90 BM and <math>2.4 \Delta_0</math>, 0.00 BM  (2) <math>2.4 \Delta_0</math>, 2.90 BM and <math>0.4 \Delta_0</math>, 1.77 BM  (3) <math>2.4 \Delta_0</math>, 0.00 BM and <math>0.4 \Delta_0</math>, 4.90 BM  (4) <math>1-2 \Delta_0</math>, 4.90 BM and <math>2.4 \Delta_0</math>, 0.00 BM</p>
42.	<p><math>[\text{Ni}^{\text{II}} \text{L}_6]^{n+ \text{ or } n-}</math> show absorption bands at 8500, 15400 and 26000 <math>\text{cm}^{-1}</math> whereas <math>[\text{Ni}^{\text{II}} \text{L}'_6]^{n+ \text{ or } n-}</math> at 10750, 17500 and 28200 <math>\text{cm}^{-1}</math>, L and L' are respectively</p> <p>(1) <math>\text{OH}^-</math> and <math>\text{N}_3^-</math>                      (2) <math>\text{Cl}^-</math> and <math>\text{I}^-</math>  (3) <math>\text{NCS}^-</math> and <math>\text{RCOO}^-</math>              (4) <math>\text{H}_2\text{O}</math> and <math>\text{NH}_3</math></p>
43.	<p>The rate of exchange of <math>\text{OH}_2</math> present in the coordination sphere by <math>^{18}\text{OH}_2</math> of</p> <p>i. <math>[\text{Cu}(\text{H}_2\text{O})_6]^{2+}</math>; ii) <math>[\text{Mn}(\text{H}_2\text{O})_6]^{2+}</math>; iii) <math>[\text{Fe}(\text{H}_2\text{O})_6]^{2+}</math>; iv) <math>[\text{Ni}(\text{H}_2\text{O})_6]^{2+}</math>, follows the order</p> <p>(1) i) &gt; iv) &gt; iii) &gt; ii)              (2) i) &gt; ii) &gt; iii) &gt; iv)  (3) ii) &gt; iii) &gt; iv) &gt; i)              (4) iii) &gt; i) &gt; iv) &gt; ii)</p>
44.	<p>On addition of an inert gas at constant volume to the reaction <math>\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3</math> at equilibrium</p> <p>(1) The reaction remains unaffected  (2) Forward reaction is favoured  (3) The reaction halts  (4) Backward reaction is favoured</p>







Question No.	Questions
50. ✓	Which of the following thermodynamic function is called as the arrow of "time" (1) Enthalpy (2) Gibbs free energy (3) Entropy (4) Helmholtz free energy
51. ✓	The room temperature magnetic moment ( $\mu_{\text{eff}}$ in BM) for a monomeric Cu(II) complex is greater than 1.73. This may be explained using the expression (1) $\mu_{\text{eff}} = \mu_s (1 - \alpha\lambda/\Delta)$ (2) $\mu_{\text{eff}} = [n(n+2)]^{1/2}$ (3) $\mu_{\text{eff}} = [4s(s+1) + L(L+1)]^{1/2}$ (4) $\mu_{\text{eff}} = g[J(J+1)]^{1/2}$
52.	The numbers of P-S and P-P bonds in the compound $P_4S_3$ are, respectively, (1) 3 and 6 (2) 4 and 3 (3) 6 and 3 (4) 6 and 2
53.	In the absence of bound globin chain, heme group on exposure to $O_2$ gives the iron-oxygen species (1) $Fe(III)-O-Fe(III)$ (2) $Fe(III)-O-O^-$ (3) $Fe(III)-O-O-Fe(III)$ (4) $Fe(IV)-O-$
54.	The complex $[Cr(\text{bipyridyl})_3]^{2+}$ , shows a red phosphorescence due to transition (1) ${}^4T_{1g} \leftarrow {}^4A_{2g}$ (2) ${}^2E_g \leftarrow {}^4A_{2g}$ (3) ${}^4T_{2g} \leftarrow {}^4A_{2g}$ (4) ${}^4A_{2g} \leftarrow {}^2E_g$









Question No.	Questions																																			
65.	<p>The correct expression for the product <math>(\overline{M}_n)(\overline{M}_w)</math> [where <math>\overline{M}_n</math> and <math>\overline{M}_w</math> are the number average and weight average molar masses, respectively, of a polymer] is</p> <p>(1) <math>N^{-1} \sum_i N_i M_i</math>                      (2) <math>N^{-1} \sum_i N_i M_i^2</math></p> <p>(3) <math>N / \sum_i N_i M_i</math>                      (4) <math>N / \sum_i N_i M_i^2</math></p>																																			
66.	<p>Match the following columns :</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">Column-1</th> <th style="width: 50%; text-align: center;">Column-2</th> </tr> </thead> <tbody> <tr> <td>A. Energy of the ground state of He+</td> <td>1. - 6.04 eV</td> </tr> <tr> <td>B. Potential energy of 1st orbit of H- atom</td> <td>2. - 27.2 eV</td> </tr> <tr> <td>C. Kinetic energy of II excited state of He+</td> <td>3. <math>8.68 \times 10^{-18}</math> J</td> </tr> <tr> <td>D. Ionisation potential of He+</td> <td>4. - 54.4 eV</td> </tr> </tbody> </table> <p>Codes.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 12.5%;"></th> <th style="width: 12.5%; text-align: center;">A</th> <th style="width: 12.5%; text-align: center;">B</th> <th style="width: 12.5%; text-align: center;">C</th> <th style="width: 12.5%; text-align: center;">D</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> </tr> <tr> <td>(2)</td> <td style="text-align: center;">4</td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> </tr> <tr> <td>(3)</td> <td style="text-align: center;">4</td> <td style="text-align: center;">2</td> <td style="text-align: center;">1</td> <td style="text-align: center;">3</td> </tr> <tr> <td>(4)</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">1</td> <td style="text-align: center;">4</td> </tr> </tbody> </table>	Column-1	Column-2	A. Energy of the ground state of He+	1. - 6.04 eV	B. Potential energy of 1st orbit of H- atom	2. - 27.2 eV	C. Kinetic energy of II excited state of He+	3. $8.68 \times 10^{-18}$ J	D. Ionisation potential of He+	4. - 54.4 eV		A	B	C	D	(1)	1	2	3	4	(2)	4	3	2	1	(3)	4	2	1	3	(4)	2	3	1	4
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67.	<p>The protecting power of lyophilic colloidal sol is expressed in terms of</p> <p>(1) Critical miscelle concentration    (2) Oxidation number</p> <p>(3) Coagulation value                      (4) Gold number</p>																																			
68.	<p>Which one of the following is an example for homogenous catalysis ?</p> <p>(1) Hydrogenation of oil</p> <p>(2) Manufacture of ammonia by Haber's process</p> <p>(3) Manufacture of sulphuric acid by Contact process</p> <p>(4) Hydrolysis of sucrose in presence of dilute hydrochloric acid</p>																																			

Code-D

Question No.	Questions
69.	The energy of a hydrogen atom in a state is $(-hcR_H/25)$ , where $R_H$ = Rydberg Constant). The degeneracy of the state will be - (1) $25^1$ (2) $25^2$ (3) $25^3$ (4) $25^4$
70.	The value of the commutator $[x, p_x^2]$ is (1) $2i$ (2) $2ihp_x$ (3) $2ixp_x$ (4) $h ip_x/\pi$
71.	The normality of 2.3 M $H_2SO_4$ solution is (1) 2.3 N (2) 4.6 N (3) 6.9 N (4) 7.9 N
72.	Crystal cannot posses (1) 1 fold axis of symmetry (2) 3 fold axis of symmetry (3) 5 fold axis of symmetry (4) 6 fold axis of symmetry
73.	Number of sigma bonds in $P_4O_{10}$ is (1) 6 (2) 7 (3) 17 (4) 16
74.	2 mol of an ideal gas at $27^\circ C$ is expanded reversibly from 2 lit. To 20 lit. Find entropy change ( $R = 2 \text{ cal / mol K}$ ) (1) 92.1 (2) 0 (3) 4 (4) 9.2

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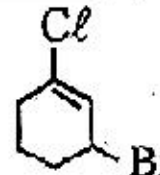


Code-D

Question No.	Questions										
75.	<p>An adiabatic process is</p> <p>(1) isenthalpic                      (2) isoentropic</p> <p>(3) isochoric                          (4) isobaric</p>										
76.	<p>At a certain temperature, the following observations were made for the reaction</p> <p style="text-align: center;">A <math>\longrightarrow</math> Products</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Time (From the start)</th> <th style="text-align: left;">[A]</th> </tr> </thead> <tbody> <tr> <td>2 minutes</td> <td><math>5 \times 10^{-3}</math></td> </tr> <tr> <td>5 minutes</td> <td><math>4 \times 10^{-3}</math></td> </tr> <tr> <td>8 minutes</td> <td><math>3 \times 10^{-3}</math></td> </tr> <tr> <td>11 minutes</td> <td><math>2 \times 10^{-3}</math></td> </tr> </tbody> </table> <p>The order of the reaction is</p> <p>(1) 1                                      (2) 2</p> <p>(3) 3                                      (4) Zero</p>	Time (From the start)	[A]	2 minutes	$5 \times 10^{-3}$	5 minutes	$4 \times 10^{-3}$	8 minutes	$3 \times 10^{-3}$	11 minutes	$2 \times 10^{-3}$
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77.	<p>How many stereoisomers does have 2, 3-dichloropentane ?</p> <p>(1) 2                                      (2) 4</p> <p>(3) 3                                      (4) 5</p>										

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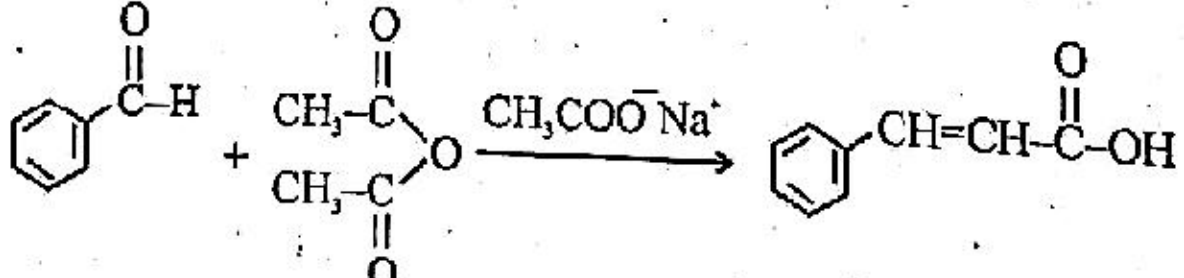
Question No.	Questions
78.	Which statement about benzene is incorrect ? (1) The $C_6$ ring is planar (2) The $C-C\pi$ -bonding is delocalised. (3) The reactivity of the benzene reflects the presence of carbon-carbon double bond. (4) Each C atom is $sp^2$ hybridized.
79.	Which of the following is not a Huckel ( $4n + 2$ ) aromatic system ? (1) [18]-Annulene ( $C_{18}H_{18}$ )      (2) Cyclooctatetraene ( $C_8H_8$ ) (3) Benzene ( $C_6H_6$ )                      (4) Cyclopentadienyl anion ( $C_5H_5^-$ )
80.	The IUPAC name of  is : (1) 1-bromo-3-chlorocyclohexene (2) 2-bromo-6-chlorocyclohex-1-ene (3) 6-bromo-2-chlorocyclohexene (4) 3-bromo-1-chlorocyclohexene
81.	Which one of the following high spin complexes has the largest CSFE Crystal field stabilization energy (1) $[Cr(H_2O)_6]^{2+}$ (2) $[Mn(H_2O)_6]^{2+}$ (3) $[Fe(H_2O)_6]^{2+}$ (4) $[Co(H_2O)_6]^{2+}$
82.	The number of $3c, 2e$ BHB and B-B bonds present in $B_4H_{10}$ respectively are (1) 2, 4                                      (2) 3, 2 (3) 4, 1                                      (4) 4, 0



Question No.	Questions
83.	<p>The most unstable species among the following is</p> <p>(1) <math>\text{Ti}(\text{C}_2\text{H}_5)_4</math>                              (2) <math>\text{Ti}(\text{CH}_2\text{Ph})_4</math>  (3) <math>\text{Pb}(\text{CH}_3)_4</math>                                (4) <math>\text{Pb}(\text{C}_2\text{H}_5)_4</math></p>
84.	<p>The acid catalyzed hydrolysis of <math>\text{trans}-[\text{Co}(\text{en})_2\text{AX}]^{n+}</math> can give <i>cis</i>-product also due to the formation of</p> <p>(1) Square pyramidal intermediate  (2) Trigonal bipyramidal intermediate  (3) Pentagonal bipyramidal intermediate  (4) Face capped octahedral intermediate</p>
85.	<p>Total number of lines expected in <math>^{31}\text{P}</math> NMR spectrum of <math>\text{HPF}_2</math> is (<math>I = 1/2</math> for both <math>^{19}\text{F}</math> and <math>^{31}\text{P}</math>)</p> <p>(1) Six    (2) Four  (3) Five    (4) Three</p>
86.	<p>The number of faces, vertices and edges in <math>\text{IF}_7</math> polyhedron are, respectively</p> <p>(1) 15, 7 and 15                              (2) 10, 7 and 15  (3) 10, 8 and 12                                (4) 12, 6 and 9</p>
87.	<p>The light pink colour of <math>[\text{Co}(\text{H}_2\text{O})_6]^{2+}</math> and the deep blue colour of <math>[\text{CoCl}_4]^{-2}</math> are due to</p> <p>(1) MLCT transition in the first and d-d transition in the second  (2) LMCT transitions in both  (3) d-d transitions in both  (4) d-d transition in the first and MLCT transition in the second</p>

Question No.	Questions
88.	In $[\text{Mo}_2(\text{S}_2)_6]^{2-}$ cluster the number of bridging S atoms and coordination number of Mo respectively, are (1) 2 and 8 (2) 2 and 6 (3) 1 and 8 (4) 1 and 6
89.	The number of possible isomers of $[\text{Ru}(\text{PPh}_3)_2(\text{acac})_2]$ (acac = acetylacetonate) is (1) 2 (2) 5 (3) 4 (4) 3
90.	Which ones among $\text{CO}_3^{2-}$ , $\text{XeO}_3$ , $\text{SO}_3$ , $\text{PO}_3^{3-}$ and $\text{NO}_3^-$ have planar structure? (1) $\text{CO}_3^{2-}$ , $\text{PO}_3^{3-}$ and $\text{XeO}_3$ (2) $\text{CO}_3^{2-}$ , $\text{XeO}_3$ and $\text{NO}_3^-$ (3) $\text{SO}_3$ , $\text{PO}_3^{3-}$ and $\text{NO}_3^-$ (4) $\text{CO}_3^{2-}$ , $\text{SO}_3$ and $\text{NO}_3^-$
91.	Heating 1, 4-dicarbonyl compounds in the presence of phosphorus pentoxide ( $\text{P}_2\text{O}_5$ ) gives : (1) Pyrrole (2) Furan (3) Thiophene (4) Quinoline
92.	The Acetylation of thiophene occurs at : (1) $\text{C}_3$ -position (2) $\text{C}_4$ -position (3) $\text{C}_2$ -position (4) both at $\text{C}_2$ and $\text{C}_4$ -positions
93.	Pyridine is basic in nature having (1) $\text{pKa} = 5.21$ (2) $\text{pKa} = -0.27$ (3) $\text{pKa} = 5.81$ (4) $\text{pKa} = -0.35$
94.	Least stable carbocation among the following is (1) $(\text{CH}_3)_3\text{C}^+$ (2) $(\text{CH}_3)_2\text{CH}^+$ (3) $\text{CH}_3\text{CH}_2^+$ (4) $\text{CH}_3^+$



Question No.	Questions
95.	Due to the presence of an unpaired electron, free radicals are (1) Anions (2) Cations (3) Chemically reactive (4) Chemically inactive
96.	Benzoyl peroxide undergoes homolytic cleavage to produce (1) Phenyl radical (2) Methyl radical (3) Phenyl chloride (4) Methyl chloride
97.	$S_N1$ mechanism for the hydrolysis of an alkyl halide involves the formation of intermediate (1) Free radical (2) Carbanion (3) Carbocation (4) None of these
98.	Which of the following is <u>NOT</u> polar protic solvent? (1) $H_2O$ (2) $C_2H_5OH$ (3) Fumaric acid (4) Acetone
99.	A new carbon-carbon bond formation is possible in (1) Clemmensen reduction (2) Wurtz reduction (3) Friedel-Craft alkylation (4) Oppenauer oxidation
100.	Give the name of reaction given below :  (1) Perkin reaction (2) Pechmann condensation (3) Benzoin condensation (4) Claisen-Schmidt reaction