JEE MAIN-2018

CHEMISTRY

[Time: 3 Hours] [Maximum Marks: 243]

General Instructions:

(i) **Section I** contains 9 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **only one** is correct.

(ii) **Section II** contains 4 multiple correct answer type questions. Each question has 4 choices (A), (B), (C) and (D), out of which **one or more answers** are correct.

(iii) **Section III** contains 4 Reasoning type questions. Each question contains STATEMENT–1 and STATEMENT–2.

Bubble (A) if both the statements are TRUE and STATEMENT-2 is the correct explanation of STATEMENT-1

Bubble (B) if both the statements are TRUE but STATEMENT-2 is NOT the correct explanation of STATEMENT- 1

Bubble (C) if STATEMENT-1 is TRUE and STATEMENT-2 is FALSE.

Bubble (D) if STATEMENT-1 is FALSE and STATEMENT-2 is TRUE.

(iv) **Section IV** contains 3 sets of Linked Comprehension type questions. Each set consists of a paragraph followed by 3 questions. Each question has 4 choices (A), (B), (C) and (D), out of which **only one** is correct.

Marking Scheme:

(i) For each question in **Section I**, you will be awarded **3 Marks** if you have darkened only the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In all other cases, **minus one (– 1) mark** will be awarded.

(ii) For each question in **Section II**, you will be awarded **3 Marks** if you darken only the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In all other cases, **minus one (−1) mark** will be awarded.

(iii) For each question in **Section III**, you will be awarded **4 Marks** if you darken only the bubble corresponding to the correct answer and **zero mark** if no bubble is darkened. In all other cases, **minus one (– 1) mark** will be awarded.

(iv) For each question in **Section IV**, you will be awarded **6 Marks** if you have darken ALL the bubble corresponding ONLY to the correct answer or **awarded 1 mark each** for correct bubbling of answer in any row. **No negative mark will be awarded for an incorrectly bubbled answer**.

SECTION – I

This section contains 9 multiple choice questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

45. The IUPAC name of $\left[\mathrm{Ni}\left(\mathrm{NH_3}\right)_4\right]\left[\mathrm{NiCl_4}\right]$ is

(A) Tetrachloronickel $\left(\mathrm{II}\right)$ – tetraamminenickel $\left(\mathrm{II}\right)$

(B) Tetraamminenickel $\left(\mathrm{II}\right)$ – tetrachloronickel $\left(\mathrm{II}\right)$

(C) Tetraamminenickel $\left(\mathrm{II}\right)$ – tetrachloronickelate $\left(\mathrm{II}\right)$

(D) Tetrachloronickel $\left(\mathrm{II}\right)$ – tetraamminenickelate $\left(0\right)$

46. Among the following the coloured compound is

(A) CuCl

(B) $\mathrm{K_3}\left[\mathrm{Cu}\left(\mathrm{CN}\right)4\right]$

(C) $\mathrm{CuF_2}$

(D) $\left[\mathrm{Cu}\left(\mathrm{CH_3CN}\right)_4\right]\mathrm{BF_4}$

47. Both $\left[\mathrm{Ni}\left(\mathrm{CO}\right)_4\right]$ and $\left[\mathrm{Ni}\left(\mathrm{CN}\right)_4\right]^{2-}$ are diamagnetic. The hybridization of nickel in these complexes, respectively, are

(A) $\mathrm{sp^3}, \mathrm{sp^3}$

(B) $\mathrm{sp^3}, \mathrm{dsp^2}$

(C) $\mathrm{dsp^2}, \mathrm{sp^3}$

(D) $\mathrm{dsp^2}, \mathrm{dsp^2}$

48. Among the following, the surfactant that will form micelles in aqueous solution at the lowest molar concentration at ambient conditions is

(A) $CH_3(CH_2)_{15}N^+(CH_3)_3Br^-$

(B) $CH_3(CH_2)_{11}OSO_3^-Na^+$

(C) $CH_3(CH_2)_6COO^-Na^+$

(D) $CH_3(CH_2)_{11}N^+(CH_3)_3Br^-$

49. Solubility product constant (K_{sp}) of salts of types MX, MX_2 and M_3X at temperature 'T' are 4.0×10^{-8}, 3.2×10^{-14} and 2.7×10^{-15}, respectively. Solubilities (mole dm^{-3}) of the salts at temperature 'T' are in the order

(A) $MX > MX_2 > M_3X$

(B) $M_3X > MX_2 > MX$

(C) $MX_2 > M_3X > MX$

(D) $MX > M_3X > MX_2$

50. Electrolysis of dilute aqueous $NaCl$ solution was carried out by passing 10 milli ampere current. The time required to liberate 0.01mol of H_2 gas at the cathode is $(1\text{ Faraday} = 96500\text{ C mol}^{-1})$

(A) 9.65×10^4 sec

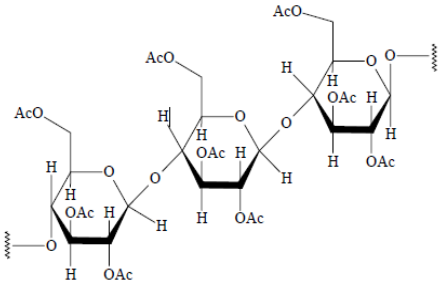
(B) 19.3×10^4 sec

(C) 28.95×10^4 sec

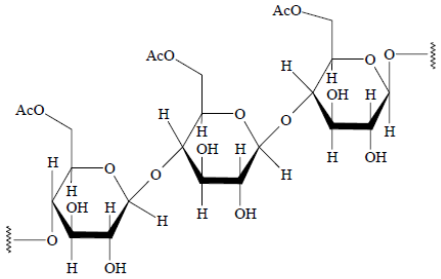
(D) 38.6×10^4 sec

51. Cellulose upon acetylation with excess acetic anhydride/ H_2SO_4 catalytic) gives cellulose triacetate whose structure is

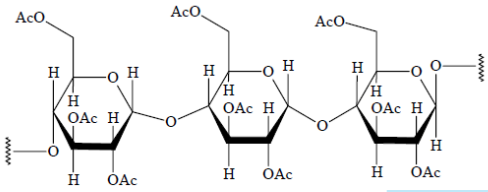
(A)



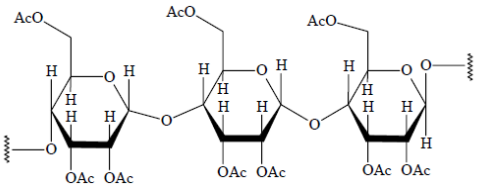
(B)



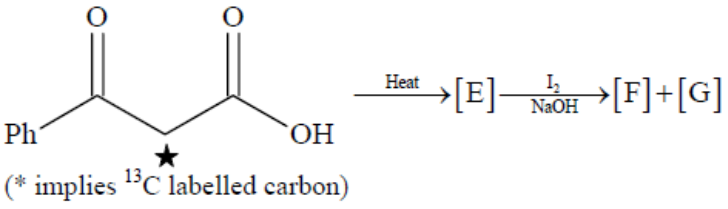
(C)



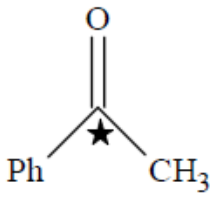
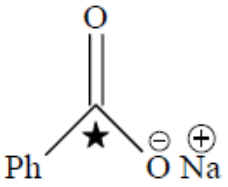
(D)

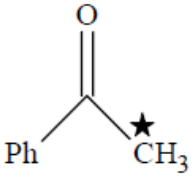
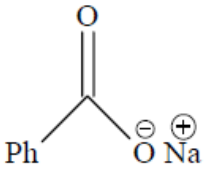


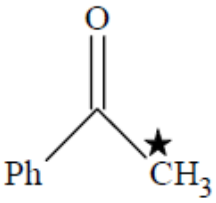
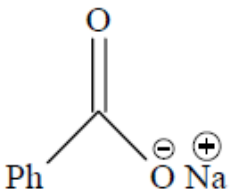
52. In the following reaction sequence, the correct structures of E, F and G are

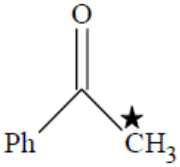
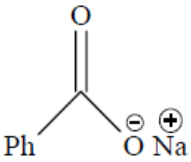


(* implies ^{13}C labelled carbon)

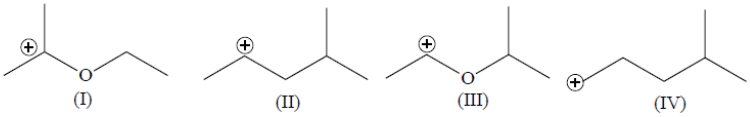
(A) E =  F =  G = CHI_3

(B) E =  F =  G = CHI_3

(C) E =  F =  G = $\overset{\star}{C}HI_3$

(D) E =  F =  G = $\overset{\star}{C}H_3I$

53. The correct stability order for the following species is



(A) $(II) > (IV) > (I) > (III)$

(B) $(I) > (II) > (III) > (IV)$

(C) $(II) > (I) > (IV) > (III)$

(D) $(I) > (III) > (II) > (IV)$

SECTION – II

This section contains 4 reasoning type questions. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

54. STATEMENT-1: The geometrical isomers of the complex $\left[M\left(NH_3\right)_4 Cl_2\right]$ are optically inactive.

and

STATEMENT-2: Both geometrical isomers of the complex $\left[M\left(NH_3\right)_4 Cl_2\right]$ possess axis of symmetry.

(A) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is correct explanation for STATEMENT-1

(B) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is NOT a correct explanation for STATEMENT-1

(C) STATEMENT-1 is True, STATEMENT-2 is False

(D) STATEMENT-1 is False, STATEMENT-2 is True

55. STATEMENT-1: $\left[Fe\left(H_2O\right)_5 NO\right]SO_4$ is paramagnetic.

and

STATEMENT-2: The Fe in $\left[Fe\left(H_2O\right)_5 NO\right]SO_4$ has three unpaired electrons.

(A) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is correct explanation for STATEMENT-1

(B) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is NOT a correct explanation for STATEMENT-1

(C) STATEMENT-1 is True, STATEMENT-2 is False

(D) STATEMENT-1 is False, STATEMENT-2 is True

56. STATEMENT-1: Aniline on reaction with $NaNO_2/HCl$ at $0°C$ followed by coupling with β-naphthol gives a dark blue coloured precipitate.

and

STATEMENT-2: The colour of the compound formed in the reaction of aniline with $NaNO_2/HCl$ at $0°C$ followed by coupling with β-naphthol is due to the extended conjugation.

(A) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is correct explanation for STATEMENT-1

(B) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is NOT a correct explanation for STATEMENT-1

(C) STATEMENT-1 is True, STATEMENT-2 is False

(D) STATEMENT-1 is False, STATEMENT-2 is True

57. STATEMENT-1: There is a natural asymmetry between converting work to heat and converting heat to work.

and

STATEMENT-2: No process is possible in which the sole result is the absorption of heat from a reservoir and its complete conversion into work.

(A) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is correct explanation for STATEMENT-1

(B) STATEMENT-1 is True, STATEMENT-2 is True; STATEMENT-2 is NOT a correct explanation for STATEMENT-1

(C) STATEMENT-1 is True, STATEMENT-2 is False

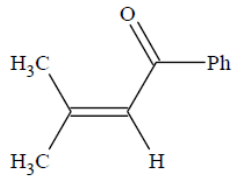
(D) STATEMENT-1 is False, STATEMENT-2 is True

SECTION – III

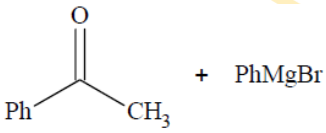
This section contains 2 paragraphs. Based upon each paragraph, 3 multiple choice questions have to be answered. Each question has 4 choices (A), (B), (C) and (D), out of which **ONLY ONE** is correct.

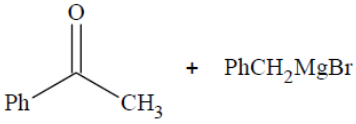
Paragraph for Question Nos. 58 to 60

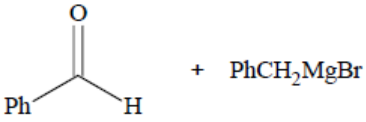
A tertiary alcohol H upon acid catalysed dehydration gives a product I. Ozonolysis of I leads to compounds J and K. Compound J upon reaction with KOH gives benzyl alcohol and a compound L, whereas K on reaction with KOH gives only M,

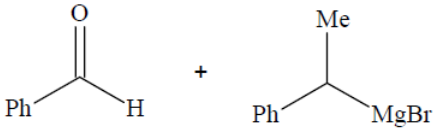
M = 

58. Compound H is formed by the reaction of

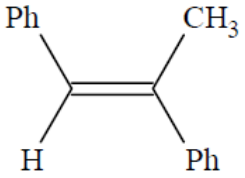
(A) 

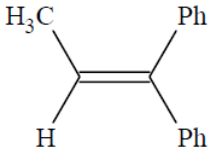
(B) 

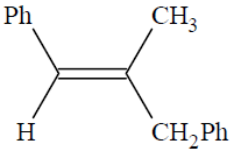
(C) 

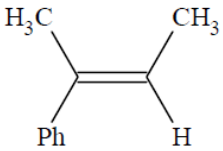
(D) 

59. The structure of compound I is

(A) 

(B) 

(C) 

(D) 

60. The structures of compounds J, K and L, respectively, are

(A) $PhCOCH_3$, $PhCH_2COCH_3$ and $PhCH_2COO^-K^+$

(B) PhCHO, $PhCH_2CHO$ and $PhCOO^-K^+$

(C) $PhCOCH_3$, $PhCH_2CHO$ and $CH_3COO^-K^+$

(D) PhCHO, $PhCOCH_3$ and $PhCOO^-K^+$

Paragraph for Question Nos. 61 to 63

In hexagonal systems of crystals, a frequently encountered arrangement of atoms is described as a hexagonal prism. Here, the top and bottom of the cell are regular hexagons and three atoms are sandwiched in between them. A space-filling model of this structure, called hexagonal close-packed (HCP), is constituted of a sphere on a flat surface surrounded in the same plane by six identical spheres as closely as possible. Three spheres are then placed over the first layer so that they touch each other and represent the second layer. Each one of these three spheres touches three spheres of the bottom layer. Finally, the second layer is covered with a third layer that is identical to the bottom layer in relative position. Assumer radius of every sphere to be ' r '.

61. The number of atoms on this HCP unit cell is

(A) 4

(B) 6

(C) 12

(D) 17

62. The volume of this HCP unit cell is

(A) $24\sqrt{2}r^3$

(B) $16\sqrt{2}r^3$

(C) $12\sqrt{2}r^3$

(D) $\frac{64r^3}{3\sqrt{3}}$

63. The empty space in this HCP unit cell is

(A) 74%

(B) 47.6%

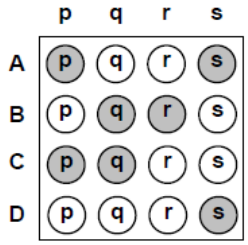
(C) 32%

(D) 26%

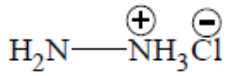
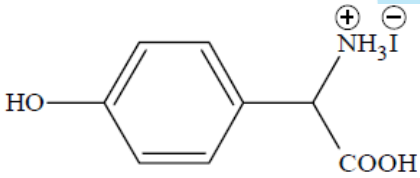
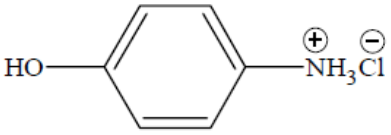
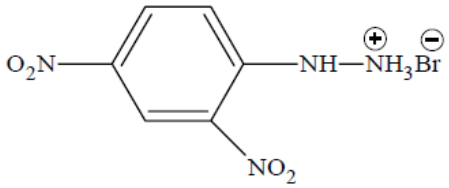
SECTION – IV

This contains 3 questions. Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in column I have to be matched with statements (p, q, r, s) in column II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.

If the correct match are A-p, A-s, B-r, C-p, C-q and D-s, then the correctly bubbled 4 × 4 matrix should be as follows:



64. Match the compounds in **Column I** with their characteristic test(s)/ reaction(s) given in **Column II**. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix gives in the ORS.

Column I	**Column II**
(A) 	(p) sodium fusion extract of the compound gives Prussian blue colour with FeSO4
(B) 	(q) gives positive FeCl3 test
(C) 	(r) gives white precipitate with AgNO3
(D) 	(s) reacts with aldehydes to form the corresponding hydrazone derivative

65. Match the entries in **Column I** with the correctly related quantum number(s) in **Column II.** Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS.

Column I	**Column II**
(A) Orbital angular momentum of the electron in a hydrogen-like atomic orbital	(p) Principal quantum number
(B) A hydrogen-like one-electron wave function obeying Pauli principle	(q) Azimuthal quantum number
(C) Shape, size and orientation of hydrogen-like atomic orbitals	(r) Magnetic quantum number
(D) Probability density of electron at the nucleus in hydrogen-like atom	(s) Electron spin quantum number

66. Match the conversions in **Column I** with the type(s) of reaction(s) given in **Column II**. Indicate your answer by darkening the appropriate bubbles of the 4 × 4 matrix given in the ORS.

Column I	**Column II**
(A) PbS→PbO	(p) roasting
(B) $CaCO_3$ →CaO	(q) calcination
(C) ZnS→ Zn	(r) Carbon reduction
(D) Cu_2S→Cu	(s) self reduction