KOTA (RAJASTHAN)
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## FINAL JEE-MAIN EXAMINATION - JANUARY, 2024

(Held On Thursday 01 ${ }^{\text {st }}$ February, 2024)
TIME: 9:00 AM to 12:00 NOON

## CHEMISTRY

## SECTION-A

61. If one strand of a DNA has the sequence ATGCTTCA, sequence of the bases in complementary strand is:
(1) CATTAGCT
(2) TACGAAGT
(3) GTACTTAC
(4) ATGCGACT

Ans. (2)
62. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Haloalkanes react with KCN to form alkyl cyanides as a main product while with AgCN form isocyanide as the main product.
Reason (R) : KCN and AgCN both are highly ionic compounds.
In the light of the above statement, choose the most appropriate answer from the options given below:
(1) (A) is correct but (R) is not correct
(2) Both (A) and (R) are correct but (R) is not the correct explanation of (A)
(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)
63. In acidic medium, $\mathrm{K}_{2} \mathrm{Cr}_{2} \mathrm{O}_{7}$ shows oxidising action as represented in the half reaction

$$
\mathrm{Cr}_{2} \mathrm{O}_{7}^{2-}+\mathrm{XH}^{+}+\mathrm{Ye}^{-} \rightarrow 2 \mathrm{~A}+\mathrm{ZH}_{2} \mathrm{O}
$$

$\mathrm{X}, \mathrm{Y}, \mathrm{Z}$ and A are respectively are:
(1) $8,6,4$ and $\mathrm{Cr}_{2} \mathrm{O}_{3}$
(2) $14,7,6$ and $\mathrm{Cr}^{3}$
(3) $8,4,6$ and $\mathrm{Cr}_{2} \mathrm{O}_{3}$
(4) $14,6,7$ and $\mathrm{Cr}^{3+}$

## Ans. (4)

64. Which of the following reactions are disproportionation reactions?
(A) $\mathrm{Cu}^{+} \rightarrow \mathrm{Cu}^{2+}+\mathrm{Cu}$
(B) $3 \mathrm{MnO}_{4}^{2-}+4 \mathrm{H}^{+} \rightarrow 2 \mathrm{MnO}_{4}^{-}+\mathrm{MnO}_{2}+2 \mathrm{H}_{2} \mathrm{O}$
(C) $2 \mathrm{KMnO}_{4} \rightarrow \mathrm{~K}_{2} \mathrm{MnO}_{4}+\mathrm{MnO}_{2}+\mathrm{O}_{2}$
(D) $2 \mathrm{MnO}_{4}^{-}+3 \mathrm{Mn}^{2+}+2 \mathrm{H}_{2} \mathrm{O} \rightarrow 5 \mathrm{MnO}_{2}+4 \mathrm{H}^{+}$

Choose the correct answer from the options given below:
(1) (A), (B)
(2) (B), (C), (D)
(3) (A), (B), (C)
(4) (A), (D)

Ans. (1)

## TEST PAPER WITH ANSWER

65. In case of isoelectronic species the size of $\mathrm{F}^{-}, \mathrm{Ne}$ and $\mathrm{Na}^{+}$is affected by:
(1) Principal quantum number (n)
(2) None of the factors because their size is the same
(3) Electron-electron interaction in the outer orbitals
(4) Nuclear charge (z)

Ans. (4)
66. According to the wave-particle duality of matter by de-Broglie, which of the following graph plot presents most appropriate relationship between wavelength of electron ( $\lambda$ ) and momentum of electron (p)?
(1)

(2)

(3)

(4)


Ans. (1)
67. Given below are two statements:

Statement (I): A solution of $\left[\mathrm{Ni}\left(\mathrm{H}_{2} \mathrm{O}\right)_{6}\right]^{2+}$ is green in colour.
Statement (II): A solution of $\left[\mathrm{Ni}(\mathrm{CN})_{4}\right]^{2-}$ is colourless.
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 correct
(3) Statement I is incorrect but Statement II is correct
(4) Statement I is correct but Statement II is incorrect
Ans. (2)
68. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : $\mathrm{PH}_{3}$ has lower boiling point than $\mathrm{NH}_{3}$.

Reason (R) : In liquid state $\mathrm{NH}_{3}$ molecules are associated through vander waal's forces, but $\mathrm{PH}_{3}$ molecules are associated through hydrogen bonding.
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) (A) is not correct but (R) is correct
(3) Both (A) and (R) are correct but (R) is the correct explanation of (A)
(4) (A) is correct but (R) is not correct

Ans. (4)
69. Identify A and B in the following sequence of reaction

(1)

(B)

(2)

(B)

(3)

(B)

(4)

(B)


Ans. (2)
70. Given below are two statements:

Statement (I) : Aminobenzene and aniline are same organic compounds.
Statement (II) : Aminobenzene and aniline are different organic compounds.
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) 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 incorrect

Ans. (2)
71. Which of the following complex is homoleptic?
(1) $\left[\mathrm{Ni}(\mathrm{CN})_{4}\right]^{2-}$
(2) $\left[\mathrm{Ni}\left(\mathrm{NH}_{3}\right)_{2} \mathrm{Cl}_{2}\right]$
(3) $\left[\mathrm{Fe}\left(\mathrm{NH}_{3}\right)_{4} \mathrm{Cl}_{2}\right]^{+}$
(4) $\left[\mathrm{Co}\left(\mathrm{NH}_{3}\right)_{4} \mathrm{Cl}_{2}\right]^{+}$

Ans. (1)
72. Which of the following compound will most easily be attacked by an electrophile?
(1)

(2)

(3)

(4)


Ans. (4)
73. Ionic reactions with organic compounds proceed through:
(A) Homolytic bond cleavage
(B) Heterolytic bond cleavage
(C) Free radical formation
(D) Primary free radical
(E) Secondary free radical

Choose the correct answer from the options given below:
(1) (A) only
(2) (C) only
(3) (B) only
(4) (D) and (E) only

Ans. (3)

Given below are two statements :
Statement (I) : Potassium hydrogen phthalate is a primary standard for standardisation of sodium hydroxide solution.
Statement (II) : In this titration phenolphthalein can be used as indicator.
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) 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 incorrect

Ans. (1)
78. Match List - I with List -II.

|  | List - I (Reactions) | List - II (Reagents) |  |
| :---: | :---: | :---: | :---: |
| (A) |  | (I) | $\mathrm{CH}_{3} \mathrm{MgBr}, \mathrm{H}_{2} \mathrm{O}$ |
| (B) | $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{COC}_{6} \mathrm{H}_{5} \rightarrow \mathrm{C}_{6} \mathrm{H}_{5} \mathrm{CH}_{2} \mathrm{C}_{6} \mathrm{H}_{5}$ | (II) | $\mathrm{Zn}(\mathrm{Hg})$ and conc. HCl |
| (C) | $\mathrm{C}_{6} \mathrm{H}_{5} \mathrm{CHO} \rightarrow \mathrm{C}_{6} \mathrm{H}_{5} \mathrm{CH}(\mathrm{OH}) \mathrm{CH}_{3}$ | (III) | $\mathrm{NaBH}_{4}, \mathrm{H}^{+}$ |
| (D) |  | (IV) | DIBAL-H, $\mathrm{H}_{2} \mathrm{O}$ |

Choose the correct answer from options given below:
(1) A-(III), (B)-(IV), (C)-(I), (D)-(II)
(2) A-(IV), (B)-(II), (C)-(I), (D)-(III)
(3) A-(IV), (B)-(II), (C)-(III), (D)-(I)
(4) A-(III), (B)-(IV), (C)-(II), (D)-(I)

Ans. (2)
79. Choose the correct option for free expansion of an ideal gas under adiabatic condition from the following :
(1) $q=0, \Delta T \neq 0, w=0$
(2) $\mathrm{q}=0, \Delta \mathrm{~T}<0, \mathrm{w} \neq 0$
(3) $q \neq 0, \Delta T=0, w=0$
(4) $q=0, \Delta T=0, w=0$

Ans. (4)
80. Given below are two statements:

Statement (I): The $\mathrm{NH}_{2}$ group in Aniline is ortho
and para directing and a powerful activating group. Statement (II) : Aniline does not undergo FriedelCraft's reaction (alkylation and acylation).
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 incorrect but Statement II is correct
(4) Statement I is correct but Statement II is incorrect
Ans. (1)
(2)
x-2

## SECTION-B

81. Number of optical isomers possible for 2 - chlorobutane $\qquad$
Ans. (2)
82. The potential for the given half cell at 298 K is $(-) \ldots \ldots \ldots \ldots \times 10^{-2} \mathrm{~V}$.
$2 \mathrm{H}_{\text {(aq) }}^{+}+2 \mathrm{e}^{-} \rightarrow \mathrm{H}_{2}(\mathrm{~g})$
$\left[\mathrm{H}^{+}\right]=1 \mathrm{M}, \mathrm{P}_{\mathrm{H}_{2}}=2 \mathrm{~atm}$
(Given: 2.303 RT/F $=0.06 \mathrm{~V}, \log 2=0.3$ )
Ans. (1)
83. The number of white coloured salts among the following is $\qquad$
(A) $\mathrm{SrSO}_{4}$
(B) $\mathrm{Mg}\left(\mathrm{NH}_{4}\right) \mathrm{PO}_{4}$
(c) $\mathrm{BaCrO}_{4}$
(D) $\mathrm{Mn}(\mathrm{OH})_{2}$
(E) $\mathrm{PbSO}_{4}$
(F) $\mathrm{PbCrO}_{4}$
(G) AgBr
(H) $\mathrm{PbI}_{2}$
(I) $\mathrm{CaC}_{2} \mathrm{O}_{4}$
(J) $\left[\mathrm{Fe}(\mathrm{OH})_{2}\left(\mathrm{CH}_{3} \mathrm{COO}\right)\right]$

Ans. (5)
84. The ratio of $\frac{{ }^{14} \mathrm{C}}{{ }^{12} \mathrm{C}}$ in a piece of wood is $\frac{1}{8}$ part that of atmosphere. If half life of ${ }^{14} \mathrm{C}$ is 5730 years, the age of wood sample is ..... years.
Ans. (17190)
85. The number of molecules/ion/s having trigonal bipyramidal shape is $\qquad$

$$
\mathrm{PF}_{5}, \mathrm{BrF}_{5}, \mathrm{PCl}_{5},\left[\mathrm{PtCl}_{4}\right]^{2-}, \mathrm{BF}_{3}, \mathrm{Fe}(\mathrm{CO})_{5}
$$

Ans. (3)
86. Total number of deactivating groups in aromatic electrophilic substitution reaction among the following is


Ans. (2)
87. Lowest Oxidation number of an atom in a compound $\mathrm{A}_{2} \mathrm{~B}$ is -2 . The number of an electron in its valence shell is
Ans. (6)
88. Among the following oxide of p - block elements, number of oxides having amphoteric nature is $\mathrm{Cl}_{2} \mathrm{O}_{7}, \mathrm{CO}, \mathrm{PbO}_{2}, \mathrm{~N}_{2} \mathrm{O}, \mathrm{NO}, \mathrm{Al}_{2} \mathrm{O}_{3}, \mathrm{SiO}_{2}, \mathrm{~N}_{2} \mathrm{O}_{5}, \mathrm{SnO}_{2}$
Ans. (3)
89. Consider the following reaction:
$3 \mathrm{PbCl}_{2}+2\left(\mathrm{NH}_{4}\right)_{3} \mathrm{PO}_{4} \rightarrow \mathrm{~Pb}_{3}\left(\mathrm{PO}_{4}\right)_{2}+6 \mathrm{NH}_{4} \mathrm{Cl}$
If 72 mmol of $\mathrm{PbCl}_{2}$ is mixed with 50 mmol of $\left(\mathrm{NH}_{4}\right)_{3} \mathrm{PO}_{4}$, then amount of $\mathrm{Pb}_{3}\left(\mathrm{PO}_{4}\right)_{2}$ formed is ...... mmol. (nearest integer)
Ans. (24)
90. $\mathrm{K}_{\mathrm{a}}$ for $\mathrm{CH}_{3} \mathrm{COOH}$ is $1.8 \times 10^{-5}$ and $\mathrm{K}_{\mathrm{b}}$ for $\mathrm{NH}_{4} \mathrm{OH}$ is $1.8 \times 10^{-5}$. The pH of ammonium acetate solution will be
Ans. (7)


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