JEE MAIN - 2016

CHEMISTRY

General Instructions :

1. Immediately fill in the particulars on this page of the test booklet with blue/black ball point pen.

2. This Test Booklet consists of three parts - **Part I, Part II** and **Part III. Part I** has **30** objective type questions of Mathematics Test consisting of **FOUR(4)** marks for each correct response .**Part II** Aptitude Test has **50** objective type questions consisting of **FOUR(4)** marks for each correct response. Mark your answers for these questions in the appropriate space against the number corresponding to the question in the Answer Sheet placed inside this Test Booklet. Use Blue/Black Ball Point Pen only for writing particulars/marking responses of **Side-1** and **Side-2** of the Answer Sheet. **Part III** consists of 2 questions carrying **70** marks which are to be attempted on a separate Drawing Sheet which is also placed inside the Test Booklet. Marks allotted to each question are written against each question. Use colour **pencils or crayons** only on the Drawing Sheet. Do not use water colours. For each incorrect response in **Part I** and **Part II**, **one-fourth (¼)** of the total marks allotted to the question from the total score. **No deduction** from the total score, however, will be made if no response is indicated for an item in the Answer Sheet.

3. There is only one correct response for each question in **Part I** and **Part II**. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 2 above.

4. The test is of 3 hours duration. The maximum marks are 390.

5. On completion of the test, the candidates must hand over the Answer Sheet of Mathematics and **Aptitude Test Part- I & II** and the Drawing Sheet of Aptitude **Test-Part III** along with Test Booklet for Part III to the Invigilator in the Room/Hall. Candidates are allowed to take away with them the Test Booklet of **Aptitude Test -Part I & II**

6. The CODE for this Booklet is S. Make sure that the **CODE** printed on **Side – 2** of the Answer Sheet and on the Drawing Sheet (Part III) is the same as that on this booklet. Also tally the Serial Number of the Test Booklet, Answer Sheet and Drawing Sheet and en sure that they are same. In case of discrepancy in Code or Serial Number, the candidate should immediately report the matter to the Invigilator for replacement of the Test Booklet, Answer Sheet and the Drawing Sheet.

Q61. Which one of the following statements about water is **FALSE?**

(A) Ice formed by heavy water sinks in normal water.

(B) Water is oxidized to oxygen during photosynthesis.

(C) Water can act both as an acid and as a base.

(D) There is extensive intramolecular hydrogen bonding in the condensed phase.

Q62. The concentration of fluoride, lead, nitrate and iron in a water sample from an underground lake was found to be 1000 ppb, 40 ppb, 100 ppm and 0.2 ppm, respectively. This water is unsuitable for drinking due to high concentration of:

(A) Iron

(B) Fluoride

(C) Lead

(D) Nitrate

Q63. Galvanization is applying a coating of:

(A) Zn

(B) Pb

(C) Cr

(D) Cu

Q64. Which one of the following complexes shows optical isomerism:

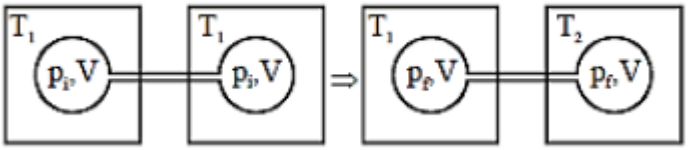
(A) $\left[\mathrm{Co}\left(\mathrm{NH}_3\right)_4 \mathrm{Cl}_2\right]\mathrm{Cl}$

(B) $\left[\mathrm{Co}\left(\mathrm{NH}_3\right)_3 \mathrm{Cl}_3\right]$

(C) $\mathrm{cis}\left[\mathrm{Co}\left(\mathrm{en}\right)_2 \mathrm{Cl}_2\right]\mathrm{Cl}$

(D) $\mathrm{trans}\left[\mathrm{Co}\left(\mathrm{en}\right)_2 \mathrm{Cl}_2\right]\mathrm{Cl}\ \left(\mathrm{en} = \mathrm{ethylenediamine}\right)$

Q65. Two closed bulbs of equal volume (V) containing an ideal gas initially at pressure pi and temperature T_1 are connected through a narrow tube of negligible volume as shown in the figure below. The temperature of one of the bulbs is then raised to T_2. The final pressure P_f is:



(A) $2p_i\left(\dfrac{T_1T_2}{T_1+T_2}\right)$

(B) $p_i\left(\dfrac{T_1T_2}{T_1+T_2}\right)$

(C) $2p_i\left(\dfrac{T_1}{T_1+T_2}\right)$

(D) $2p_i\left(\dfrac{T_2}{T_1+T_2}\right)$

Q66. The heats of combustion of carbon and carbon monoxide are -393.5 and $-285.5\,\text{kJ mol}^{-1}$, respectively. The heat of formation (in kJ) of carbon monoxide per mole is:

(A) -110.5

(B) 110.5

(C) 676.5

(D) -676.5

Q67. At 300 K and 1atm, 15mL of a gaseous hydrocarbon requires 375mL air containing 20% O_2 by volume for complete combustion. After combustion the gases occupy 330mL ..Assuming that the water formed is in liquid form and the volumes were measured at the same temperature and pressure, the formula of the hydrocarbon is:-

(A) C_4H_{10}

(B) C_3H_6

(C) C_3H_8

(D) C_4H_8

Q68. Decomposition of H_2O_2 follows a first order reaction. In fifty minutes the concentration of H_2O_2 decreases from 0.5 to 0.125M in one such decomposition. When the concentration of H_2O_2 reaches 0.05M, the rate of formation of O_2 will be:

(A) $1.34\times10^{-2}\,\text{mol min}^{-1}$

(B) $6.93\times10^{-2}\,\text{mol min}^{-1}$

(C) $6.93\times10^{-4}\,\text{mol min}^{-1}$

(D) $2.66\,\text{L min}^{-1}$ at STP

Q69. The pair having the same magnetic moment is:-

$[At.No.: \mathrm{Cr} = 24, \mathrm{Mn} = 25, \mathrm{Fe} = 26, \mathrm{Co} = 27]$

(A) $[CoCl_4]^{2-}$ and $[Fe(H_2O)_6]^{2+}$

(B) $[Cr(H_2O)_6]^{2+}$ and $[CoCl_4]^{2-}$

(C) $[Cr(H_2O)_6]^{2+}$ and $[Fe(H_2O)_6]^{2+}$

(D) $[Mn(H_2O)_6]^{2+}$ and $[Cr(H_2O)_6]^{2+}$

Q70. The species in which the N atom is in a state of sp hybridization is:

(A) NO_2

(B) NO_2^+

(C) NO_2^-

(D) NO_3^-

Q71. Thiol group is present in:

(A) Methionine

(B) Cytosine

(C) Cystine

(D) Cysteine

Q72. The pair in which phosphorous atoms have a formal oxidation state of +3 is:

(A) Pyrophosphorous and pyrophosphoric acids

(B) Orthophosphorous and pyrophosphorous acids

(C) Pyrophosphorous and hypophosphoric acids

(D) Orthophosphorous and hypophosphoric acids

Q73. The distillation technique most suited for separating glycerol from spent-lye in the soap industry is:

(A) Distillation under reduced pressure

(B) Simple distillation

(C) Fractional distillation

(D) Steam distillation

Q74. Which one of the following ores is best concentrated by froth floatation method?

(A) Malachite

(B) Magnetite

(C) Siderite

(D) Galena

Q75. Which of the following atoms has the highest first ionization energy?

(A) Sc

(B) Rb

(C) Na

(D) K

Q76. In the Hofmann bromamide degradation reaction, the number of moles of $NaOH$ and Br_2 used per mole of amine produced are:

(A) Four moles of $NaOH$ and one mole of Br_2

(B) One mole of $NaOH$ and one mole of Br_2

(C) Four moles of $NaOH$ and two moles of Br_2

(D) Two moles of $NaOH$ and two moles of Br_2

Q77. Which of the following compounds is metallic and ferromagnetic?

(1) MnO_2

(2) TiO_2

(3) CrO_2

(4) VO_2.

Q78. Which of the following statements about low density polythene is FALSE?

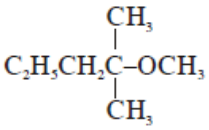
(A) It is used in the manufacture of buckets, dust-bins etc.

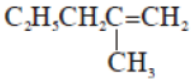
(B) Its synthesis requires high pressure

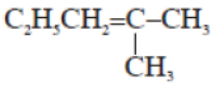
(C) It is a poor conductor of electricity

(D) Its synthesis requires dioxygen or a peroxide initiator as a catalyst.

Q79. 2-chloro-2-methylpentane on reaction with sodium methoxide in methanol yields:

a) 

b) 

c) 

(A) (a) and (b)

(B) All of these

(C) (a) and (c)

(D) (c) only

Q80. A stream of electrons from a heated filament was passed between two charged plates kept at a potential difference V esu. If e and m are charge and mass of an electron respectively, then the value of h/λ (where λ is wavelength associated with electron wave) is given by:

(A) $\sqrt{2meV}$

(B) meV

(C) $2meV$

(D) $\sqrt{meV}$

Q81. 18g glucose $(C_6H_{12}O_6)$ is added to 178.2 g water. The vapour pressure of water (in torr) for this aqueous solution is:

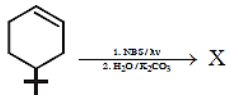
(A) 759.0

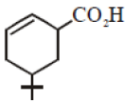
(B) 7.6

(C) 76.0

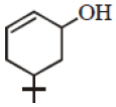
(D) 752.4

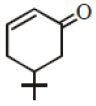
Q82. The product of the reaction given below is:



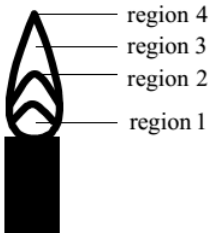
(A) 

(B) 

(C) 

(D) 

Q83. The hottest region of Bunsen flame shown in the figure below is:



(A) region 4

(B) region 1

(C) region 2

(D) region 3

Q84. The reaction of zinc with dilute and concentrated nitric acid, respectively produces:

(A) NO_2 and N_2O

(B) N_2O and NO_2

(C) NO_2 and NO

(D) NO and N_2O

Q85. Which of the following is an anionic detergent?

(A) Glyceryl oleate

(B) Sodium stearate

(C) Sodium lauryl sulphate

(D) Cetyltrimethyl ammonium bromide

Q86. The reaction of propene with $HOCl(Cl2 + H2O)$ proceeds through the intermediate:

(1) $CH_3 - CHCl–CH_2^+$

(2) $CH_3 - CH^+ –CH_2 –OH$

(3) $CH_3 - CH^+ - CH_2 –Cl$

(4) $CH_3 - CH(OH)–CH_2^+$

Q87. For a linear plot of log(x/m) versus log p in a Freundlich adsorption isotherm, which of the following statements is correct? (k and n are constants)

(A) $\log(1/n)$ appears as the intercept

(B) Both k and $1/n$ appear in the slope term

(C) $1/n$ appears as the intercept

(D) Only $1/n$ appears as the slope

\Q88. The main oxides formed on combustion of Li, Na and K in excess of air are respectively:

(1) Li_2O, Na_2O_2 and KO_2

(2) Li_2O, Na_2O and KO2

(3) LiO_2,Na_2O_2 and K_2O

(4) Li_2O_2,Na_2O_2 and KO_2

Q89. The equilibrium constants at $298\ K$ for a reaction $A + B \rightleftharpoons C + D$ is 100. If the initial concentration of all the four species were $1\ M$ each, then equilibrium concentration of D (in $mol\ L^{-1}$) will be:

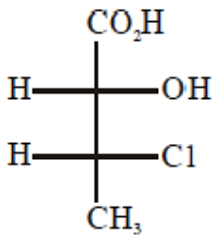
(A) 1.182

(B) 0.182

(C) 0.818

(D) 1.818

Q90. The absolute configuration of:



(A) $(2R, 3R)$

(B) $(2R, 3S)$

(C) $(2S, 3R)$

(D) $(2S, 3S)$