

BOARD QUESTION PAPER : MARCH 2017

CHEMISTRY

Note:

- All questions are compulsory.
- Answers of both the sections should be written in same answer book.
- Draw well labelled diagrams and write balanced equations wherever necessary.
- Figures to the right indicate full marks.
- Use of logarithmic table is allowed.
- Every new question must be started on a new page.

SECTION – I

Q.1. Select and write the most appropriate answer from the given alternatives for each sub-question:

[7]

- An antifriction alloy made up of antimony with tin and copper, which is extensively used in machine bearings is called _____.
(A) Duralumin (B) Babbitt metal
(C) Spiegeleisen (D) Amalgam
- Which of the following pairs is an intensive property?
(A) Density, viscosity (B) Surface tension, mass
(C) Viscosity, internal energy (D) Heat capacity, volume
- Fe^{2+} ions react with nitric oxide formed from reduction of nitrate and yields a brown coloured complex _____.
(A) $[\text{Fe}(\text{CO})_5\text{NO}]^{2+}$ (B) $[\text{Fe}(\text{NH}_3)_5\text{NO}]^{2+}$
(C) $[\text{Fe}(\text{CH}_3\text{NH}_2)_5\text{NO}]^{2+}$ (D) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$
- MnO_2 and $\text{Ca}_3(\text{PO}_4)_2$ present in iron ore get reduced to Mn and P in the zone of _____.
(A) combustion (B) reduction
(C) fusion (D) slag formation
- An ionic compound crystallises in FCC type structure with 'A' ions at the centre of each face and 'B' ions occupying corners of the cube. The formula of compound is _____.
(A) AB_4 (B) A_3B
(C) AB (D) AB_3
- On passing 1.5 F charge, the number of moles of aluminium deposited at cathode are _____.
[Molar mass of Al = 27 gram mol^{-1}]
(A) 1.0 (B) 13.5
(C) 0.50 (D) 0.75
- For a chemical reaction, $\text{A} \rightarrow \text{products}$, the rate of reaction doubles when the concentration of 'A' is increased by a factor of 4, the order of reaction is _____.
(A) 2 (B) 0.5
(C) 4 (D) 1

Q.2. Answer any SIX of the following:

[12]

- i. What are 'fuel cells'? Write cathode and anode reaction in a fuel cell.
- ii. Derive the relationship between half life and rate constant for first order reaction.
- iii. Explain magnetic separation process of ores with the help of a neat, labelled diagram.
- iv. Derive the relationship between relative lowering of vapour pressure and molar mass of solute.
- v. Define the term 'enthalpy'.
What will happen to the internal energy if work is done by the system?
- vi. Nitrogen does not form pentahalides. Give reason.
- vii. Calculate the percentage efficiency of packing in case of simple cubic cell.
- viii. Write the electronic configuration of the following elements:
 - a. Sulphur ($Z = 16$)
 - b. Krypton ($Z = 36$)

Q.3. Answer any THREE of the following:

[9]

- i. How is phosphine prepared using the following reagents?
 - a. HCl
 - b. H_2SO_4
 - c. Caustic soda
- ii. 0.05 M NaOH solution offered a resistance of 31.6Ω in a conductivity cell at 298 K. If the cell constant of the cell is 0.367 cm^{-1} , calculate the molar conductivity of NaOH solution.
- iii. Calculate ΔH° for the reaction between ethene and water to form ethyl alcohol from the following data:
 $\Delta_c H^\circ \text{C}_2\text{H}_5\text{OH}_{(l)} = -1368 \text{ kJ}$
 $\Delta_c H^\circ \text{C}_2\text{H}_4_{(g)} = -1410 \text{ kJ}$
Does the calculated ΔH° represent the enthalpy of formation of liquid ethanol?
- iv. In the Arrhenius equation for a first order reaction, the values of 'A' of ' E_a ' are $4 \times 10^{13} \text{ sec}^{-1}$ and 98.6 kJ mol^{-1} respectively. At what temperature will its half life period be 10 minutes?
[$R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$]

Q.4. Answer any ONE of the following:

[7]

- i. State Faraday's first law of electrolysis.
Write any 'two' uses of each of the following:
 - a. H_2SO_4
 - b. ChlorineDistinguish between crystalline solids and amorphous solids.
A solution of a substance having mass $1.8 \times 10^{-3} \text{ kg}$ has the osmotic pressure of 0.52 atm at 280 K. Calculate the molar mass of the substance used.
[Volume = 1 dm^3 , $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$]
- ii. Define the following:
 - a. Leaching
 - b. Metallurgy
 - c. AnisotropyDerive an expression for maximum work.
The boiling point of benzene is 353.23 K. When 1.80 gram of non-volatile solute was dissolved in 90 gram of benzene, the boiling point is raised to 354.11 K. Calculate the molar mass of solute.
[K_b for benzene = $2.53 \text{ K kg mol}^{-1}$]

SECTION – II

Q.5. Select and write the most appropriate answer from the given alternatives for each sub-question:

[7]

- i. When primary amine reacts with CHCl_3 in alcoholic KOH, the product is _____.
- (A) aldehyde (B) alcohol
(C) cyanide (D) an isocyanide
- ii. $\text{CH}_3\text{-CH}_2\text{-Br} \xrightarrow[\Delta]{\text{Alcoholic KOH}} \text{B} \xrightarrow{\text{HBr}} \text{C} \xrightarrow{\text{Na/ether}} \text{D}$, the compound D is _____.
- (A) ethane (B) propane
(C) n-butane (D) n-pentane
- iii. Cisplatin compound is used in the treatment of _____.
- (A) malaria (B) cancer
(C) AIDS (D) yellow fever
- iv. A gas when passed through $\text{K}_2\text{Cr}_2\text{O}_7$ and dil. H_2SO_4 solution turns it green, the gas is _____.
- (A) CO_2 (B) NH_3
(C) SO_2 (D) Cl_2
- v. The alcohol used in thermometers is _____.
- (A) methanol (B) ethanol
(C) propanol (D) butanol
- vi. Which of the following vitamins is the vitamin of alicyclic series?
- (A) Vitamin C (B) Vitamin K
(C) Vitamin B (D) Vitamin A
- vii. Which of the following is the first oxidation product of secondary alcohol?
- (A) Alkene (B) Aldehyde
(C) Ketone (D) Carboxylic acid

Q.6. Answer any SIX of the following:

[12]

- i. How is diethyl ether prepared by continuous etherification process?
- ii. Write a note on Hoffmann bromamide degradation.
- iii. How is ethanoic acid prepared from dry ice?
- iv. Write the molecular and structural formula of BHA and BHT.
- v. Explain the preparation of glucose from cane sugar.
- vi. Write the factors which are related to the colour of transition metal ions.
- vii. Explain the following terms:
 - a. Homopolymers
 - b. Elastomers
- viii. Define racemic mixture.

Give IUPAC name of $\text{CH}_3 - \text{CH}_2 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CHO}$.

Q.7. Answer any THREE of the following:

[9]

- i. What is 'effective atomic number' (EAN)?
Calculate the effective atomic number of the central metal atom in the following compounds:
 - a. $\text{K}_4\text{Fe}(\text{CN})_6$ b. $\text{Cr}(\text{CO})_6$
Fe (Z = 26) Cr (Z = 24)
- ii. Write the different oxidation states of iron. Why +2 oxidation state of manganese is more stable? (Z of Mn = 25).
- iii. Write a note on 'aldol condensation'.
- iv. What are 'nucleic acids'?
Define complex lipids. Mention any 'two' functions of lipids.

Q.8. Answer any ONE of the following:

[7]

- i. What is the action of mixture of NaNO_2 and dil. HCl on:
 - a. Ethylamine
 - b. Aniline
 - c. DiethylamineHow is nylon 6,6 prepared?
What are 'antacids'?
Write any 'two' side effects of tranquilizers.
- ii. Explain the mechanism of alkaline hydrolysis of tert-butyl bromide with energy profile diagram.
Define carbolic acid.
How carbolic acid is prepared from benzene sulphonic acid?