# BOARD QUESTION PAPER : MARCH 2017
# CHEMISTRY

**Note:**

i. All questions are compulsory.
ii. Answers of both the sections should be written in same answer book.
iii. Draw well labelled diagrams and write balanced equations wherever necessary.
iv. Figures to the right indicate full marks.
v. Use of logarithmic table is allowed.
vi. 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]**

i. 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

ii. Which of the following pairs is an intensive property?

(A) Density, viscosity (B) Surface tension, mass
(C) Viscosity, internal energy (D) Heat capacity, volume

iii. $Fe^{2+}$ ions react with nitric oxide formed from reduction of nitrate and yields a brown coloured complex _____.

(A) $[Fe(CO)_5NO]^{2+}$ (B) $[Fe(NH_3)_5NO]^{2+}$
(C) $[Fe(CH_3NH_2)_5NO]^{2+}$ (D) $[Fe(H_2O)_5NO]^{2+}$

iv. $MnO_2$ and $Ca_3(PO_4)_2$ present in iron ore get reduced to Mn and P in the zone of _____.

(A) combustion (B) reduction
(C) fusion (D) slag formation

v. 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) $AB_3$

vi. 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

vii. For a chemical reaction, A$\rightarrow$ 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 31.6 Ω 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 $\Delta H°$ for the reaction between ethene and water to form ethyl alcohol from the following data:

$\Delta_c H° \ C_2H_5OH_{(l)} = -1368$ kJ

$\Delta_c H° \ C_2H_{4(g)} = -1410$ kJ

Does the calculated $\Delta H°$ 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 $4 \times 10^{13}$ $sec^{-1}$ and 98.6 kJ $mol^{-1}$ respectively. At what temperature will its half life period be 10 minutes?

[R = 8.314 J $K^{-1}$ $mol^{-1}$]

**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. Chlorine

Distinguish between crystalline solids and amorphous solids.

A solution of a substance having mass $1.8 \times 10^{-3}$ 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 J $K^{-1}$ $mol^{-1}$]

ii. Define the following:

a. Leaching

b. Metallurgy

c. Anisotropy

Derive 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 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. $CH_3–CH_2–Br \xrightarrow[\Delta]{\text{Alcoholic KOH}} B \xrightarrow{HBr} C \xrightarrow{Na/\text{ether}} D$, 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 $K_2Cr_2O_7$ 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 $CH_3 - CH_2 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CHO$.

**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. $K_4Fe(CN)_6$ b. $Cr(CO)_6$
   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. Diethylamine
How 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?