



## BOARD QUESTION PAPER : MARCH 2018

**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. The process in which the value of  $\Delta U = 0$  is \_\_\_\_\_.  
 (A) adiabatic (B) isothermal  
 (C) isobaric (D) isochoric
- ii. An ionic crystal lattice has  $\frac{r^+}{r^-}$  radius ratio of 0.320, its coordination number is \_\_\_\_\_.  
 (A) 3 (B) 4  
 (C) 6 (D) 8
- iii. In hydrogen-oxygen fuel cell, the carbon rods are immersed in hot aqueous solution of \_\_\_\_\_.  
 (A) KCl (B) KOH  
 (C) H<sub>2</sub>SO<sub>4</sub> (D) NH<sub>4</sub>Cl
- iv. The chemical formula of willemite is \_\_\_\_\_.  
 (A) ZnS (B) ZnCO<sub>3</sub>  
 (C) ZnO (D) Zn<sub>2</sub>SiO<sub>4</sub>
- v. The oxidation state of nitrogen in dinitrogen trioxide is \_\_\_\_\_.  
 (A) +1 (B) +2  
 (C) +3 (D) +4
- vi. Which of the following 0.1 M aqueous solutions will exert highest osmotic pressure?  
 (A) Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> (B) Na<sub>2</sub>SO<sub>4</sub>  
 (C) MgCl<sub>2</sub> (D) KCl
- vii. The half-life period of zero order reaction  $A \rightarrow \text{product}$  is given by \_\_\_\_\_.  
 (A)  $\frac{[A]_0}{k}$  (B)  $\frac{0.693}{k}$   
 (C)  $\frac{[A]_0}{2k}$  (D)  $\frac{2[A]_0}{k}$

**Q.2. Answer any SIX of the following:**

[12]

- i. Derive the relation between elevation of boiling point and molar mass of solute.
- ii. State third law of thermodynamics. Give 'two' uses.
- iii. Draw a neat and labelled diagram of lead storage battery.
- iv. Ionic solids are hard and brittle. Explain.



- v. A certain reaction occurs in the following steps:
- $\text{Cl}_{(g)} + \text{O}_{3(g)} \rightarrow \text{ClO}_{(g)} + \text{O}_{2(g)}$
  - $\text{ClO}_{(g)} + \text{O}_{(g)} \rightarrow \text{Cl}_{(g)} + \text{O}_{2(g)}$ 
    - What is the molecularity of each of the elementary steps?
    - Identify the reaction intermediate and write the chemical equation for overall reaction.
- vi. Define: a. Semipermeable membrane  
b. Reference electrode
- vii. What is the action of chlorine on:  
a.  $\text{CS}_2$   
b. Excess  $\text{NH}_3$
- viii. Write the chemical equations involved in van Arkel method for refining zirconium metal.

**Q.3. Answer any THREE of the following:**

[9]

- Write balanced chemical equations for the following:
  - Phosphorus reacts with magnesium.
  - Flowers of sulphur boiled with calcium hydroxide.
  - Action of ozone on hydrogen peroxide.
- The density of iron crystal is  $8.54 \text{ gram cm}^{-3}$ . If the edge length of unit cell is  $2.8 \text{ \AA}$  and atomic mass is  $56 \text{ gram mol}^{-1}$ , find the number of atoms in the unit cell.  
(Given: Avogadro's number =  $6.022 \times 10^{23}$ ,  $1 \text{ \AA} = 1 \times 10^{-8} \text{ cm}$ )
- How many faradays of electricity are required to produce 13 gram of aluminium from aluminium chloride solution?  
(Given: Molar mass of Al =  $27.0 \text{ gram mol}^{-1}$ )
- Calculate the internal energy at 298 K for the formation of one mole of ammonia, if the enthalpy change at constant pressure is  $-42.0 \text{ kJ mol}^{-1}$ .  
(Given :  $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ )

**Q.4. Answer any ONE of the following:**

[7]

- Define:
  - Enthalpy of atomization
  - Enthalpy of vaporization
- Draw the structure of  $\text{IF}_7$ . Write its geometry and the type of hybridization.
- State Henry's law.
  - 22.22 gram of urea was dissolved in 300 grams of water. Calculate the number of moles of urea and molality of the urea solution.  
(Given: Molar mass of urea =  $60 \text{ gram mol}^{-1}$ )

**OR**

- What is the action of carbon on the following metal oxides:
  - $\text{Fe}_2\text{O}_3$  in blast furnace
  - $\text{ZnO}$  in vertical retort furnace
- Write the molecular and structural formulae of:
  - Thiosulphuric acid
  - Dithionous acid
- The reaction  $\text{A} + \text{B} \rightarrow \text{products}$  is first order in each of the reactants.
  - How does the rate of reaction change if the concentration of A is increased by factor 3?
  - What is the change in the rate of reaction if the concentration of A is halved and concentration of B is doubled?



# BOARD QUESTION PAPER : MARCH 2018

**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 – II

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

[7]

- i. A polymer used in paints is \_\_\_\_\_.  
(A) nomex (B) thiokol  
(C) saran (D) glyptal
- ii. The number of primary and secondary hydroxyl groups in ribose are \_\_\_\_\_ respectively.  
(A) 1, 3 (B) 2, 3  
(C) 3, 1 (D) 3, 2
- iii. The ligand diethylenetriamine is \_\_\_\_\_.  
(A) monodentate (B) bidentate  
(C) tridentate (D) tetradentate
- iv. Propene on oxidation with diborane in presence of alkaline hydrogen peroxide gives \_\_\_\_\_.  
(A) propan-1-ol (B) propan-2-ol  
(C) allyl alcohol (D) propan-1,2-diol
- v. Baeyer's reagent is \_\_\_\_\_.  
(A) acidified potassium dichromate  
(B) alkaline potassium dichromate  
(C) alkaline potassium permanganate  
(D) acidified potassium permanganate
- vi. Identify 'A' in the following reaction:  
$$A + 2\text{Na} \xrightarrow[\text{ether}]{\text{Dry}} 2,2,5,5\text{-Tetramethylhexane} + 2\text{NaBr}$$
  
(A) 2-Bromo-2-methylbutane  
(B) 1-Bromo-2,2-dimethylpropane  
(C) 1-Bromo-3-methylbutane  
(D) 1-Bromo-2-methylpropane
- vii. An antifertility drug is \_\_\_\_\_.  
(A) novestrol (B) histamine  
(C) veronal (D) equanil

**Q.6. Answer any SIX of the following:****[12]**

- i. Write balanced chemical equations for the conversion of  $\text{CrO}_4^{2-}$  to  $\text{Cr}_2\text{O}_7^{2-}$  in acidic medium and  $\text{Cr}_2\text{O}_7^{2-}$  to  $\text{CrO}_4^{2-}$  in basic medium.
- ii. Explain the geometry of  $[\text{Co}(\text{NH}_3)_6]^{3+}$  on the basis of hybridisation. (Z of Co = 27)
- iii. Why ethanol has higher boiling point than ethane?
- iv. Write only reactions for the preparation of benzophenone from benzonitrile.
- v. What is the action of p-toluenesulphonylchloride on ethylamine and diethylamine?
- vi. What are amino acids? Write the correct reaction for formation of peptide bond between amino acids.
- vii. Define:
  - a. Antiseptics
  - b. Antioxidants
- viii. Explain only reaction mechanism for alkaline hydrolysis of tert-butylbromide.

**Q.7. Answer any THREE of the following:****[9]**

- i. Complete and rewrite the balanced chemical equations:
  - a. Chlorobenzene  $\xrightarrow[473\text{K, pressure}]{\text{NaCN} + \text{CuCN}}$  ?
  - b. Isobutyraldehyde  $\xrightarrow{50\% \text{KOH}}$  ?
  - c. Butanone + 2,4-dinitrophenyl hydrazine  $\xrightarrow{\text{H}^+}$  ?
- ii. Prepare carboic acid from benzene sulphonic acid.  
Write a chemical equation for the action of neutral ferric chloride on phenol.
- iii. Explain the preparation and uses of nylon-2-nylon-6.
- iv. How glucose is prepared from cane sugar?  
Write the formula of the complex: copper (II) hexacyanoferrate (II).

**Q.8. Answer any ONE of the following:****[7]**

- i. What is lanthanide contraction?
- ii. Explain the cause of lanthanide contraction.
- iii. Draw the structures of chloroxylenol and adenine.
- iv. How are ethylamine and ethylmethanamine distinguished by using nitrous acid?

**OR**

- i. What is the action of the following reagents on ethanoic acid?
  - a.  $\text{LiAlH}_4 / \text{H}_3\text{O}^+$
  - b.  $\text{PCl}_3$ , heat
  - c.  $\text{P}_2\text{O}_5$ , heat
- ii. Identify 'A' and 'B' in the following reaction and rewrite the complete reaction:  

$$\text{CH}_3 - \text{CH}_2 - \text{Br} + \text{AgCN} \xrightarrow{\Delta} \text{A} \xrightarrow{\text{Na/C}_2\text{H}_5\text{OH}} \text{B}$$
- iii. Explain Hoffmann bromamide degradation reaction.