

BOARD QUESTION PAPER : JULY 2016

CHEMISTRY

Time: 3 Hours

Total Marks: 70

Note:

- i. All questions are compulsory.
- ii. Answers to the two sections are to be written in the same answer book.
- iii. Figures to the right hand side indicate full marks.
- iv. Write balanced chemical equations and draw neat and labelled diagrams, wherever necessary.
- v. Use of logarithmic table is allowed.
- vi. Answer to every 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. Schottky defects are observed in which solid among the following?
(A) Brass (B) Cesium Chloride (C) Zinc sulphide (D) Stainless steel
 - ii. 'No machine has an efficiency unity', is stated in _____.
(A) first law of thermodynamics (B) second law of thermodynamics
(C) third law of thermodynamics (D) Hess's law of constant heat summation
 - iii. Which among the following reactions is an example of a zero order reaction?
(A) $\text{H}_{2(\text{g})} + \text{I}_{2(\text{g})} \rightarrow 2\text{HI}_{(\text{g})}$
(B) $2\text{H}_2\text{O}_{2(\text{l})} \rightarrow 2\text{H}_2\text{O}_{(\text{l})} + \text{O}_{2(\text{g})}$
(C) $\text{C}_{12}\text{H}_{22}\text{O}_{11(\text{aq})} + \text{H}_2\text{O}_{(\text{l})} \rightarrow \text{C}_6\text{H}_{12}\text{O}_{6(\text{aq})} + \text{C}_6\text{H}_{12}\text{O}_{6(\text{aq})}$
(D) $2\text{NH}_{3(\text{g})} \xrightarrow{\text{PT}} \text{N}_{2(\text{g})} + 3\text{H}_{2(\text{g})}$
 - iv. Potential of saturated calomel electrode is _____.
(A) 0.242 V (B) 1.1 V
(C) 0.337 V (D) 0.28 V
 - v. Which of the following compounds is used as a semipermeable membrane?
(A) Potassium ferrocyanide (B) Potassium argentocyanide (C) Sodium meta aluminate (D) Copper ferrocyanide
 - vi. Which among the following minerals does NOT contain aluminium?
(A) Cryolite (B) Siderite (C) China clay (D) Corundum
 - vii. The group 15 element having inner electronic configuration as of argon is _____.
(A) Phosphorus (Z = 15) (B) Antimony (Z = 51)
(C) Arsenic (Z = 33) (D) Nitrogen (Z = 7)

Q.2. Answer any SIX of the following:

[12]

- i. Write chemical reactions involved in Van Arkel method for refining titanium.
- ii. Explain the relationship between Gibbs standard energy change of the reaction and equilibrium constant.
- iii. A face centred cube (fcc) consists of how many atoms? Explain.
- iv. Describe isolation method in determination of rate law and order of reaction.
- v. Explain the following methods to protect metals from corrosion:
 - a. Galvanization
 - b. Passivation
- vi. Write the Nernst equation and explain the terms involved.
- vii. What happens when dilute sulphuric acid is treated with:
 - a. Fe?
 - b. CaF₂?
- viii. Define:
 - a. Osmosis
 - b. Freezing point

Q.3. Answer any THREE of the following:

[9]

- i. The rate constant of a first order reaction are 0.58 s^{-1} at 313 K and 0.045 s^{-1} at 293 K. What is the energy of activation for the reaction?
- ii. Calculate the standard enthalpy of the reaction,

$$2\text{C}(\text{graphite}) + 3\text{H}_2(\text{g}) \rightarrow \text{C}_2\text{H}_6(\text{g}); \quad \Delta H^\circ = ?$$
 from the following ΔH° values:
 - a. $\text{C}_2\text{H}_6(\text{g}) + \frac{7}{2}\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 3\text{H}_2\text{O}(\text{l}); \quad \Delta H^\circ = -1560 \text{ kJ}$
 - b. $\text{H}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g}) \rightarrow \text{H}_2\text{O}(\text{l}); \quad \Delta H^\circ = -285.8 \text{ kJ}$
 - c. $\text{C}(\text{graphite}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}); \quad \Delta H^\circ = -393.5 \text{ kJ.}$
- iii. 3.795 g of sulphur is dissolved in 100 g of CS₂. This solution boils at 319.81 K. What is molecular formula of sulphur in solution? The boiling point of CS₂ is 319.45 K. (Given that K_b for CS₂ = 2.42 K kg mol⁻¹ and atomic mass of S = 32.)
- iv. Write the reactions involved in large scale preparation of nitric acid.

Q.4. Answer any ONE of the following:

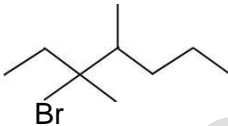
[7]

- i. State third law of thermodynamics. Write applications of standard molar entropy. Draw neat labelled diagram of electrolytic refining of blister copper. Determine the density of cesium chloride which crystallizes in bcc type structure with the edge length 412.1 pm. The atomic masses of Cs and Cl are 133 and 35.5 respectively. Predict the coordination number of Cs⁺ ion if $r_{\text{Cs}^+} = 1.69 \text{ \AA}$ and $r_{\text{Cl}^-} = 1.81 \text{ \AA}$.
- ii. What happens when thin copper leaves are thrown in jar containing chlorine? H₂O is liquid while H₂S is gas at room temperature. Explain. The conductivity of 0.02 M AgNO₃ at 25°C is $2.428 \times 10^{-3} \Omega^{-1} \text{ cm}^{-1}$. What is its molar conductivity? State Henry's law.

SECTION – II

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

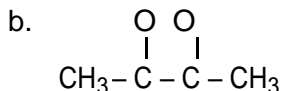
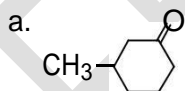
[7]

- i. Sodium acetate reacts with ethanoyl chloride to form _____.
- (A) acetic acid (B) acetone
(C) acetic anhydride (D) sodium formate
- ii. Natalite is a mixture of _____.
- (A) diethyl ether and methanol (B) diethyl ether and ethanol
(C) dimethyl ether and methanol (D) dimethyl ether and ethanol
- iii. What is effective atomic number of Fe ($Z = 26$) in $[\text{Fe}(\text{CN})_6]^{4-}$?
- (A) 12 (B) 30
(C) 26 (D) 36
- iv. Maltose is a _____.
- (A) polysaccharide (B) disaccharide
(C) trisaccharide (D) monosaccharide
- v. Which one of the following oxidation state of manganese is unstable?
- (A) +2 (B) +4
(C) +5 (D) +7
- vi. IUPAC name of the following compound is _____.
- 
- (A) 3-Bromo-3,4-dimethylheptane (B) 3,4-dimethyl-3-bromoheptane
(C) 5-Bromo-4,5-dimethylheptane (D) 4,5-dimethyl-5-bromoheptane
- vii. Which of the following compounds is NOT prepared by the action of alcoholic NH_3 on alkyl halide?
- (A) $\text{CH}_3 - \text{NH}_2$ (B) $\text{CH}_3 - \text{CH}_2 - \text{NH}_2$
(C) $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{NH}_2$ (D) $(\text{CH}_3)_3\text{C} - \text{NH}_2$

Q.6. Answer any SIX of the following:

[12]

- i. Write IUPAC names of the following compounds:



- ii. What are the sources of Vitamin C and Vitamin K?
- iii. Write four points of distinction between lanthanoids and actinoids.
- iv. How is benzonitrile converted to benzophenone?
- v. Write the formulae of the raw materials used for preparation of:
- a. Buna-S
b. Dextron
- vi. Write a note on Sandmeyer's reaction.

- vii. What is the action of benzene diazonium chloride on:
- phenol in alkaline medium?
 - aniline?
- viii. Explain any two chemical methods of food preservation.

Q.7. Answer any THREE of the following:

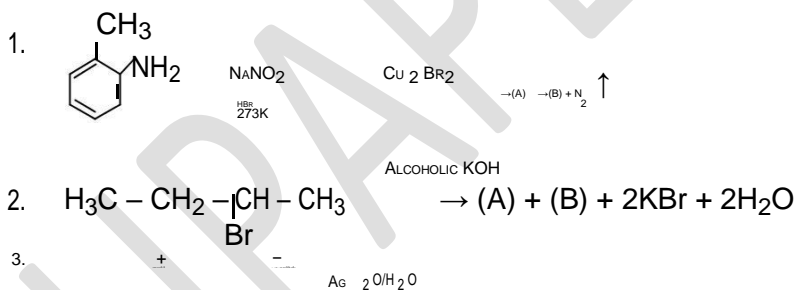
[9]

- What is the action of following reagents on glucose?
 - Bromine water
 - Dilute HNO_3
 - Hydroxylamine
- Define ligand. Write four postulates of Werner's theory.
- Write reactions involved in preparation of potassium dichromate from chrome iron ore.
- What is metamerism?
Write the structure and IUPAC name of methyl-n-propylether. What is the action of hot HI on it?

Q.8. Answer any ONE of the following:

[7]

- How are the following polymers prepared?
 - Orlon
 - Teflon
 - Classify the following drugs into analgesics and antibiotics.
 - Ofloxacin
 - Morphine
 - Ampicillin
 - Chloramphenicol
 - Identify 'A' and 'B' and rewrite the reactions.



- How are the following conversions carried out?
 - 2-methylbutan-1-ol into 2-methylbutanoic acid
 - Phenylethene into benzoic acid
 - Benzoic acid into meta-nitrobenzoic acid.

What is the action of benzene sulphonyl chloride on primary, secondary and tertiary amines? Write two uses of formaldehyde.