

DAY — 07

SEAT NUMBER

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2017 III 08

1100

J-555

(E)

CHEMISTRY (55)

Time : 3 Hrs.

(7 Pages)

Max. Marks : 70

Notes :

- (i) All questions are compulsory.
- (ii) Answers to the questions of Section - I and Section - II should be written in the same answer book.
- (iii) Draw neat, labelled diagrams and write balanced chemical 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) Amalgams

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- (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) $[\text{Fe}(\text{CO})_5\text{NO}]^{2+}$ (b) $[\text{Fe}(\text{NH}_3)_5\text{NO}]^{2+}$
 (c) $[\text{Fe}(\text{CH}_3\text{NH}_2)_5\text{NO}]^{2+}$ (d) $[\text{Fe}(\text{H}_2\text{O})_5\text{NO}]^{2+}$
- (iv) MnO_2 and $\text{Ca}_3(\text{PO}_4)_2$ present in iron ore get reduced to M_n 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, $\text{A} \rightarrow \text{products}$, 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 298K. 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' and ' 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. State Faraday's first law of electrolysis.

[7]

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 $1.8 \times 10^{-3} \text{ kg}$ has the osmotic pressure of 0.52 atm at 280 K. Calculate the molar mass of the substance used.

$$[\text{Volume} = 1 \text{ dm}^3, R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}]$$

OR

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.

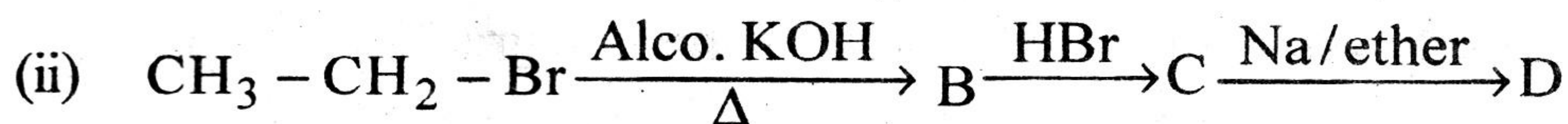
$$[K_b \text{ for benzene} = 2.53 \text{ K mol}^{-1}]$$

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 |



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 Hofmann 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.

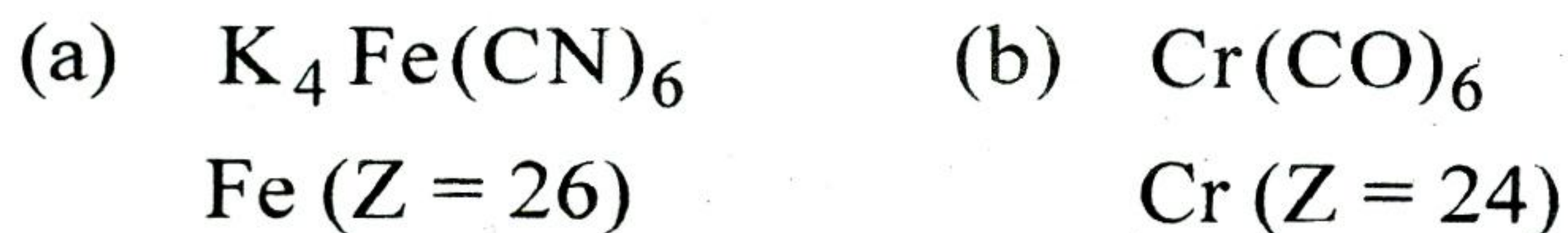
Give IUPAC name of $\text{CH}_3 - \text{CH}_2 - \overset{\text{CH}_3}{\underset{|}{\text{CH}}} - \text{CHO}$.

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 :



(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. What is the action of mixture of $NaNO_2$ and dil. HCl on :

[7]

(a) Ethyl amine, (b) Aniline, (c) Diethyl amine

How is nylon 6, 6 prepared?

What are 'antacids'?

Write any 'two' side effects of tranquilizers.

OR

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?

