Q.P. Code – 42234

Second Semester B.Sc. Degree Examination, April/May 2019

(CBCS Scheme)

Chemistry

Paper II – CHEMISTRY

Time : 3 Hours] *[Max. Marks : 90*

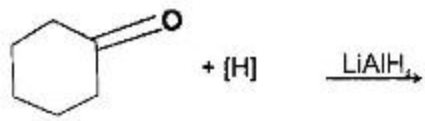
Instructions to Candidates :

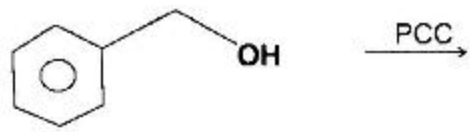
1. *The question paper has 2 parts A & B. Both the parts should be answered.*
2. *Write equations/reactions wherever necessary.*

PART – A

Answer any **TEN** of the following questions. Each question carries 2 marks. **(10 × 2 = 20)**

1. State any two statements of second law of thermodynamics.
2. Standard free energy change of a reaction at 298 K is –12.5 kJ. Calculate the equilibrium constant.
3. What is degree of ionisation? Name any two factors which influence it.
4. Distinguish between physical adsorption and chemical adsorption.
5. Calculate the hydrogen ion concentration present in 0.1 m acetic acid solution if its Ka is 1.8×10^{-5}.
6. What is the composition of Zeigler-Natta catalyst? Give any one of its applications.
7. Write the name and structure of product in the following reactions :

(a) 

(b) 

8. What is tautomerism? Explain the tautomerism in ethylacetoacetate.

9. What are epoxides? Give one method for the preparation of ethylene oxide.

10. How do you convert ethylbromide to (a) Ethylalcohol (b) Ethylisocyanide.

11. Chlorobenzene does not give a precipitate even on prolonged heating with $AgNO_3$. Why?

12. How naphthalene is prepared from α -tetralone?

PART – B

Answer any **SEVEN** of the following questions. Each question carries 10 marks. **(7 × 10 = 70)**

13. (a) Derive Van's-Hoff reaction isotherm.

    (b) Using G = H – TS, deduce Gibb's-Helmholtz equation.

    (c) A Carnot engine works between 573 K and 298 K. Find the efficiency of engine and calculate the work done if the total heat absorbed is 1000 kJ. **(4 + 3 + 3)**

14. (a) (i) What is spontaneous process? Give an example.

    (ii) "Entropy is a measure of the disorder of a system". Justify the statement.

    (b) The equilibrium constant K_p for a reaction $A + B \rightleftharpoons C + D$ is 10^{-12} at 327°C and 10^{-7} at 427°C. Calculate the enthalpy of reaction $(R = 8.314 Jk^{-1}mol^{-1})$.

    (c) Write a note on residual entropy. **(4 + 3 + 3)**

15. (a) What is a catalyst? Write any three general characteristics of catalyst.

    (b) Name the catalyst used in the industrial synthesis of the following compounds :

        (i) Ethanol from starch

        (ii) Methanol from carbonmonoxide

        (iii) Nitric acid by Ostwald's process.

    (c) Deduce Langmuir adsorption isotherm. **(4 + 3 + 3)**

16. (a) Derive an expression for the hydrolysis constant when a salt of weak base and strong acid is hydrolysed.

(b) What is common ion effect? Explain with an example.

(c) Calculate the solubility product of silver chromate Ag_2Cro_4 at 25°C if the concentration of Ag^+ ion is 1.5×10^{-4} mol lit^{-1} in a saturated solution of silver chromate at 25°C. **(4 + 3 + 3)**

17. (a) What is buffer solution? Derive Henderson's equation for p^H of a buffer solution.

(b) Discuss the purification of common salt based on solubility product principle.

(c) If the dissociation constant of HCN be 7.2×10^{-10} and that of ammonia be 1.75×10^{-5}, find out the hydrolysis constant for ammonium cyanide and also its degree of hydrolysis. **(4 + 3 + 3)**

18. (a) How do you convert toluene to (i) Benzaldehyde (ii) Benzoic acid?

(b) Explain the mechanism of Friedel Craft's alkylation with an example.

(c) What are carcinogens? Write the structure of benzo(a) anthracene. **(4 + 3 + 3)**

19. (a) Write benzyne mechanism.

(b) How do you prepare diethyl zinc from ethyliodide?

(c) Explain the participation of neighbouring group in nucleophilic substitution in mustard gas. **(4 + 3 + 3)**

20. (a) Explain the preparation of glycerol from propene.

(b) Write the equation and name of products of the reaction of glycol with (i) Nitric acid (ii) HIO_4.

(c) What is methanol poisoning of alcohol? Write the harmful effects of ethanol on the human body. **(4 + 3 + 3)**

Q.P. Code – 42234

21. (a) How do you prepare :

(i) Primary alcohol from carboxylic acid

(ii) Secondary alcohol from Grignard reagent.

(b) Explain the following reactions with suitable example :

(i) Gattermann-Koch reaction

(ii) Claisen-rearrangement reaction.

(c) Discuss the mechanism of Reimer-Tiemann reaction. **(4 + 3 + 3)**

22. (a) Explain the synthesis of the following compounds from diethyl malonate (i) Cinnamic acid (ii) Barbituric acid.

(b) Describe the synthesis of carboxylic acid from organolithium.

(c) How phenol reacts with concentrated H_2SO_4 at 20^0C and 100^0C. **(4 + 3 + 3)**