TDC (CBCS) Odd Semester Exam., 2024

CHEMISTRY

(3rd Semester)

Course No. : CHMDSC/GE-301T

(Physical and Organic Chemistry)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *three* from the following : 1×3=3

(a) State Raoult's law.

(b) What is azeotrope?

(c) Define an ideal solution.

(d) What is non-ideal solution?

2. Answer any *one* from the following : 2

(a) Ethanol and water cannot be separated completely by simple distillation. Explain why. Give example of maximum and minimum boiling azeotropes.

(b) Define triple point of water.

3. Answer any *one* from the following : 5

(a) Draw and discuss the phase diagram for the sulphur system.

(b) Define the following with suitable example of each : 1×5=5

(i) Phase equilibrium

(ii) CST

(iii) Eutectic system

(iv) Degrees of freedom

(v) Metastable equilibrium

UNIT—II

4. Answer any *three* from the following : 1×3=3

(a) What is conductance?

(b) What is specific conductance?

(c) How does specific conductance change upon dilution?

(d) What is equivalent conductance?

5. Answer any *one* from the following : 2

(a) Define transference number.

(b) Explain the principle of conductometric titration.

6. Answer any *one* from the following : 5

(a) Explain the term 'electrode potential'. Derive the Nernst equation for describing the effect of concentration of electrolyte on electrode potential. What is meant by standard electrode potential?

(b) What is reversible electrode? What type of reversible electrodes are commonly used? Explain the electrode reaction in each case.

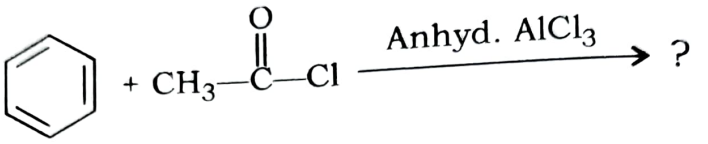
UNIT—III

7. Answer any *three* from the following : 1×3=3

(a) Write the product of the following reaction :

$$CH_3—\overset{\overset{O}{\|}}{C}—Cl + H_2 \xrightarrow[S,\ xylene]{Pd–BaSO_4} ?$$

(b) Write the product of the following reaction :



(c) Write the product of the following reaction :

$$2C_6H_5CHO + NaOH \xrightarrow[(50\%)]{} ?$$

(d) Write the product of the following reaction :

$$Ph—CH=CH—CHO + NaBH_4 \longrightarrow ?$$

8. Answer any *one* from the following : 2

(a) What is aldol condensation reaction? Explain with an example.

(b) What is Wolff-Kishner reduction? Explain it with an example.

9. Answer any *one* from the following : 5

(a) (i) How can you distinguish between acetaldehyde and benzaldehyde? Write the reactions. 3

(ii) What happens when benzaldehyde is treated with concentrated NaOH? Write the reaction. 2

(b) (i) Illustrate benzoin condensation with an example along with mechanism. 3

(ii) Prepare a suitable mechanism for the acid hydrolysis of ester. 2

UNIT—IV

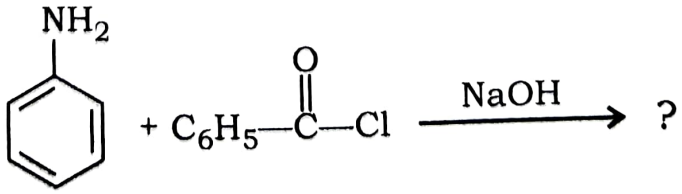
10. Answer any *three* from the following : 1×3=3

(a) Give the reagent for the following transformation :

$$C_6H_5—NH_2 \xrightarrow{?} C_6H_5OH$$

(b) Why is the boiling point of ethylamine lesser than ethyl alcohol?

(c) Write the product of the following reaction :



(d) Why is it difficult to prepare primary amine by ammonolysis of alkyl halide?

11. Answer any *one* from the following : 2

(a) What is Hofmann bromamide reaction? Give an example.

(b) Discuss Schotten-Baumann reaction with one example.

12. Answer any *one* from the following : 5

(a) Define primary, secondary and tertiary amines. How can they be distinguished?

(b) *(i)* What is the *ortho*-effect? 1

(ii) How will you convert aniline into—

(1) *p*-nitroaniline;

(2) benzamide? 2+2=4

UNIT—V

13. Answer any *three* from the following : 1×3=3

(a) What is reducing sugar?

(b) What is zwitterion in amino acid?

(c) What is peptide linkage?

(d) What is isoelectric point?

14. Answer any *one* from the following : 2

(a) Write open chain and cyclic structure of fructose.

(b) Discuss any one preparatory method of amino acids.

15. Answer any *one* from the following : 5

(a) *(i)* What are essential amino acids? Name two of them and write their structures. 1+1+1=3

(ii) What is electrophoresis? 2

(b) *(i)* What is the structural difference between glucose and fructose? 2

(ii) How do you convert aldopentose to aldohexose? 3

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