Q.P. Code : 11322

Third Semester B.Sc. Degree Examination,
November/December 2019

(CBCS Scheme)

CHEMISTRY – III

Time : 3 Hours]   [Max. Marks : 70

Instructions to Candidates :

   1)   *The question paper has Two Parts.*

   2)   *Answer Both the Parts.*

   3)   *Draw diagrams and write chemical equations wherever necessary.*

PART – A

Answer any **EIGHT** of the following questions. Each question carries **2** marks :
(8 × 2 = 16)

1.   Define temperature co-efficient of a reaction.

2.   State second law of thermodynamics.

3.   Calculate the entropy change during the vapourisation of 1 mole of liquid water at 373 K and 1 atmospheric pressure. The molar enthalpy of vapourisation of water at 373 K is 40.67 kJ mol^{-1}.

4.   State Nernst heat theorem.

5.   What is an adsorption isotherm?

6.   Mention two applications of bleaching powder.

7.   What are Ellingham diagrams?

8.   How does an alcohol react with metallic sodium? Give equation.

9.   What is Lucas reagent? How does a tertiary alcohol react with it?

10.   Why is para nitrophenol more acidic than phenol?

11.   Explain the action of lithium aluminium hydride on epoxides.

12.   What are Grignard reagents? Give an example.

PART – B

Answer any **NINE** of the following questions. Each question carries **6** marks :

$$(9 \times 6 = 54)$$

13. (a) Derive an expression for the rate constant of the second order reaction $A + B \rightarrow$ products where the concentrations of the reactants A and B are not equal.

    (b) Rate constants of a reaction at 300 K and 315 K are 4.28×10^{-3} s^{-1} and 1.3×10^{-2} respectively. Calculate the activation energy of the reaction. $(R = 8.314$ JK^{-1}mol$^{-1})$.

    (4 + 2)

14. (a) Explain the spectrophotometric method for the study of kinetics of the reaction potassium persulphate and potassium iodide.

    (b) Explain the determination of order of a reaction by half-life method. (4 + 2)

15. (a) Explain the different steps involved in Carnot's cycle.

    (b) Calculate the work done by 2 moles of an ideal gas during its isothermal reversible expansion from a pressure of 90 kNm^{-2} to a pressure of 40 kNm^{-2} at 300 K. $(R = 8.314$ JK^{-1} mol$^{-1})$.

    (4 + 2)

16. (a) What are homogeneous and heterogeneous catalysis? Give one example for each.

    (b) Explain bimolecular surface reaction.

    (4 + 2)

17. (a) With the help of Ellingham's diagram explain the selection of reducing agents taking suitable examples.

    (b) Give one method of preparation of borazole.

    (4 + 2)

18. (a) Explain the extraction of uranium from roasted pitch blende.

    (b) Give any two functions of nitrogen as essential plant nutrient.

    (4 + 2)

19. (a) Write the mechanism of oxidation of ethylene glycol using alkaline potassium permanganate.

    (b) What is Meerwin – Pondorff – Verley reduction? Give an example. (3 + 3)

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

    (b) How are thiols converted into alkyl sulphonic acids?

    (4 + 2)

21. (a) Explain the mechanism of conversion of phenol into salicylaldehyde.

    (b) Give an example for a trihydric phenol and write its structural formula.

    (4 + 2)

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22. (a) (i) Give the preparation of ethers from alcohols.

       (ii) What are epoxides? Give an example.

    (b) How does ethylene oxide react with nitrogen nucleophile?   **(4 + 2)**

23. (a) Describe the manufacture of urea.

    (b) How is methyl lithium converted into ethanoic acid?   **(4 + 2)**

24. (a) Explain the two types of polymerisation with one example for each.

    (b) What are thermosetting plastics? Give an example.   **(4 + 2)**

25. (a) Derive Gibbs–Helmholtz equation.

    (b) The equilibrium constant of a reaction at 298 K is 0.5. Calculate the standard free energy change of the reaction. ($R = 8.314$ JK^{-1} mol^{-1})   **(4 + 2)**

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