2020
CHEMISTRY

Total marks : 70 Time : 3 hours

General instructions:

i) Approximately 15 minutes is allotted to read the question paper and revise the answers.

ii) The question paper consists of 30 questions. All questions are compulsory.

iii) Marks are indicated against each question.

iv) Internal choice has been provided in some questions.

N.B: Check that all pages of the question paper is complete as indicated on the top left side.

1. Which type of crystal system has axial angles $\alpha = \beta = \gamma = 90^{\circ}$? **1**
   (a) cubic (b) tetrahedral
   (c) hexagonal (d) trigonal

2. Liquid in Liquid colloidal system are called **1**
   (a) aerosols (b) foams
   (c) gels (d) emulsion

3. The oxidation number of cobalt in $K[Co(CO)_4]$ is **1**
   (a) +1 (b) +3
   (c) −1 (d) −3

4. Which of the following is an example of vinylic- dihalide? **1**
   (a) Dichloro ethane (b) 1-2-dichloroethene
   (c) Ethylene chloride (d) Allyl chloride

5. The disaccharides present in milk is **1**
   (a) sucrose (b) maltose
   (c) lactose (d) cellulose

6. Define standard electrode potential. **1**

7. State the rate law for chemical reaction. **1**

8. Draw the structure of 4-bromopent-2-ene. **1**

9. What are benzylic alcohol? **1**

10. Arrange the following compounds in increasing order of their boiling points: CH_3CHO, CH_3CH_2OH, CH_3OCH_3, $CH_3CH_2CH_3$. **1**

11. State Henry's law and write its important application. **2**

12. **a.** Calculate the magnetic moment of a divalent ion in aqueous solution if its atomic number is 25.

Or **2**

b. What is meant by disproportionation reaction? Give examples.

13. **a.** Draw the structures of geometrical isomers of $[Fe(NH_3)_2 (CN)_4]^-$

Or **2**

b. Draw the figure to show the splitting of d-orbital ion in octahedral crystal field.

14. Explain SN_2 mechanism in haloalkanes. **2**

15. Complete the following reaction. **2**

$C_6 H_5— CH_2— Cl \xrightarrow{NH_3} ? \xrightarrow{2CH_3Cl} ?$

16. **a.** Why aniline does not undergo Friedel-Craft's reaction?

Or **2**

b. What is acylation reaction? Give an example.

17. If the radius of the octahedral void is 'r' and radius of the atoms in closed packing is 'R', derive relation between 'r' and 'R'. **3**

18. **a.** Vapour pressure of water at 293K is 17.535 mmHg. Calculate the vapour pressure of water at 293K, when 25g of glucose is dissolved in 450g of water.

Or **3**

b. The boiling point of benzene is 353.23K when 1.80g of non-volatile solute was dissolved in 90g of benzene, the boiling point is raised to 354.11K. Calculate the molar mass of the solute. Kb for benzene is $2.53 Kkgmol^{-1}$.

19. Define half-life of a reaction. Show that in a first order reaction, time required for completion of 99.9% is 10 times of half-life (t½) of the reaction. **3**

20. Give the difference between physisorption and chemisorption. **3**

21. **a.** Explain zone refining method for the purification of metals.

Or **3**

b. Explain calcination and roasting with examples.

22. How is nitric acid prepared by Ostwald's process? Give the reaction involved. **3**

23. Write the preparation of potassium dichromate from iron chromite ore. **3**

24. Explain Reimer-Tiemann reaction. Write the reaction involved in it. **3**

25. **a.** What are amino acids? How are they classified?

Or **3**

b. Write the biological importance of nucleic acid.

26. **a.** How is nylon-66 obtained? Give one of its uses.

Or **3**

b. Explain homopolymers and copolymers with examples.

27. Why do soaps not work in hard water? **3**

28. **a.** (i) State Kohlrausch's law.Give its application.

(ii) Λ°_{m} for NaCl,HCl and CH_3COONa are 126.4, 425.9 and 91.0 Scm^2mol^{-1} respectively. Calculate Λ° for CH_3COOH.

Or **5**

b. What are primary cells? Calculate the equilibrium constant for the reaction at 298K.

$Cu + 2Ag^{+} \rightarrow Cu^{2+} + 2Ag.$

$E^{\circ}_{(Ag^{+}/Ag)} = 0.80V$ and $E^{\circ}_{(Cu^{2}/Cu)} = 0.34V$

29. **a.** (i) How are XeF_6 and XeO_3 prepared?

(ii) Draw the structure of XeF_2, XeF_4 and $XeOF_4$.

Or **5**

b. (i) Explain the thermal stability of hydrides of gr-15 elements.

(ii) List three oxoacids of halogens in their different oxidation state.

30. **a.** (i) Describe the following reactions and give the reaction involved in it.

(A) Aldol condensation

(B) Etard reaction.

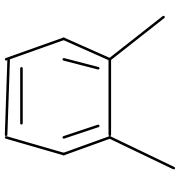
(ii) What is Fehling's solution test?

Or **5**

b. (i) What happens when acetone reacts with HCN?

(ii) Complete the following reactions:

(A) $C_6H_5CHO \xrightarrow{H_2NCONHNH_2} ?$

(B) 

$\xrightarrow{SOCl_2 / heat} ?$

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