

2017

## CHEMISTRY

(Theory)

Full Marks : 70

Pass Marks : 21

Time : Three Hours and \*Fifteen Minutes

(\*15 minutes are given as extra time for reading questions)

All the Questions are compulsory.

The figures in the right margin indicate full marks for the questions.

(Questions 1-10 are Very Short Answer (VSA) type of 1 mark each.)

1. What is Schottky defect ? 1
2. What are the characteristics of ideal solution ? 1
3. Why does vapour pressure of a liquid decrease when a non-volatile solute is added into it ? 1
4. Zinc protects iron from corrosion better than tin. Give reason. 1
5. What is haloform reaction ? 1

6. How is acetophenone converted to benzoic acid ? 1
7. What are diazonium salts ? 1
8. How is nitrobenzene converted to benzenediazonium chloride ? 1
9. Fresh tomatoes are a better source of vitamin C than those which have been stored for some time. Why ? 1
10. How does aspirin act as an analgesic ? 1

*Questions 11-14 are Objective type carrying 1 mark each. Choose and rewrite the best answer out of the given alternatives.*

11. A ferromagnetic substance becomes a permanent magnet when it is placed in a magnetic field because \_\_\_\_\_ 1
- A. all the domains get oriented in the direction of magnetic field.
- B. all the domains get oriented in the direction opposite to the direction of magnetic field.
- C. domains get oriented randomly.
- D. domains are not affected by magnetic field.

12. In the metallurgy of iron from haematite, limestone is added to act as 1
- A. flux
  - B. slag
  - C. a reducing agent
  - D. an oxidising agent.
13. Which of the following reactions is most suitable for the preparation of n-propylbenzene ? 1
- A. Freidel– Crafts alkylation
  - B. Wurtz reaction
  - C. Wurtz-Fittig reaction
  - D. Grignard reaction.
14. A carbonyl compound with molecular weight 86, does not reduce Fehling's solution but forms crystalline bisulphite derivative and gives iodof orm test. The possible compounds are 1
- A. 2- pentanone and 3-pentanone
  - B. 2-pentanone and 3-methyl-2-butanone
  - C. 2-pentanone and pentanal
  - D. 3-pentanone and 3-methyl-2-butanone.

Question Nos. 15-24 are Short Answer (SA-II) types of 2 marks each.

15. Write *two* differences between crystalline solids and amorphous solids. 2
16. What are primary cells and secondary cells? 2
17. What is meant by Faraday constant? How much charge is required for reduction of 1 mole of  $Al^{3+}$  ion to  $Al$ ? 2
18. Define the following giving an example of each : 2
- a) Coagulation
  - b) Tyndall effect.
19. How do the size of the particles of adsorbent and pressure of the gas influence the extent of adsorption? 2
20. Define metallurgy. Name the important metallurgical operations. 2
21. Write mechanism of acid dehydration of ethanol to yield ethene. 2
22. Give *two* reactions that show the acidic nature of phenol. 2
23. Give the chemical equations for each of the following reactions : 2
- i) Hofmann bromamide reaction
  - ii) Carbylamine reaction.

24. Define the following with *one* example each :

2

i) Antipyretics

ii) Antibiotics

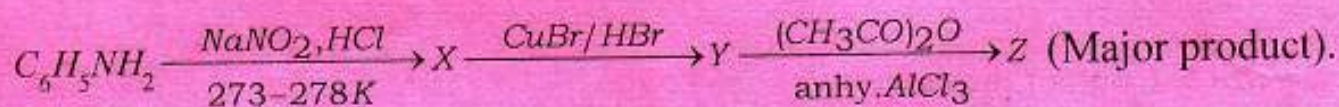
Question Nos. 25-31 are Short Answer (SA-I) types of 3 marks each.

25. What is Raoult's law ? The vapour pressure of a 5% aqueous solution of a non-volatile organic substance at 373K is 745 mm. Calculate the molar mass of the solute. 3

26. Ozone is an oxidising as well as a reducing agent. Support the statement by giving *one* example of each. 3

27. Write the postulates of Werner's theory of coordination compounds. 3

28. Identify the compounds X, Y and Z in the following sequence of reactions : 3



29. How are aldehydes distinguished from ketones using Tollen's and Fehling's reagents ? Give complete chemical reactions. 3

30. Represent sucrose and  $\alpha$ -D-maltose in the form of Haworth structures. 3

31. How is bakelite made and what is its major use ? Why is bakelite a thermosetting polymer ? 3

*Questions from 32-34 are Essay (E) type of 5 marks each.*

32. a) What is activation energy of a reaction ?
- b) The rate of reaction increases in presence of catalyst. Explain the statement by plotting a curve between reaction coordinate and energy.
- c) For a reaction, the initial concentration of reactant is 0.4M and rate constant is  $2.5 \times 10^{-4} \text{ mol L}^{-1} \text{ S}^{-1}$ . Calculate the half-life period of the reaction. 1+3+1=5
33. Describe in brief the following : 1×5=5
- a) Haber's process
- b) Contact process
- c) Ostwald's process
- d) Interhalogen process
- e) Anomalous behaviour of fluorine.

34. a) Describe the preparation of potassium dichromate from chromite ore.
- b) How does the acidified solution of potassium permanganate react with
- i) oxalic acid
  - ii) Iron (II) ions.

3+2=5