

F 7069

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Reg. No.....

Name.....

M.Sc. DEGREE (CSS) EXAMINATION, JANUARY 2014

Faculty of Science

Third Semester

Branch III—Chemistry

AN 3C 09/CH 3C 09/PO 3C 09—STRUCTURAL INORGANIC CHEMISTRY

(Common to M.Sc. Analytical Chemistry, Chemistry and Polymer Chemistry)

Time : Three Hours

Maximum Weight : 30

Section A

Answer any ten questions.

Each question carries a weight of 1.

1. What is Kronig-Penney potential ?
2. Explain, what is Hall Effect ?
3. Which are the elements present in Ilmenite ? Comment on its magnetic properties.
4. What are carbon nano tubes ? Give one application.
5. Briefly explain "Antifluorite" structure.
6. What are Frenkel defects ? Explain using an example.
7. An intermetallic compound has the Antifluorite structure in which the cation has a 4-fold co-ordination and the anion an 8-fold co-ordination. For what values of the radius ratio do you expect this ionic compound to adopt fluorite structure ?
8. Explain why the wurtzite containing excess Zinc does not behave like electron excess semiconductor ?
9. Define the term Catenation. Give an example for a hetrocatenation material.
10. What are Zeolites ? Give two important applications of Zeolites.
11. Give the structure of Borazine and explain the special nature of the bonding in the molecule.
12. Explain the use of Wade Mingos Lauher rules in predicting the structure of clusters.
13. Give one example each for Terra nuclear and hexanuclear clusters.

(10 × 1 =10)

Turn over

Section B

Answer five questions.

Each question carries a weight of 2.

14. What are Spinel? Give the general formula of the spinels. What is inverse spinel structure?
15. Give an account of the different mechanisms for the diffusion in solids.
16. Explain briefly the different methods used in Crystal growth.
17. Explain the terms using suitable examples (a) Pyroelectricity; (b) Piezoelectricity; and (c) Ferroelectricity.
18. What is photoconductivity? Give examples of such materials. Explain how they are useful in measuring the radiations?
19. What is Meissner effect? What do you mean by perfect diamagnetism?
20. What are the Isopoly and heteropoly molybdenum blues? Give an account of their uses.
21. Define and explain Glassy state of matter. Give examples for organic, inorganic materials which remain in glassy state.

(5 × 2 = 10)

Section C

Answer any two questions.

Each question carries a weight of 5.

22. What are refractories? Name some of the important classes of refractories. Explain the terms (a) MOR (Modulus of rupture); (b) HMOR (Hot modulus rupture); (c) PCE (Pyrometric Cone Equivalent); (d) TEUL (Thermal Expansion Under Load and creep).
23. List out some of the Homocyclic and Heterocyclic inorganic ring systems of sulphur, selenium and Phosphorus. Give their structure and conformations.
24. Explain the Fritz and Heinz "Phenomenological theory of superconductivity which came in 1935. What are its drawbacks? Explain how the BCS theory of superconductivity overcame the drawbacks?
25. Explain Free electron theory and Zone theory of solids. What are the advantages of M.O. Theory over these theories?

(2 × 5 = 10)