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B – 3702

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, December 2016
First Degree Programme under CBCSS
CHEMISTRY
Core Course II
CH 1341 : Inorganic Chemistry – II
(2013 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Answer in **one** word to a maximum of **two** sentences. **Each** question carries **1** mark.

1. Give the structure of NH_3 molecule.
2. What is the bond order of O_2^+ ion ?
3. Name the equation used for calculating the lattice energy of an ionic compound.
4. Name the species responsible for the blue colour exhibited by a dilute solution of an alkali metal in liquid ammonia.
5. State Beer-Lambert's law.
6. Name the type of nuclear reaction in an atom bomb.
7. What happens to the atomic number of an atom when one α particle is emitted ?
8. Give an example of a fuel gas used for producing flames in flame emission spectroscopy.
9. Give an example of a non-aqueous solvent which does not self ionise.
10. Name the analytical technique which works on the principle of quantum tunnelling.

(10×1=10 Marks)

P.T.O.

SECTION – B

Short answer type questions. (Answer **not** to exceed **one** paragraph). Answer **any eight** questions. **Each** question carries **2** marks.

11. Give the structures of IF_5 and IF_7 based on VSEPR theory.
12. Sketch the MO diagram of CO and calculate the bond order.
13. o-nitrophenol is more volatile than p-nitrophenol. Why ?
14. How can you explain the conductivity in metals using band theory ?
15. State Fajan' rules.
16. Arrange the following interactions in the increasing order of their strength :
    a) ion – dipole
    b) dipole – dipole
    c) induced dipole – induced dipole
    d) dipole – induced dipole.
17. Give two examples for the use of radioactive isotopes as tracers.
18. State and explain the Geiger-Nuttall rule.
19. Explain the self ionisation of liquid HF, giving the chemical equation.
20. What do you mean by levelling effect of a solvent ?
21. What are the causes of chemical interferences in atomic absorption spectroscopy ?
22. Briefly explain the structure of C_{60} fullerene. **(8×2=16 Marks**

SECTION – C

Short essay (Answer **not** to exceed **120** words). Answer **any six** questions. **Each** question carries **4** marks.

23. Sketch the MO diagrams of B_2, N_2 and O_2. Arrange them in the increasing order of their bond strength.

24. Describe LCAO method with H_2^+ ion as an example.

25. Explain with examples how dipole moment measurements are useful in molecular structure elucidation.

26. Explain Born-Haber cycle with a suitable example.

27. Explain artificial transmutation and artificial radioactivity with examples.

28. Write a note on the mechanical and thermal properties of nanoparticles.

29. Discuss the characteristic features and uses of liquid NH_3 as a non-aqueous solvent.

30. Acetic acid behaves as a stronger acid in liquid NH_3 than in water. Justify.

31. Discuss the principle and uses of transmission electron microscopy. **(6×4=24 Marks)**

SECTION – D

Long essay. Answer **any two** questions. **Each** question carries **15** marks.

32. a) Write notes on the principles and applications of TG, DTA and DSC.
    b) Give the thermogravimetric curve of $CuSO_4, 5H_2O$. **(12+3)**

33. a) Write notes on (i) neutron activation analysis and (ii) ^{14}C dating.
    b) Explain the nuclear reactions happening in sun's atmosphere. How do they produce huge amount of energy ? **(10+5)**

34. a) Describe the hybridisation in methane, ethylene and acetylene.
    b) Explain the free electron theory of metallic bonding. **(9+6)**

35. a) What are carbon nanotubes ? Describe any two methods for their preparation.
    b) Describe any two methods, belonging to the top-down approach, for the preparation of nanoparticles. **(7+8)**

(2×15=30 Marks)