



MS – 302



II Semester B.Sc. Examination, May 2016
(CBCS) (2014-15 and Onwards) (F + R)
CHEMISTRY (Paper – II)

Time : 3 Hours

Max. Marks : 70

Instructions: 1) The question paper has **two** Parts. Answer both the Parts.
2) Write diagrams, equations **wherever** necessary.

PART – A

Answer any eight of the following questions :

(8×2=16)

1. Write the shapes of the orbitals when $l = 0$ and $l = 1$.
2. Write Radial probability distribution curve for 1s electron.
3. Write Schrodinger's wave equation and explain the terms involved.
4. Write Born-Landé equation of lattice energy. Name the terms involved.
5. Which of the following is polar molecule H_2O , CO_2 ? Give reason.
6. Give an example for each of the following :
 - i) Intermolecular – H – bond
 - ii) Intramolecular – H – bond.
7. What are orthosilicates ? Give an example.
8. Give the reaction of XeF_4 with water.
9. Cupric chloride is blue, while cuprous chloride is colourless. Give reason.
10. How is toluene converted into Benzaldehyde ? Give equation.
11. How is anthracene converted into anthraquinone ?
12. Mention the factors which effects SN^1 reaction.

P.T.O.



PART – B

Answer any nine of the following questions :

(9×6=54)

13. a) Explain the terms (i) Hamiltonian operator (ii) Laplacean operator.
b) Calculate the energy associated with the Fourth Bohr orbit in hydrogen atom.
Given the energy of Bohr first orbit is -2.17×10^{-18} J. (4+2)
14. a) Write any four postulates of quantum mechanics.
b) State Heisenberg's uncertainty principle. Write its mathematical form. (4+2)
15. a) Derive an expression for the energy of the first Bohr orbit in Hydrogen atom.
b) Calculate the wavelength of the wave associated with an electron moving with velocity $4.0 \times 10^6 \text{ ms}^{-1}$, Electronic mass = 9.1×10^{-31} Kg, $h = 6.63 \times 10^{-34}$ Js. (4+2)
16. a) Setup Born-Haber cycle for the formation of magnesium oxide crystal. Write the expression for lattice energy.
b) Write any two differences between sigma bond and pi bond. (4+2)
17. a) Explain sp hybridization with an example.
b) HF has higher boiling point than HCL why ? (4+2)
18. a) On the basis of VSEPR theory explain the shape of BrF_3 molecule.
b) State Fajan's rule. (4+2)
19. a) Explain the characteristics of transition elements with respect to (i) variable oxidation states (ii) Magnetic properties.
b) Why are the elements with At.No 58 to 71 placed separately in the periodic table ? (4+2)
20. a) How is Helium isolated from natural gas ?
b) Write structure of basic unit present in pyrosilicates. (4+2)



21. a) Write molecular orbital diagram of Be_2 molecule and calculate the bond order.
b) Write the electronic configuration of He_2^+ ion. (4+2)
22. a) Discuss the mechanism of nitration of Benzene.
b) Give an example Diel-Alder reaction. (4+2)
23. a) Explain mechanism of SN^1 reaction with an example.
b) How is Biphenyl prepared ? Name the reaction. (4+2)
24. a) Explain orienting influence $-\text{OH}$ group in phenol.
b) Compare the reactivities of alkyl halide and vinyl halide. (4+2)
25. a) What are intrinsic semiconductors ? Give an example.
b) Why chromium in the +6 oxidation state is diamagnetic ? Write electronic configuration of chromium.
c) Explain Hoffman elimination reaction with an example. (2+2+2)
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