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Total Number of Pages : 02

M.Sc.I
FCYC101

3rd Semester Back Examination 2019-20

INORGANIC CHEMISTRY-I

BRANCH : M.Sc.I(AC)

Max Marks : 70

Time : 3 Hours

Q.CODE : HB577

Answer Question No.1 which is compulsory and any FIVE from the rest.

The figures in the right hand margin indicate marks.

- Q1 Answer the following questions : (2 x 10)**
- a) Calculate the de-Broglie wavelength of helium atom at 27°C moving with velocity of $2.4 \times 10^2 \text{mS}^{-1}$.
 - b) What is the significance of ψ^2 ?
 - c) Mention the number of radial nodes in 4P and 3P orbitals?
 - d) Why electron affinity of F is less than Cl?
 - e) Why first ionization energy of N is greater than the first ionization energy of O?
 - f) What is screening effect? How does it affect the trend of ionization energy?
 - g) Between LiCl and KCl which is more covalent? explain by applying Fajan's rule
 - h) The ionic radii of Na^+ and Cl^- are 0.95Å and 1.81Å respectively. Calculate the coordination number?
 - i) What is isoelectronic species? Give an example of a molecule which is isoelectronic with CO.
 - j) On the basis of MOT, how will you account for the smaller bond order of NO compared to NO^+ ?
- Q2 a) Write the Schrödinger wave equation for hydrogen atom in terms of polar coordinates. Separate the resultant equation in three equations. (5)**
- b) State and explain de-Broglie wave equation. Give the experimental verification of this equation. (5)**
- Q3 a) Explain the terms principal quantum number, angular momentum quantum number, magnetic quantum number and spin quantum number. Explain the significance of these quantum numbers. (5)**
- b) Explain the term Ionization energy of an element? How do ionization energy of elements vary as we move (i) along a period (ii) down a group and why? (5)**
- Q4 a) Give reason for the following (5)**
- (i) Electron affinity of N is almost zero while that of F is very high.
 - (ii) The second ionization energy of Na is very high as compared to its first ionization energy.
 - (iii) Alkali metals are strong reducing agents.
- b) What are main postulates of VSEPR theory? (5)**

- Q5** a) Discuss M.O theory. Explain on the basis of M.O theory that N_2 molecule is diamagnetic where as O_2 molecule is paramagnetic (5)
b) What is Born-Haber cycle? Discuss the steps to calculate the lattice energy of Magnesium bromide by using Born- Haber cycle (5)
- Q6** a) Give the hybridization of the central atom and explain the geometry of XeF_4 and $SnCl_2$ molecule. (5)
b) Using VSEPR theory, explain the structure of SF_4 and ClF_3 molecule. (5)
- Q7** a) What is Solvation energy? Describe the various factors which affect the solubility of ionic or polar solutes in various solvents. (10)
b) Explain Fajan's rule with special reference to polarizing power and polarisability.
- Q8** Write short answer on any TWO : (5 x 2)
a) Explain band theories of metallic bond.
b) Explain the following
(i) B.P of $H_2O > HF > NH_3$ although electronegativity of $F > O > N$.
(ii) *o*-Nitrophenol is more volatile *p*-Nitrophenol.
(iii) H_2O is a liquid where as H_2S is a gas.