

SARDAR PATEL UNIVERSITY
B.Sc. (I Semester) (NC) Examination
Tuesday, 19th April 2016
2:30 am to 4:30 pm
US01CCHE02 – INORGANIC CHEMISTRY

Total Marks : 70

Q.1 Multiple choice questions.**(10)**

- 1 How the magnitude of Z_{eff} varies on going down a group ?
 (a) Decreases (b) increase (c) remain constant (d) none
- 2 Who has suggested that light shows dual character ?
 (a) Planck (b) Einstein (c) de-Broglie (d) Bohr
- 3 What is the basis of modern periodic table ?
 (a) Ionization energy (c) Atomic weight
 (b) Atomic number (d) electro negativity
- 4 Addition of an electron to gaseous atom is an _____ process.
 (a) Endothermic (b) Adiabatic (c) Isochoric (d) Exothermic
- 5 What is the percentage S character in sp^3 hybridization ?
 (a) 25 (b) 33.33 (c) 50 (d) 100
- 6 The shape of I_3^- molecule is _____ .
 (a) Triangle (b) Tetrahedral (c) Linear (d) none
- 7 The bond angle of N—H—N bond in NH_3 is _____ .
 (a) $104^\circ 27'$ (b) $107^\circ 48'$ (c) 180° (d) 90°
- 8 Which symbol is used to represent antibonding molecular orbital ?
 (a) σ and π (b) σ^* and π^* (c) σ and σ (d) σ^* and π^*
- 9 Which of the following molecular species has unpaired electrons ?
 (a) N_2 (b) F_2 (c) O_2^- (d) O_2^{2-}
- 10 Molecular orbitals possess _____ symmetry.
 (a) Curve (b) cylindrical (c) spherical (d) Dumb bell shape

Q . 2 Answers the following short questions (any ten)**(20)**

- 1 Draw the graphs of R, n, l against r for 1S, 2S, and 3S orbitals.
- 2 "H₂ does exist but He₂ does not exist" explain.
- 3 Define electron probability function D.
- 4 Define effective nuclear charge and shielding effect.
- 5 What are bonding molecular orbital ?
- 6 Why N₂ molecule is diamagnetic ?
- 7 Give the factors affecting magnitude of electronegativity.
- 8 Why alkali metals can not form M²⁺ ion ?
- 9 Helogen has a highest value of electro negativity. Why ?
- 10 Draw the structure of PCl₅ and ClF₃ molecule.
- 11 Give the shape and bond angles of the molecule predicted by Sidgwick – Powell theory .
- 12 Show the covalent bond formation in Cl₂ and H₂O molecule by Lewis theory .

- Q.3 Derive the Schrodinger's wave equation. (6)
 Calculate the wave length of an electron moving with a velocity of $2.5 \times 10^7 \text{ ms}^{-1}$ (4)
 Given : $h = 6.626 \times 10^{-34} \text{ J.Sec.}$
 $m = 9.11 \times 10^{-31} \text{ Kg.}$

OR

- Q.3 Derive de-Broglie's wave equation. (4)
 Calculate σ and Z_{eff} for 3d electron in (a) Mn ($Z=25$) (6)
 (b) Cu ($Z=29$)

- Q.4 (a) Discuss the trends of Ionization energy. (i) Across the period (5)
 (ii) Down the group
 (b) Calculate the electro negativity of F-atom by Allred - Rochow method. (5)
 Given : Atomic number of F-atom = 9
 Covalent radius of F-atom = 0.71 \AA

OR

- Q.4 (a) Discuss the factors affecting the magnitude of electro negativity. (5)
 (b) Explain : CsOH is basic while IOH is acidic. (5)

- Q.5 (a) Define hybridization. Discuss the sp^2 hybridization in BF_3 molecule. (5)
 (b) Write note on Sidgwick - Powell theory. (5)

OR

- Q.5 (a) Discuss the structure of H_2O and PCl_5 molecule. (5)
 (b) Discuss the effect of lone pair and electro negativity in the geometry of the molecule. (5)

- Q.6 (a) Explain : "P-P Combination of orbitals yields two different type of molecular orbitals." (5)
 (b) N_2 molecule is diamagnetic and there is a triple bond between N-atom, Explain on basis of MOT. (5)

OR

- Q.6 (a) Describe molecular orbital treatment of : C_2 molecule. (5)
 (b) Distinguish between : (i) σ bond and π bond (5)
 (ii) Bonding MO and Antibonding MO.

$X=X=X$

Page-2