

V.P. & R. P. T. P. SCIENCE COLLEGE

B. Sc. (Semester - I) Exam
INORGANIC CHEMISTRY
3rd October 2013, Thursday
COURSE NO: US01CCHE02



TIME: 11:00 to 12:00 pm

TOTAL MARKS: 30

Q.1 Answer the following MCQs:

(06)

- (I) The permitted combination of l and m value for p orbitals are
(a) one (b) three (c) two (d) none
- (II) Which scientist imagined matter wave?
(a) de-Broglie (b) Rutherford (c) Bohr (d) Einstein
- (III) What is the geometrical arrangement of sp^3 hybrid orbital?
(a) linear (b) tetrahedral (c) trigonal planar (d) trigonal
- (IV) In PCl_5 molecule due to P-Cl bonds in the same plane, angle between them is
(a) 90° (b) 120° (c) 45° (d) 180°
- (V) A π -bond is formed by the overlap of
(a) s-s orbital (b) s-p orbital (c) p-p orbital in end-to-end fashion
(d) p-p orbital in sidewise manner.
- (VI) In N_2 molecule the numbers of electrons in bonding molecular orbital are
(a) 2 (b) 4 (c) 10 (d) 14

Q.2 Answer the following short questions: (Any three)

(06)

- (I) State and explain Heisenberg's uncertainty principle.
- (II) Define electron probability function and intervening electrons.
- (III) Give the shape of: NH_3 , SF_4 , XeF_4 and CO_3^{2-} .
- (IV) What are isoelectronic species?
- (V) Explain s-s linear combination of orbital.
- (VI) Explain: Be_2 does not exist.

Q.3 Answer the following questions:

(06)

- (A) Derive de-Broglie's matter wave equation. State the de-Broglie's hypothesis.
- (B) Calculate σ and Z_{eff} for 3d electron in: (i) Mn ($Z=25$) (ii) Cu ($Z=29$)

OR

Q.3 Answer the following questions:

(06)

- (A) Explain the factors affecting shield constant and effective nuclear charge.
- (B) A microscope using suitable photon is employed to locate an electron in an atom within a distance of $0.1 \text{ \AA}$. What is the uncertainty involved in the measurement of its velocity. Comment on your result.
(Given: $m_e = 9.1 \times 10^{-31} \text{ kg}$; $h = 6.626 \times 10^{-34} \text{ Js}$.)

Q.4 Answer the following questions: (06)

- (A) Chlorine trifluoride (ClF_3) has distorted trigonal bipyramidal shape while I_3^- (triiodide ion) has linear shape. Explain by VSEPR theory.
- (B) Define hybridization. Discuss the sp hybridization in BeF_2 molecule.

OR

Q.4 Answer the following questions: (06)

- (A) Discuss the Lewis theory to explain covalent bond with suitable example.
- (B) The shape of molecule is distorted in presence of lone pair and by difference in electronegativity. Explain.

Q.5 Answer the following questions: (06)

- (A) How molecular orbitals are defined? Give their order of energies.
- (B) Write note on: π – Bonding.

OR

Q.5 (06)

Sketch and explain on the basis of MOT: O_2 – molecule is paramagnetic while O_2^{2-} (peroxide ion) is diamagnetic in nature.

All the Best!!

