Home Assignment-1

Subject : Chemistry

Class : 3rd Semester (Major)

Paper : M 301

Total Marks : 38

1 . Answer all the questions : 1x6 = 6

(a) The shape of XeF_4 molecule is ----------

(b) Why is boiling point of NH_3 higher than PH_3 ?

(c) Arrange the following compounds in order of increasing H-X-H bond angle

CH_4, C_2H_4 , PH_3 , H_2O

(d) What is meant by angular wave function of atomic arbitals ?

(e) Arrange O_2^+, O_2, O_2^- and O_2^{2-} in order of increasing bond order

(f) Whioch of the following can be expected to be more soluble in water ?

$NaClO_4$ or $KClO_4$

2 . Answer any two questions 2x4 = 8

(a) what is meant by aromaticity ? Discuss the structural features of aromatic compounds .

(b) what are Miller indices ?Determine Miller indices of crystal plane that cut through the crystal axis at (2a , 3b , c)

(c) Explain polarising power and polarisability . How these effect covalent character of bonds in molecules?

3. Write short notes on any two : 2x2 = 4

(a) Steric Effects (b) Electronic Effects (c) Spinel

4. Answer the following 5x4=20

(a) Explain VSEPR theory.Hoe this theory explains the shapes of molecules?Explain with the help of example.

(b)How hybridization influence bond length,bond angle and other properties of molecules including shapes and dipole moments.

(c)Draw molecular orbital energy level diagram for N2 molecule.Calculate bond order.

(d) Draw angular parts of the wave function of H2+ molecule ion.

Home Assignment-2

Subject : Chemistry

Class : 3rd Semester (Major)

Paper : M 301

Total Marks : 38

1 . Answer all the questions : 1x6 = 6

(a) Write the time independent Schrodinger equation for hydrogen atom.

(b) Why is sigma bond stronger than pi bond?

(c) How does bond multiplicity effect bond length?

(d) What are l and m values of 2Px electron?

(e) Which quantum number is not obtained from the Schrodinger wave equation?

(f) What is bond order?

2 . Answer any two questions 2x4 = 8

(a)Draw the Lewis structure of PCl5 and SF4.

. (b) Explain why BF3 has not dipole moment,but NH3 has.

(c) An electron is in a 4f orbital.What possible values for the quantum numbers n,l and s can it have.

3. Write short notes on any two : 2x2 = 4

(a) Mulliken's scale of electronegativity

(b) Radial probability distribution function

(c) Spinel

4. Answer the following 5x4=20

(a) UsingVSEPR theory,explain the geometry of the following molecules.

XeF2, IF5

(b)Write a note on Aufbau Principle.

(c)Draw molecular orbital energy level diagram for O2 molecule.Calculate bond order.

(d) What is resonance? What are the essential rules for writing resonating structures? Draw the different resonating structures of carbonate ion.

Home Assignment-I

Subject : Chemistry

Class : 3rd Semester (Major)

Paper : M 302

Total Marks : 38

1.Answrer the following : 1x6 = 6

(a) Give the Lewis dot picture of SO_2.

(b) Calculate the Zeff of zinefor the outermost valence shell electron.

(c) Which series of lines of the hydrogen spectrum lie in the visible region ?

(d) Relate the wave length of a photon to its mass.

(e) Calculate the formal charge of P in PH_4^+ ion.

(f)Define micro and micro particles.

2.Answer the following (Any three) 4x3=12

(a)Explain the black body radiation phenomenon.

(b)Plot psi square for 1S,2S,2Px,2Pz orbitals.

(c)Explain the concept of overlapping with the help of valence bond apporoach of H2 molecule.

3.Write short notes on any two: 5

(a)Electron Diffraction

(b)de-Broglie hypothesis

(c)Pauli's exclusion principle

4.Answer the following 5x3=15

(a)Derive Schrodinger wave equation.

(b)Explain the terms resonance and resonance energy by taking the example of benzene.

(c)What do you mean by bond moment and dipole moment? Give reason why NF3 is less basic thanNH_3?

Home Assignment-II

Subject : Chemistry

Class : 3rd Semester (Major)

Paper : M 302

Total Marks : 38

1.Answrer the following : 1x6 = 6

(a)Mention the type of crystal system found in diamond and graphite.

(b) What would be the type of hybridization in PCl_5?

(c) Which series of lines of the hydrogen spectrum lie in the visible region ?

(d) What is the difference between a quantum and a photon?

(e) Calculate the formal charge of N in NF_3 .

(f) What is eigen function?

2.Answer the following (Any three) 4x3=12

(a)Compare CO_2 and H_2O with respect to the hybridization of central atom.

(b)Define radius ratio.State how radius ratio is helpful in predicting coordination number of ions.

(c)Define lattice energy.How is it important to predict the solubility of an ionic crystal in a liquid?

3.Write short notes on any two: 5

(a)Heisenberg uncertainty principle

(b)de-Broglie hypothesis

(c)Aufbau principle

4.Answer the following 5x3=15

(a)Discuss the structure and bonding in electron deficient compound diborane.

(b)Explain the terms resonance and resonance energy by taking the example of benzene.

(c)What are thethree important types of hybrid orbitals that can be formed by an atom with only s- and p- orbitals in its valence shell?Describe the molecular geometry that each of these produces. Which one of the avobe hybird orbitals is supposed to from the long

INSTRUCTINS

1. Submit the two assignments separately.
2. Write both question and answer in the assignment.
3. Write the assignments in A4 size paper with black ball pen. There should be sufficient spacing between successive lines.
4. The A4 sized papers used for writing assignment should be properly margined (1inch in all the four sides).
5. Submit the hard copy of the Home Assignment – I & Home Assignment – II of both the papers to the HoD, Department of Chemistry, on or before 10^{th} August, 2021. If a candidate resides outside Hojai district, he/she may send the pdf copy of the two assignments to **drskchem@gmail.com**.
6. The cover page of the assignments should contain the following:
   a) Home Assignment No.
   b) Name of Student
   c) GU Roll No.
   d) GU Registration No
   e) Class
   f) Date of submission.
7. While submitting the assignments, enlist your name the Departmental Register.
8. For any clarification, contact:
   a) Dr. S Kumar (HoD) – 9435069312
   b) Mrs. S. Mitra – 7576075738.