

C.U.SHAH UNIVERSITY

WADHWAN CITY

University (Winter) Examination -2013

Course Name :M.Sc(Chemistry)-Sem-I

Subject Name: -Inorganic Chemistry

Duration :- 2:30 Hours

Date : 02/12/2013

Instructions:-

- (1) Attempt all Questions of both sections in same answer book / Supplementary.
- (2) Use of Programmable calculator & any other electronic instrument is prohibited.
- (3) Instructions written on main answer Book are strictly to be obeyed.
- (4) Draw neat diagrams & figures (If necessary) at right places.
- (5) Assume suitable & Perfect data if needed.

SECTION-I

Q-1 Answer the following short questions (Compulsory) (07)

1. Write down the wave equation for the helium atom.
2. Give the definition of “*multiplet width (W)*”.
3. Write the experimental bowng angle value of water?
4. How the probability of finding the electron can be defined?
5. Define: Magnetically dilute substance.
6. Give the definition of volume magnetic susceptibility (k or χ_v).
7. Define paramagnetic property.

- Q-2 1. Using the relation of *multiplet width (W)* as large compared to *thermal energy (KT)*, find out the equation for magnetic moment (μ_{eff}). (05)
2. Draw the graph of magnetic susceptibility (χ) Vs Temperature (T) and discuss antiferromagnetic and ferromagnetic bodies in brief. (05)
3. Calculate the magnetic moment (μ_{eff}) values for Titanium (II), Manganese (III), Iron (III) and Copper (II). (04)

OR

- Q-2 1. Define the following: i) Magnetic induction (B) ii) Gram susceptibility (χ_g) (05)
2. Find out the ground state term symbol of I) Mn^{+2} , II) Fe^{+2} , III) Co^{+2} , IV) Ni^{+2} and V) Cu^{+2} ions. (05)
3. Give an account on the properties of paramagnetic bodies. (04)
- Q-3 1. Calculate the pi-bonding energy, delocalization energy and charge density for allylic carbonium ion and allylic free radical system. (05)
2. Discuss the self-consistent field method in detail. (04)
3. Discuss the electron distribution in the Hydrogen molecule ion. (05)

OR

- Q-3 1. Explain the hybridization concept in water molecule. (04)
2. Find out the pi-bonding energy and delocalization energy I) 1,3-Butadiene and II) Cyclo 1,3-Butadiene. (05)
3. Explain the $E\pi-\pi$ bonding energy, delocalization energy and charge density for cyclopropenyl cation. (05)



SECTION-II

- Q-4 Answer the following short questions (Compulsory) (07)
1. What is the role of electrons in p, d and f-orbitals in the isomer shift (δ)?
 2. The gases and non-viscous liquids do not exhibit Mössbauer effect because of _____.
 3. Give the equation of Doppler energy and Recoil energy.
 4. Define Isomer shift.
 5. Give the definition of quadrupole splitting.
 6. Mössbauer spectroscopy is the study of _____.
 7. Electronic wave function at the nucleus can be symbolized by _____.
- Q-5 1. How the Ethylenediamine Tetra Acetic Acid (EDTA) is useful as the reagent? (04)
2. Explain the principle of Mössbauer effect. (05)
 3. Write on the dithiozone and dithioamide organic reagents. (05)
- OR**
- Q-5 1. Give a short note on Salicylaldehyde and Pyragallol. (05)
2. Discuss the Potassium Bromate (KBrO_3) and Potassium Iodate (KIO_3) as the reagent. (05)
 3. Write on the diphenyl carbazone Organic reagent use in inorganic analysis. (04)
- Q-6 1. What is Mössbauer spectroscopy? Draw the Schematic diagram of Mössbauer spectrophotomer. (05)
2. Give an account on the applications of Mössbauer spectroscopy. (05)
 3. Why the Mössbauer spectrum of spin-free $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ is expected to give doublet peak? (04)
- OR**
- Q-6 1. Write on the Ceric Sulfate [$\text{Ce}(\text{SO}_4)_2$] and Ammonium Vanadate (NH_4VO_3) reagents. (05)
2. Write on the Anthranilic acid and rubenic acid. (05)
 3. Explain the benzidine and O-phenanthroline reagents for inorganic analysis. (04)

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