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SB-3505

M. Sc. (Part - II) Examination

March / April – 2011

Inorganic Chemistry : Paper - I

Time : **3** Hours] [Total Marks : **70**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ M. SC. (PART - II)

Name of the Subject :

☛ INORGANIC CHEMISTRY : PAPER - I

☛ Subject Code No. : 3 5 0 5 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Answer all questions.

(3) Figures to the **right** hand side of each question indicate full marks.

(4) Give neat and clean diagram whenever applicable.

1 (a) Explain the resonance condition of ESR spectroscopy. **12**
Explain the nature of ESR spectra of methyl radical. Calculate the energy of each energy level and find out the energy between two transitions.

(b) Calculate the g value of methyl radical showing ESR at 3290 gauss in a spectrometer at 9230 MHz.

OR

1 (a) How are the IR data utilized to identify the unidentate and bidentate SO_4 moiety in complex? **12**

(b) Write note on zero field splitting in ESR.

(c) Calculate the O-H stretching frequency from the following data.

Force constant of O-H bond = 7.7×10^5.

2 (a) How NMR spectra are obtained ? Give their applications in the study of inorganic complex molecule. **12**

(b) Explain the chemical shift in NMR. Discuss the factors affecting the chemical shift values.

(c) Discuss the use of

(i) Internal standards and

(ii) Shift reagents in NMR spectroscopy.

OR

2 (a) What is relaxation ? Describe the relaxation mechanism and line width in ESR spectroscopy. **12**

(b) How IR studies can be useful to study the geometrical isomerism in coordination compounds.

(c) ESR spectrum of $[Mo(CN)_8]^{3-}$ in solution consists of one line, but ^{13}C enriched sample exhibited nine line spectrum. Explain.

3 (a) Explain the metallic cluster for biomolecular molecule. **12**

(b) Discuss the chemistry of trimeric phosphonitrilic chloride.

(c) Describe the methods for the synthesis of various B-N polymers.

OR

3 (a) What are pseudohalogens ? Why are they so called ? Describe the important characteristics of pseudohalogens. **12**

(b) What is intercalation compounds of graphite ? Discuss preparation, properties and structure of intercalation compound of potassium metal.

(c) What is cage compounds ? Give name and structure of two cage compounds.

4 (a) What are protic and aprotic solvents ? Is liquid HF a protic or an aprotic solvent ? **12**

(b) Explain giving reasons :

(i) A strong acid like HNO_3 behaves as a base in HF.

(ii) Solution of alkali metals in liquid ammonia are coloured.

(iii) Strong oxidizing agent do not exist in liquid ammonia.

(c) Give the structure and physical properties of liquid ammonia.

OR

4 (a) What is Wilkinson's catalyst ? Show, how it allows hydrogenation of alkenes. **12**

(b) Describe the preparation, properties and bonding in alkene organometallic compounds.

(c) What are sandwich compounds ? Explain with suitable examples. Describe the structure and nature of bonding in ferrocene molecule.

5 (a) What is photochemistry ? Explain Stark-Einstein law of photo-chemistry. How quantum yield is related with reactivity of the state ? **12**

(b) Explain the terms :

(i) Biomolecular quenching

(ii) Radiationless transition

(iii) Chemiluminescence.

OR

5 (a) What is difference between actual life time and inherent life time. **12**

(b) State and explain photochemical activation.

(c) Explainl fluorescence and phosphorescence.

6 Write notes on : (any **three**) **10**

(i) Binary Xenon fluorides

(ii) Krammer's degeneracy.

(iii) Anisotropic shielding in NMR.

(iv) Frank-Condon principle and its consequences

(v) Ziegler-Natta catalyst and its importance.

(vi) Hyperfine and superhyperfine interactions.
