AVISEK

MSc-Chem-IS–(402)

January, 2017

BASIC INORGANIC CHEMISTRY

Time : Three Hours] [*Maximum Marks* : 80

Note : Answer from both the Sections as directed. The figures in the right-hand margin indicate marks.

SECTION-A

1. Answer any **four** of the following : 4×4

(*a*) Explain Linnet's double quartet theory.

(*b*) On the basis of hybridisation, discuss the geometry of the following molecules :

(*i*) SF_6

(*ii*) XeO_3

(*c*) Write the important postulates of crystal field theory.

(*d*) Write a short note on antiferromagnetism.

(*e*) Discuss the limitations of Orgel diagram.

(*f*) How does nuclear reaction differ from chemical reaction ?

OR

2. Answer **all** of the following questions : 2×8

(*a*) Among the species O_2^+, O_2^- and O_2^{-2} which would have maximum bond strength ?

(*b*) Calculate CFSE for $[Co(NH_3)_6]^{+3}$ ion.

(*c*) Which complex ion shows greater crystal field splitting and why ?

(*i*) $[Co(H_2O)_6]^{+2}$

(*ii*) $[Rh(H_2O)_6]^{+2}$

(*d*) Calculate spin only magnetic moment of Ni^{+2} ion in $[Ni(H_2O)_6]^{+2}$.

(*e*) What is Magnetic Susceptibility ?

(*f*) What do you mean by Radioisotopes ?

(*g*) What is meant by Packing Fraction ?

(*h*) What are Tanabe-Sugano Diagram ?

SECTION-B

Answer **all** of the following questions : 16×4

3. (*a*) Discuss VSPER theory. Illustrate carefully that VSPER theory has to be combined with the concept of hybridisation to account for the geometry of covalent molecule.

OR

(*b*) What is Hybridisation ? What are important characteristics of hybridisation ?

4. (*a*) Explain the Valence Bond theory. Discuss its strength and shortcomings.

OR

(*b*) Discuss sigma and Pi bonding in square planar complexes by constructing a MO diagram for $[PtCl_4]^{-2}$.

5. (*a*) What are Correlation diagrams ? Draw and discuss the qualitative correlation diagram of d^9 octahedral and d^1 terahedral system.

OR

(*b*) Differentiate between diamagnetism and paramagnetism. Discuss Gouy's method for measuring magnetic susceptibility.

6. (*a*) What is artificial Radioactivity ? Discuss the various types of nuclear reactions.

OR

(*b*) Discuss the use of radioisotopes in dating and medicine.

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