

NRT/KS/19/2012

Bachelor of Science (B.Sc.) Semester—I Examination
CHEMISTRY (INORGANIC CHEMISTRY) (New & Old)
Compulsory Paper—1 (New Course)

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All *five* questions are compulsory and carry equal marks.

(2) Write equations and draw diagrams wherever necessary.

1. (A) Explain the following with example :
(i) Hund's rule of maximum multiplicity and
(ii) Aufbau principle. 5
(B) Define ionization potential. Discuss the factors affecting it. How does it vary in a group and a period ? 5

OR

- (C) Write Schrodinger wave equation and specify the terms involved in it. 2.5
(D) Give the values of n , ℓ , m for 3d electron. 2.5
(E) Why size of cation and anion of an element is different from its parent atom ? 2.5
(F) Calculate effective nuclear charge for 4s electron of Potassium ($z = 19$). 2.5
2. (A) Define hybridization. Discuss sp^3 and sp^3d^2 hybridization with suitable example. 5
(B) Define :
(i) Polarizing power and
(ii) Polarizability of ion.
Discuss various factors affecting them. 5

OR

- (C) What are postulates of valence bond theory ? 2.5
(D) Define the terms with examples :
(i) Bond energy and
(ii) Bond order. 2.5
(E) What is solvation energy ? How solvation energy of NaCl is determined using Born-Haber cycle ? 2.5
(F) Discuss the structure of CsCl crystal. 2.5
3. (A) Write electronic configuration of S-block elements and compare ionization potential of S-block elements. 5
(B) Discuss the structure and bonding in :
(i) XeF_2 and
(ii) $XeOF_4$. 5

OR

- (C) Give one method of preparation of each XeF_2 and XeF_6 . 2.5
(D) What is diagonal relationship ? Discuss diagonal relationship between Lithium and Magnesium. 2.5
(E) Define Hydrogen bond. How does it affect melting and boiling points of compounds ? 2.5
(F) Discuss structure and bonding in XeF_6 . 2.5

4. (A) Discuss periodicity of the following properties of p-block elements :
- (i) Ionization potential and
 - (ii) Electronegativity. 5
- (B) What are Boranes ? Discuss the structure of Diborane in detail. 5

OR

- (C) Discuss the structure of P_2O_5 . 2.5
- (D) Give one method of preparation of :
- (i) Marshall's acid and
 - (ii) Caro's acid. 2.5
- (E) Discuss diagonal relationship between Boron and Silicon. 2.5
- (F) Discuss the structure of orthophosphoric acid (H_3PO_4). 2.5
5. Attempt any *ten* of the following :
- (i) Define electron affinity.
 - (ii) Give electronic configuration of
 - (a) $Mg_{(z=12)}^{2+}$ and $O_{(z=8)}^{2-}$ ions.
 - (iii) Draw shapes of dx^2-y^2 .
 - (iv) Mention any two limitations of valence bond theory.
 - (v) Define Lattice energy.
 - (vi) Draw potential energy diagram for formation of hydrogen molecule on the basis of VBT.
 - (vii) Give one example of intramolecular hydrogen bond.
 - (viii) Why noble gases are monoatomic in nature ?
 - (ix) Draw the structure of $XeOF_2$.
 - (x) What is Borazine ?
 - (xi) Draw the structure of Marshall's acid.
 - (xii) Why first I.P. of Nitrogen is higher than oxygen ? 1×10=10

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- (E) Why size of cation and anion of an element is different from its parent atom ? 2.5
- (F) Calculate effective nuclear charge for 4s electron of Potassium ($z = 19$). 2.5
2. (A) Define hybridization. Discuss sp^3 and sp^3d^2 hybridization with suitable example. 5
- (B) Define :
- (i) Polarizing power and
- (ii) Polarizability.
- Discuss various factors affecting them. 5

OR

- (C) Discuss the structure of NH_3 and H_2O on the basis of VSEPR theory. 2.5
- (D) Define the following terms with examples :
- (i) Bond energy and
- (ii) Bond order. 2.5
- (E) How is solvation energy of NaCl determined using Born-Haber cycle ? 2.5
- (F) Discuss structure of CsCl crystal. 2.5
3. (A) Write electronic configuration of S-block elements and compare ionization potential of S-block elements. 5
- (B) Discuss the structure and bonding in :
- (i) XeF_2 and
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- (C) Give one method of preparation of each XeF_2 and XeF_6 . 2.5
- (D) What is diagonal relationship ? Discuss diagonal relationship between Lithium and Magnesium. 2.5
- (E) Define Hydrogen bond. How does it affect melting and boiling points of compounds ? 2.5
- (F) Discuss structure and bonding in XeF_6 . 2.5

4. (A) Discuss the periodicity of the following properties of p-block elements :
- (i) Ionization potential and
 - (ii) Electronegativity. 5
- (B) What are Boranes ? Discuss the structure and bonding in Diborane in detail. 5

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 - (ii) Give electronic configuration of
 - (a) $Mg_{(z=12)}^{2+}$ and $O_{(z=8)}^{2-}$ ions.
 - (iii) Draw the shape of $d_{x^2-y^2}$ orbital.
 - (iv) Mention two limitations of valence bond theory.
 - (v) Draw the structure of SF_4 molecule using VSEPR theory.
 - (vi) Define Lattice energy.
 - (vii) Give one example of intramolecular hydrogen bond.
 - (viii) Why are noble gases monoatomic in nature ?
 - (ix) Draw the structure of $XeOF_2$.
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