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B. Sc. 3rd Semester (Pass) (New Scheme) Examination,

November-2018

BIO-TECHNOLOGY

Paper-BT-307

Inorganic Chemistry

Time allowed : 3 hours]

[Maximum marks : 40

Note : Attempt five questions in all, selecting one question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) What are amphoteric solvents ?
- (b) Name the 3rd series element which is not included in category of transition elements.
- (c) Why is liquid NH_3 a better solvent than water ?
- (d) Why does NH_3 readily form complexes whereas NH_4^+ does not ?
- (e) Write the electronic configuration of Pd ($Z=46$) and Pt ($Z=78$).
- (f) Why zinc can form only Zn^{2+} ion and not Zn^{3+} ions ?
- (g) Why tetrahedral complexes do not show geometrical isomerism ?
- (h) What are chelates ? 8×1

Section-A

2. (a) Why d-block elements show variable oxidation states ? 2
- (b) What are transition elements ? Why are they called so ? 3
- (c) Explain the structure and properties of VOCl_2 . 3
3. (a) Why do transition elements give colored and paramagnetic ions ? 4
- (b) Which of the following has higher value of electronegativity :
- (i) Fe (II) or Fe (III)
- (ii) Ni (II) in sp^2 hybridized tetrahedral complex $\text{NiCl}_2(\text{PPh}_3)_2$ or Ni (II) in $\text{sp}^3 \text{d}^2$ hybridized octahedral complex $\text{Ni}(\text{acac})_2 \cdot 2\text{H}_2\text{O}$ 4

Section-B

4. (a) What are the elements of second transition series? How do the chemistry of these elements differ from first transition series ? 4
- (b) What makes the properties of Niobium and Tantalum so similar ? How are they different from Vanadium ? 4

5. (a) How will you account for the “coinage or currency metals’ as typical transition metals? Justify. 4
- (b) What are isopolyanions and heteropolyanions? Which elements of group 6 form these anions? 4

Section-C

6. (a) Discuss the following isomerism by giving suitable examples :
- (i) Hydrate isomerism
 - (ii) Co-ordination isomerism
 - (iii) Linkage isomerism
 - (iv) Ionization isomerism 6
- (b) Differentiate between primary and secondary valence in a co-ordination compound. 2
7. (a) Write the basic postulates of Werner’s coordination theory. 2
- (b) What is Effective Atomic Number? What is EAN rule? Which of the following compounds follow this rule : (i) $[\text{Ni}(\text{NH}_3)_6]^{+2}$, (ii) $[\text{Pt Cl}_6]^{-2}$, (iii) $[\text{Cr}(\text{NH}_3)_6]^{+3}$ 3

- (c) Give IUPAC name of the complex ion $[\text{Co}(\text{NH}_3)(\text{H}_2\text{O})_2\text{Cl}]^+$ and coordination number of central metal ion. Draw the structure of ion. 3

Section-D

8. (a) Explain that SO_2 acts both as Lewis acid and as Lewis base. 2
- (b) Explain acid base reactions in liquid NH_3 and precipitation reactions in liquid SO_2 . 4
- (c) Give advantages of liquid NH_3 as a solvent. 2
9. (a) Why is SO_2 used as a solvent in spite of its toxic nature? 2
- (b) What are non-aqueous solvents? What are the characteristics of these solvents? Discuss the reducing nature of solution of Na in liquid ammonia. 6