Assignment
CHE-RC/HG-2016: CHEMISTRY 2

1. Answer the following questions.

   (a) Name the 'd' block elements which do not have partially filled d-orbitals in their atoms or in their simple ions.

   (b) What are coordination compounds? Define chelating ligands and chelates.

   (c) What is inert pair effect?

   (d) Comment on the statement, "The first element of a group shows anomalous (unusual) behaviour with respect to the rest of the members of the group".

   (e) Write the IUPAC name of $K_3[Co(NO_3)_6]$.

   (f) Cu atom has completely filled d-orbitals ($3d^{10}$) in its ground state. How can you say that it is a transition element?

2. Explain the following.

   (a) Transition metals form complex compounds – why?

   (b) Explain the term ionization energy of an element. On what factors does it depend?

   (c) Draw the structures of isomers of $[Pt(NH_3)_2Cl_2]$.

   (d) What are allotropes? What are the three allotropes of carbon? What is the structural impact on the physical properties of the allotropes?

   (e) Define the following terms with at least one example in each case:

       (i) Ionisation isomerism   (ii) Linkage isomerism   (iii) Coordination isomerism

   (f) Explain why – $TiCl_3$ is coloured while $TiCl_4$ is colourless.

3. Answer the following: (descriptive type)

   (a) Describe Werner's theory of coordination compounds (basic postulates).

   (b) Transition metals and their compounds behave as catalyst. Explain with examples.

   (c) Discuss in detail the valence bond theory to explain metal-ligand bonding in coordination compounds.

   (d) Most of the compounds of transition elements are coloured - explain.

   (e) How was the term electronegativity defined by pauling, Allred & Rochow and Mulliken ?

   (f) What is meant by diagonal relationship? How would you account for this relationship amongst the metallic and non-metallic elements of s and p block elements? (take the example of Be and Al)

4. Derive the kinetic gas equation, $PV = \frac{1}{3}mn\bar{c}^2$.

5. What are the causes of deviation of gases from ideal behaviour? Derive van der Waal's equation of state for *n* mole of real gas.

6. What is critical phenomenon? Obtain expression for critical constants.

7. From Maxwell- Boltzmann distribution of molecular velocities obtain an expression for root mean square velocity of gas.

8. Calculate *rms* velocity of N_2 gas at 27^0 C.

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