LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – APRIL 2017

16UCH1MC01- BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 19-04-2017   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART –A

Answer ALL questions   (10 x2 =20)

1. Sate Pauli's exclusion principle.
2. Noble gases have high ionization energy. Give reason.
3. What are protic and aprotic solvents? Give examples.
4. Calculate the oxidation number of Cr in i) K_2CrO_4 ii) $K_2Cr_2O_7$.
5. How many sigma and pi bonds are present in the following compounds?
   i) XeO_3 ii) CO_2
6. State octet rule. Cite an example.
7. Calculate the bond order for CO molecule.
8. Define Meissner effect.
9. What are pseudohalogens? Give an example.
10. Distinguish between iodometry and iodimetry.

PART –B

Answer any EIGHT questions   (8x5 =40)

11. Construct the molecular orbital diagram for NO molecule to predict bond order and magnetic properties.
12. Balance the following equation by oxidation number method.
    $$K_2Cr_2O_7 + FeSO_4 + H_2SO_4 \rightarrow Cr_2(SO_4)_3 + H_2O + Fe(SO_4)_3 + K_2SO_4$$
13. Calculate the effective nuclear charge experienced by the 4s-electron in potassium atom.
14. Describe briefly the limitations of Bohr's theory of atomic structure.
15. Explain Pearson concept of hard and soft acids. Give examples.
16. Discuss the reaction of alkali metals and alkaline earth metals in liquid ammonia.
17. Define the following and explain their trends in a period and in a group.
    i) Electron affinity ii) Electronegativity   iii) Ionization energy
18. On the basis of hybridization, discuss the geometry of the following molecules.
    i) NH_3 ii) SF_6

19. Discuss in detail the band model of metallic bond.

20. Explain giving reasons.

    i) Iodine is more soluble in KI than in water   ii) strength of the acids decreases in the order of $HClO_4$ >$HClO_3$ >$HClO_2$ >$HClO$.

21. Fluorine always exhibit an oxidation state of -1, while other halogens exhibit oxidation states of +3, +5 and +7. Give reasons.

22. How will you calculate the equivalent weight of oxidizing and reducing agents? Give an example each.

PART –C

Answer any FOUR questions   **(4x10 =40)**

23. a) Derive de Broglie relation. How is it verified experimentally?

    b) Predict which element in each of the following pairs has higher ionization energy and why?

        i) Be, B   ii Ne, F   **(7+3)**

24. a) Discuss the geometry of the following based on VSEPR theory

        i) CO_3^{2-} ii) ICl_4^- iii) XeO_3

    b) Which of the following can act as Lewis acids? Why?

        i) H_2O ii) SO_3 iii) OH^- iv) Ag^+ **(8+2)**

25. Describe the following reactions in liquid ammonia giving suitable examples : i) Acid –base reactions ii) precipitation reactions iii)Complex formation iv) Ammonolysis

26. Explain on the basis of MO theory why the bond order in O_2^- is less than in O_2 molecule which in turn is less than in O_2^+.

27. a) How will you estimate the available chlorine in bleaching powder?

    b) What is the effective nuclear charge felt by a 2p-electron of a nitrogen atom?   **(7+3)**

28. Describe the preparation ,properties and structure of the following interhalogens

        i) ClF_3 ii) BrF_5 iii) IF_7

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