# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2017**

**CH 1506 / CH 1503 – BASIC CONCEPTS IN INORGANIC CHEMISTRY**

Date: 06-11-2017 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

## Part A

**Answer ALL questions:** **10 X 2 =20**

1. A titration involves the following redox reaction.
   $Mn^{2+} + S_2O_8^{2-} + 4\ H_2O \rightarrow MnO_4^- + 2\ SO_4^{2-} + 8\ H^+$. Calculate the equivalent weight of $Mn^{2+}$ used in the form of $MnSO_4$.
2. Why is a large decrease in electron affinity of Li and Be despite the increase in nuclear charge?
3. What is meant by electron density mapping?
4. Why is $PbBr_2$ conducts electricity in the molten state but not in solid state?
5. Predict the shape of the $SF_6$ molecule.
6. What are the conditions for the formation of metallic bond?
7. The melting point of *o*-nitrophenol in 214 $^oC$ while those of the *m* and *p* isomer are 290 $^oC$ and 279 $^oC$ respectively. Why there is a difference in melting point?
8. Using Lux-Flood concept predict the nature of the following compounds.
   a. PbO b. ZnO
9. Why does $Be_2$ not exist?
10. Define Mulliken – Jaffe electronegativity.

## Part B

**Answer any Eight questions:** **8 X 5 = 40**

11. Explain half-filled shell effect.
12. Using the given datas. Calculate the energy deficit in the formation of $BeCl_2$. Is it a stable molecule? Justify.
    $Be \rightarrow Be^+ = 899\ kJmol^{-1}$ $Be \rightarrow Be^{2+} = 1757\ kJmol^{-1}$ $Cl \rightarrow Cl^- = 348\ kJmol^{-1}$
13. Calculate the lattice energy of $Al_2O_3$ from the following data (in $kJmol^{-1}$).
    $\Delta H_f$ of $Al_2O_3$ = -1676, $\Delta H_s$ of Al = 324, Ionization of Al $I_1$ = 572, $I_2$ = 1817 and $I_3$ = 2745, $\Delta H_D$ = 500, electron affinity of $O_2^o$ $E_1$ = - 141 and $E_2$= 791.
14. What are the general properties of ionic compounds?
15. Write the Lewis structure of the following ion
    a.$ClO_3^-$ b. $SO_4^{2-}$
16. Rationalize the following trend in thermal stability
    $CdSO_4 < SnSO_4 < BaSO_4$

17. Apply VSEPR model and explain the structure of $XeF_4$ and $XeF_6$.

18. What are the postulates of VB theory? Explain with any two examples.

19. Explain the strength of H bond in hydrogen bonded N, O and F compounds.

20. Explain *n* type semiconductor.

21. What are aprotic solvents? Explain the types of the solvents.

22. What are the advantageous of non aqueous solvents?

## Part C

**Answer any Four questions:** **4 X 10 =40**

23. a. What is ionisation potential energy? Discuss the factors influence the ionization potential. **(6)**

    b. What is diagonal relationship? Explain. **(4)**

24. a. How is covalent character induced in ionic compounds? Discuss. **(5)**

    b. What are Fajan's rules of polarization of ions? **(5)**

25. a. Explain how the MO theory predicts the paramagnetism of $O_2$ molecule.

    c. Write a short note on octet rule. **(3)**

26. a. Discuss the band theory of metals. **(6)**

    b. Explain the structure of clathrates. **(4)**

27. a. List the properties of alkali metal-liquid $NH_3$ solution. **(6)**

    b. Balance the following equation by oxidation number method. **(4)**

    $CuO + NH_3 \rightarrow Cu + N_2 + H_2O$

28. a. Discuss isolectronic relationship. **(5)**

    b. Write a note on stability of ionic compounds. **(5)**

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