LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2019**

CH 1506 – BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 30-10-2019 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer ALL questions. **(10 × 2 = 20)**

1. State the modern periodic law.
2. What is the significance of de Broglie's equation?
3. What are the factors favouring the formation of ionic compounds?
4. Define solvation energy.
5. State octet rule and its exceptions.
6. Draw the electron dot structure of CCl_4 and NH_3.
7. Why does He_2 not exist?
8. What are clathrates? Cite an example.
9. State Lux–Flood definition of acids and bases.
10. What is double decomposition reaction? Give an example.

Part-B

Answer any EIGHT questions. **(8 × 5 = 40)**

11. Discuss the horizontal and vertical relationships in the periodic table.
12. Explain the postulates of Bohr's theory.
13. Discuss Mulliken-Jaffe concept of electronegativity.
14. Explain the factors that affect the lattice energy.
15. Explain the following:
    a) NaCl is soluble in water but $BaSO_4$ is not.
    b) Lattice of CsCl is less stable than NaCl.
16. State Sidgwick-Powell theory and explain its role in the prediction of molecular shapes.
17. Explain the hybridization and geometry of the following compounds using VSEPR theory.
    i) NH_3 ii) SF_4
18. Construct a qualitative MO energy level diagram for O_2 molecule. Write the MO electronic configurations for O_2^{2+} and O_2^{2-}.
19. How does band theory of metals explain the conducting property of metals, insulators and semiconductors?
20. Discuss the effect of H-bonding on the melting and boiling points of substances.

21. Discuss the role of ammonia as a solvent.

22. Explain Lewis theory of acids and bases with examples.

Part-C

Answer any FOUR questions. **(4 × 10 = 40)**

23a. Explain the trends of the following in a period and a group.

i) Electron affinity ii) Ionization energy

b. What are isoelectronic species? Arrange the following ions in the order of increasing size and justify your answer. Cl^-, Na^+ and Mg^{2+}. **(5+5)**

24. Which among the following are oxidizing and reducing agents?

i) $KMnO_4$ ii) $LiAlH_4$ iii) $K_2Cr_2O_7$ iv) $NaBH_4$.

b. Explain Pauling scale of electronegativity. **(5+5)**

25a. Balance the following redox reaction by oxidation number method.

$MnO_4^- + C_2O_4^{2-} \rightarrow Mn^{2+} + CO_2$ (acidic Medium)

b. Explain the double decomposition reactions. **(5+5)**

26. What is lattice energy? How is it determined for the formation of CaF_2 using Born-Haber cycle?

27a. Draw the MO energy level diagram of nitrogen molecule and explain its bond order.

b. Compare VB and MO theories of covalent bond. **(5+5)**

28a. Write a note on London dispersive forces and van der Waal's forces.

b. Write a note on ion dipole-dipole interaction. **(6+4)**

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