LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIRST SEMESTER – **NOVEMBER 2018**

16/17/18UCH1MC01– BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 24-10-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART A

ANSWER ALL QUESTIONS **10x 2 = 20 Marks**

1. Mention the group and period of the following elements in the modern periodic table i) copper ii) barium.
2. Which among the following has the highest first ionisation energy? i) Na or Mg ii) Li or Be. Justify your answer
3. Mention the oxidation state of oxygen in i) KO_2 ii) H_2O_2 iii) Li_2O iv) O_2F_2
4. Classify the following as Bronsted Acid or Bases. i) HCl ii) NH_3 iii) NH_4^+ iv)Cl^-
5. Draw the electron dot formula for CCl_4 and H_2O.
6. Draw the structure of SF_6 and mention the hybridisation.
7. He_2 molecule does not exist, but He_2^+ exist. Explain
8. How do you classify solids based on their electrical conductivity?
9. What are pseudohalogens? Give any two examples.
10. Draw the structure of ClF_3. Mention the number of bond pairs and lone pairs in ClF_3.

PART B

ANSWER ANY EIGHT QUESTIONS **8 x 5 = 40 Marks**

11. a) Write de Broglie equation and mention the terms in it. Mention the limitations of Bohr's theory.
12. Mention the salient features of Modern Periodic table
13. Classify the following as oxidising or reducing agents i) potassium nitrate ii) Br_2 iii) H_2 iv) $NaBH_4$ v) ozone
14. Explain in brief about the properties of polar protic solvents
15. Define acid-base behaviour proposed by Usanovich.
16. Mention the shape, number of bond pairs and lone pairs in methane and ammonia.
17. Explain Lewis theory. What are the limitations of octet rule? **(2+3)**
18. What is Bond order? Calculate the bond order for $O_2O_2^+$ and O_2^{2+}
19. Distinguish piezoelectric from pyroelectric crystals.
20. Distinguish n-type from p-type semi conductors with suitable examples.
21. Explain the anomalous behaviour of fluorine.
22. Write a note on the oxidation states of halogen in various oxoacids.

PART C

ANSWER ANY FOUR QUESTIONS **4 x 10 = 40 Marks**

23. a) State Heisenberg theory of uncertainty. Explain the concept of ionization energy and electron affinity across a period and down a group in the Modern Periodic table

b) What are isoelctronic species? Arrange the following in the increasing order of ionic radii: Al^{3+}, Cl^-, Na^+, Mg^{2+} **(6+4)**

24. a) Calculate the oxidation state of i) Mn in potassium permanganate ii) Fe in Fe_3O_4 iii) H in $NaHCO_3$ iv) Cr in chromium sulphate v) oxygen in OF_2

b) Explain the concept of Arrhenius acids and bases. Mention any two strong bases along with their chemical formula.

25. a) Mention the reactivity of alkali metals in liquid ammonia. **(5)**

b) What are the postulates of Valence bond theory and predict the shape of $[PtCl_4]^{2-}$

26 a) Sketch the Molecular orbital diagram of nitrogen molecule and calculate the bond order. **(5)**

b) What is Meissner Effect?

27. a) Mention the geometry, hybridisation and structure of PCl_5 and XeF_4 **(6)**

b) What are the assumptions of VSEPR theory? **(4)**

28. a) Balance the following equation by oxidation number method

$K_2Cr_2O_7 + Na_2SO_3$ giving Cr(III) and SO_4^{2-} in acidic medium. **(6)**

b) What are the criteria employed for the calculation of oxidation number of elements.

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