

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – APRIL 2018

17/6UCH1MC01– BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 25-04-2018

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART A

ANSWER ALL QUESTIONS

10x 2 = 20 Marks

1. Arrange the following orbitals in the increasing order of energy based on Aufbau principle. 4s, 5d, 6s and 4f.
2. Classify the elements as metals/non metals /metalloids. i) phosphorus ii) germanium
iii) iodine iv) lead
3. Why is the second ionization energy of sodium greater than that of magnesium.
4. Mention the oxidation number of chromium in potassium chromate and potassium dichromate.
5. Draw the electron dot formula for CO₂ and HCN.
6. Draw the structure of ammonia and mention its hybridisation.
7. Calculate the bond order of O₂⁻ and predict the magnetic nature.
8. How do you classify solids based on their electrical conductivity?
9. What is bleaching powder? Mention its importance.
10. Distinguish iodometry from iodimetry.

PART B

ANSWER ANY EIGHT QUESTIONS

8 x 5 = 40 Marks

11. a) State Heisenberg theory of uncertainty principle. b) Pauli's exclusion principle.
12. Discuss the factors affecting electron affinity.
13. a) Classify the following as Bronsted Acid or Bases. i) HCl ii) NH₃ iii) NH₄⁺ iv) Cl⁻ v) KOH
14. Explain the concept of Arrhenius acids and bases. Mention any two strong bases along with their chemical formula.
15. a) Calculate the oxidation number of oxygen in MgO, OF₂, O₂F₂, Cl₂O₇, KO₂ and Na₂O₂.

b) Which among the following are oxidising/reducing agents i) KMnO_4 ii) LiAlH_4 iii) $\text{K}_2\text{Cr}_2\text{O}_7$ iv)

NaBH_4

(3+2)

16. Explain how the molecular shapes are predicted using Sidgwick-Powell theory.

17. Mention the shape, bond angle, number of bond pairs and lone pairs in PCl_5 and CH_4

18. Draw the electron dot formula of ammonia and carbon tetrachloride. What are the limitations of octet rule? (2+3)

19. What is bond order? Calculate the bond order for F_2 and N_2 .

20. Distinguish n-type from p-type semi conductor with suitable examples.

21. Write a note on the variation in the ionization energy, electron affinity and atomic radii along the period and down a group.

22. Draw the structures of ClF_3 , BrF_5 , IF_7 ICl_4^- .

PART C

ANSWER ANY FOUR QUESTIONS

4 x 10 = 40 Marks

23. Mention the salient features of modern periodic table over Mendeleev periodic table and also mention the drawbacks of the modern periodic table .

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

b) Mention the postulates of VBT and predict the shape of $[\text{PdCl}_4]^{2-}$ (6 +4)

25. a) Explain the hybridisation and geometry in ammonia and BeCl_2 (6)

b) What are the rules for Linear Combination of Atomic Orbitals? (4)

26. Sketch the molecular orbital diagram of oxygen molecule and calculate the bond order. Arrange the following in the increasing bond order O_2^+ , O_2 , O_2^{2-} , O_2^- and O_2^{2+}

27. a) Mention any four pseudohalogens and explain the properties of CN^- . (6)

b) Write a note on the oxidation states of various hypohalous acids (4)

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

$\text{K}_2\text{Cr}_2\text{O}_7 + \text{Na}_2\text{SO}_3$ giving Cr(III) and SO_4^{2-} in acidic medium. (6)

b) Explain the role of liquid ammonia as a solvent. (4)
