

QP CODE: 25022751



Reg No :

Name :

**B.Sc DEGREE (CBCS) IMPROVEMENT / REAPPEARANCE/ MERCY CHANCE
EXAMINATIONS, APRIL 2025**

Second Semester

Core Course - CH2CRT02 - THEORETICAL AND INORGANIC CHEMISTRY

(Common for B.Sc Chemistry Model I ,B.Sc Chemistry Model II Industrial Chemistry ,B.Sc
Chemistry Model III Petrochemicals)

2017 Admission Onwards

ADF5FA36

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Calculate the energy of the electron in the ground state of He^+ ion.
2. Indicate the electronic configuration in which Hund's rule is violated a) $2s^2 2p_x^2 2p_y^1 2p_z^0$ b) $2s^2 2p_x^1 2p_y^1 2p_z^1$ c) $2s^2 2p_x^2 2p_y^2 2p_z^2$
3. Among BeCl_2 , CHCl_3 , CCl_4 and PCl_5 , in which molecules octet rule is not observed.
4. Chloroform is polar, while carbon tetra chloride is non polar. Justify.
5. How pi bonds are formed in a molecule?
6. Indicate the total number of sigma and pi bonds in C_2H_2 molecule.
7. Cite any two differences between atomic and molecular orbital.
8. Calculate the bond order of heteronuclear diatomic molecule CO.
9. List some characteristics of metals.
10. Give two important uses of KMnO_4 .
11. Which lanthanide does not occur in nature?
12. What is a cation exchanger?

(10×1=10)



Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Explain the failures of Rutherford's atom model.
14. Explain Heisenberg's uncertainty principle? Give its significance.
15. Explain the factors favouring the formation of ionic compounds.
16. In both water and dimethyl ether, oxygen atom is central atom and has the same hybridisation, yet they have different bond angles. Which one has greater bond angle. Give the reason.
17. Draw the MO diagram of Nitrogen molecule. Calculate its bond order.
18. What are the conditions for the formation of a hydrogen bond?
19. Briefly explain why the first ionization energy of **Mg** is greater than that of **Na** as well as **Al**.
20. Why are atomic radii of **Cr, Mn, Fe, Co, Ni** and **Cu** and so close to each other?
21. Discuss on the industrial uses of lanthanides.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **10** marks.

22. What are quantum numbers? Explain its significance.
23. (a) Dipole moment measurement help in finding the shape of molecule. Explain. (b) Bond length of HCl molecule is 1.27 \AA . If the dipole moment is 1.080, what is its percentage ionic character.
24. Explain hydrogen bonding with proper examples. How does it affect the physical properties of compounds?
25. What is Lanthanide contraction? Discuss the consequences of the lanthanide contraction.

(2×10=20)