

Sl. No. of Ques. Paper : 1884 GC-3
Unique Paper Code : 42171111
Name of Paper : Inorganic Chemistry
Name of Course : B.Sc. (Prog.) Applied Life Science (CBCS)
with Agrochemicals & Pest Management
Semester : I
Duration : 3 hours
Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all. Question No. 1 is compulsory.

1. Answer the following briefly:

- (a) Discuss van-Arkel De-Boer method of purification for metals. 2
- (b) Write down the shape as well as hybridization for the following:
- (i) SO_4^{2-}
- (ii) BCl_3
- (iii) NH_4^+ 3
- (c) Which of the following will be having disassociation energy, O_2 or O_2^+ ? 2
- (d) Why is large number of transition metal complexes colored? 2
- (e) Explain the term 'node'. Find the number of nodes present in $3p$ and $1s$ orbital. 2
- (f) Write down the electronic configuration for Cr (At No=24) and Cu (At No=29).
Why are these considered anomalous? 2
- (g) Why are orbitals like $1p$ and $2p$ and $2d$ not possible? 2

2. (a) Discuss Lanthanide contraction. Give any two consequences of it. 4
- (b) With which element does Lithium show diagonal relationship and why? Discuss the anomalous behavior of Lithium (any two). 4
- (c) Why can no two electrons in an orbital have all the quantum numbers same? Write down all the quantum numbers for the 5th electron of Boron atom. 3
- (d) Discuss Bohr's theory for hydrogen atom. Also explain its limitations. 4

3. (a) Discuss dual nature of an electron and also derive de Broglie relationship for an electron. 4
- (b) Explain electrolytic refining as a method of purification of metals. 4
- (c) Differentiate between ionic and covalent bonding with examples. 4
- (d) What will be the shape of the orbital with value of $l=0$ and $l=2$? 3
4. (a) NaCl conducts electricity when in molten or aquated form. Discuss. 2
- (b) What do you understand by linear combination of atomic orbitals (LCAO)? How do s and p orbitals combine together to give bonding, anti-bonding and non-bonding orbitals? 4
- (c) Discuss the concept of multi center bonding with respect to diborane molecule. Also give any *two* applications of it. 4
- (d) Calculate the uncertainty in the position of a particle when uncertainty in its momentum is $2 \times 10^{-3} \text{ gcmsec}^{-1}$. ($h = 6.62 \times 10^{-27} \text{ erg sec}$ and $\pi = 3.14$) 3
- (e) Which one will be harder, NaCl or MgCl_2 ? Explain. 2
5. Write notes on the following: (any *three*)
 - (a) Molecular orbital diagram for NO molecule
 - (b) Catalytic properties of transition metals
 - (c) Lattice energy
 - (d) Ellingham diagrams (carbon as reducing agent)
 - (e) Hydrometallurgy
 - (f) Inert pair effect. 3×5
6. (a) Discuss the shape and hybridization of the following species using VSEPR theory:
 - (i) XeF_4
 - (ii) H_3O^+ 2×2
- (b) Give values for all the quantum numbers for the following:
 - (i) $5d$
 - (ii) $4p$ 2×2
- (c) Why are alkali metals strong reducing agents? Discuss why lithium is best reducing agent in its group even though its ionization potential is highest in its group. 4
- (d) Why are sulphide ores firstly converted to oxides before reduction by carbon? 3