

Total number of printed pages – 6

63(FY) (SEM-2) MAJ2/CHMMAJ1024

2025

CHEMISTRY
(MAJOR)

Paper : CHMMAJ1024

(Fundamentals of Chemistry – 2)

Full Marks : 50

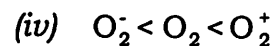
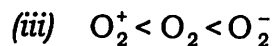
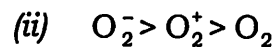
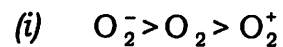
Pass Marks : 20

Time : Two hours

**The figures in the margin indicate
full marks for the questions.**

1. Choose the correct answer : 1×5=5
- (a) The radius ratio of an ionic compound is in the range 0.155–0.255. What will be the structural arrangement of the compound?
- (i) Cubic
 - (ii) Octahedral
 - (iii) Tetrahedral
 - (iv) Trigonal planner

(b) The increasing order of bond order of O_2^- , O_2 and O_2^+ is



(c) Which of the following cubic unit cells possesses 32% vacant space?

(i) Simple cubic unit cell

(ii) bcc unit cell

(iii) fcc unit cell

(iv) None of the above

(d) Friedel Crafts alkylation of nitrobenzene with methylchloride results

(i) 2-methylnitrobenzene

(ii) 3-methylnitrobenzene

(iii) 4-methylnitrobenzene

(iv) 2,4-dimethylnitrobenzene

(e) Ozonolysis of 2-methylbut-2-ene results-

(i) Propanone and ethanal

(ii) Propanal and ethanal

(iii) Propanol and ethanol

(iv) Butanone and methanol

2. Answer the following questions : **any five**
2×5=10

(a) Explain the term 'solvation energy'.

(b) BeF_2 is linear while BF_2 is angular. Explain.

(c) What is co-efficient of viscosity? How does viscosity of a liquid change with temperature?

(d) State the law of rational indices.

(e) What is Wurtz-Fittig reaction? Give example.

(f) Write Hiickel rules for aromaticity. Give example.

(g) Define activating and deactivating groups with examples.

3. Answer the following questions : (*any five*)

5×5=25

(i) What is Born-Haber cycle? Discuss how the lattice energy of an ionic solid can be calculated with the help of Born-Haber cycle. 2+3=5

(ii) Explain the terms polarization, polarizing power and polarizability. State Fajan's rule for covalent character of ionic compounds. 3+2=5

(iii) What is surface energy? What is the effect of temperature on surface tension? What will be the surface tension of a liquid at its critical temperature? 2+2+1=5

(iv) What are Miller indices? A crystal plane has intercepts on the three axes of a crystal in the ratio $\frac{3}{2}:2:1$. What will be Miller indices of the plane? What is the difference between Weiss indices and Miller indices? 1+2+2=5

(v) What are space lattice and unit cell of a crystal? Explain law of consistency of interfacial angles. 2+3=5

(vi) Explain E1 mechanism of elimination

reaction. What are Saytzeff and Hoffmann elimination? 3+2=5

(vii) Discuss the arenium ion mechanism of aromatic electrophilic substitution reaction. Give *any one* evidence in support of the mechanism. 3+2=5

(viii) Draw all the conformations of cyclohexane. Explain their relative stabilities and draw the energy profile diagram. 2+2+1=5

4. Answer the following question : (*any one*)

10

(i) (a) Draw the molecular orbital energy level diagram of O_2^+ . Discuss the bond order and magnetic property from the molecular orbital energy level diagram. 3+2=5

(b) What is hybridization? Discuss the shape of SF_4 on the basis of hybridization. 2+3=5

(ii) (a) What is Markownikoff addition to an alkene? Discuss the bromination in allylic position by N-bromosuccinimide. What is Diel-Alder reaction? 1+2+2=5

(b) Write short notes on :

Wurtz reaction and Corey-House
reaction

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