



THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2nd Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

Backlog Arrear Examination, March 2021

CHE 1514/CHS 1514

INORGANIC CHEMISTRY-II

Max: 75marks

Time: 3hrs

Answer any FIVE questions: (5×15 = 75)

1. a) Explain sp³d hybridisation with an example.
b) Give the postulates of Sidwick Powell theory of covalent bonding
c) List three rules for the linear combination of atomic molecules.
d) Differentiate between sigma bond and pi bond. (4+3+3+5)
2. a) Discuss Born Lande equation for theoretical calculation of lattice energy. What conclusion can be drawn from this equation?
b) Derive the limiting radius ratio for a tetrahedral site. (10+5)
3. a) How is XeO₃ prepared? Describe any two properties. Discuss its structure
b) What is meant by hydrogen bonding? Explain its types and consequences. (7+8)
4. a) Explain the relative strength of Lewis acidity of boron trihalides is found to the following trend BI₃>BBr₃>BCl₃>BF₃.
b) Discuss the diagonal relationship of boron with silicon.
c) How are two bridging bonds and four terminal bonds formed? What are the facts supporting the bridging structure in diborane?
d) BF₃ is not hydrolysed whereas BCl₃ get easily hydrolysed. Explain. (3+5+5+2)
5. a) Explain the following
 - i) CCl₄ resists hydrolysis while SiCl₄ gets readily hydrolysed
 - ii) Diamond is a non-conductor while graphite is a good conductor of electricity.
 - iii) What are zeolites? How do they act as molecular sieves? (2+2+3)b) How is carborundum manufactured? Discuss its important reactions, structure and uses.

6. a) Use the molecular orbital theory to predict the bond order and number of unpaired electrons in O₂ molecule.

b) What is meant by imperfection in crystal? Explain the Frenkel defect and Schottky defect in crystals with one example to each type.

c) Differentiate ion-dipole and dipole- dipole interactions. (6+6+3)

7. a) Draw and explain the structure of XeF₄ on the basis of VSEPR theory. (3)

b) What are wades rules? Discuss the application of these rules into B₆H₆²⁻ and B₅H₉ with skeletal structure. (2+4)

c) Give reason for the following

i) Carbon has a strong tendency for catenation compared to silicon.

ii) Diamond is a non-conductor while graphite is a good conductor of electricity.(3+3)
