

U.G. 3rd Semester Examination - 2020

CHEMISTRY

Course Code: BCEMCCHC302

Course Title: Inorganic Chemistry II

Full Marks : 30

Time : 2 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **ten** questions: 1×10=10
- Name the d-orbitals that does involve in sp^3d hybridization.
 - State the hybridisation of 'Xe' in $XeOF_4$.
 - What is nuclear isomer? Give one example.
 - Arrange the following species with respect to the increasing bond length
 O^2 , O^{2+} , O^{2-} and O_2^{2-}
 - What is mass defect ?
 - Explain why the volume of ice decreases on melting.

- Arrange the following compounds with respect to the increasing lattice energies
KF, KCl, KBr, KI
- Give an example of each type of crystal lattice-
(A) Fluorite Structure (B) Anti-Fluorite Structure
- "He₂ does not exist". - Explain.
- Why B-F bond distance in BF_4^- ion is larger than that of in BF_3 ?
- Indicate the type of semiconduction expected in B doped Si.
- Arrange the group-II metal chloride in increasing order of their melting point (MCl_2 , M = Be, Mg, Ca, Sr, Ba).
- HF boils at 20°C but H₂O at 100°C although HF forms stronger H-bond than H₂O. Explain.
- Give an example of symmetrical hydrogen bonding.
- An atom 'P' emits a α -particle followed by two β -particle to give 'Q' atom. What is the relation between 'P' and 'Q'?

2. Answer any **five** questions from the following:

$$2 \times 5 = 10$$

- a) ICl_2^- is linear but NH_2^- is bent,— Justify.
- b) Write ‘Born-Landé equation’ and explain each term.
- c) “The last water molecule of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ dehydrates at 250°C ”—Explain.
- d) State and explain Bent’s rule with suitable example.
- e) Compare the $\angle\text{X-P-X}$ bond angle in PX_3 ($\text{X} = \text{H, F}$).
- f) “ B_2 is paramagnetic in nature but VBT can not explain it”—Explain.
- g) Why HgI_2 is less soluble in water than HgCl_2 ?
- h) “Metals are good conductor of electricity” – Explain.

3. Answer any **two** questions from the following:

$$5 \times 2 = 10$$

- a) i) Define the nuclear binding energy per nucleons of a nucleus in terms of mass no and atomic no.

ii) “Nature of hybridization of bonding atom has strong influence in its electronegativity”—Explain $2+3=5$

b) i) Iodine is more soluble in H_2O in presence of KI —Explain.

ii) CO and N_2 are isoelectronic but N_2 is inert while CO is reactive. Explain. $2+3=5$

c) i) NO_2 readily dimerise to N_2O_4 but NO does not dimerise to N_2O_2 . Explain.

ii) Dipole moment of NaCl is 8.5 D. Calculate the % of ionic character in NaCl . Given, interatomic distance between Na^+ and Cl^- is 2.36 Å.

$$3+2=5$$