

SET –A

Unique Paper Code : 32171301
Name of the Paper : Chemistry;C-5; Inorganic Chemistry-II; s and p block elements
Name of the Course : B.Sc. (Hons) Chemistry- CBCS
Semester : III
Duration: **3 Hours** Maximum Marks: **75**

Instructions for Candidates

- Attempt any *four* questions.
- All questions carry equal marks.

1. (a) Explain the following giving reasons.
- i. Oxidation states in arsenic differ by a factor of two.
 - ii. Beryllium doesn't react with water or steam even under red hot conditions.
 - iii. ICl_7 does not exist but IF_7 exist. (2,2,2)
- (b) Explain with reason.
- i. Arrange the following in increasing order of solubility.
 BeCO_3 , BaCO_3 , MgCO_3 , CaCO_3 , SrCO_3
 - ii. C^{4+} ion doesn't exist in solid or solution state.
- (c) Name the peroxo acids of sulphur. Discuss their structure and give the oxidation state of 'S' in them. Explain their oxidizing property. (3,3)
- (6.75)
2. (a) Justify the following statements, giving reason.
- i. Nitrogen is an inert gas whereas phosphorous is highly reactive solid.
 - ii. Solution of beryllium chloride in water is acidic in nature. (3,3)
- (b) Explain the following:
- i. Cr_2O_3 can be reduced by Al, but Al_2O_3 can't be reduced by Cr.
 - ii. Phosphoric acid is syrupy and viscous. (3,3)
- (c) Using molecular orbital theory, describe the bonding in XeF_2 . (6.75)

3. (a) Give reasons for the following:
- Which has greater bond length and why? SiF_4 or $[\text{SiF}_6]^{2-}$
 - Be and Mg do not impart flame coloration, while other elements of group 2 exhibit characteristic colour. (3,3)
- (b) Justify giving reason:
- Which is more basic: NaOH or RbOH ? (3,3)
 - Molten PCl_5 conducts electricity. (3,3)
- (c) Write short note on: Solution of alkali metals in liquid ammonia. (6.75)
4. (a) Draw the structures of the following molecules/ions, giving hybridization of central atom, geometry and shape of each of them.
- ClO_4^-
 - XeF_4
 - SO_2 (2,2,2)
- (b) Explain giving reason:
- Which has greater bond angle? H_2O or H_2S
 - Which has greater complex forming tendency? Mg^{2+} or Rb^{2+} (3,3)
- (c) What is diagonal relationship? Why Be and Al show diagonal relationship? Explain with examples. (6.75)
5. (a) Justify the following statements:
- On reaction with air, Li predominantly forms monoxide, Na forms peroxide and other alkali metals form superoxides.
 - Trimethylamine is a lewis base, but trisilylamine has negligible basic character. (3,3)
- (b) Discuss the structures of the following:
- Basic beryllium acetate
 - Cryptate -2,2,2 (3,3)
- (c) Discuss the structure and bonding in borazine. Give the similarities and differences between borazine and benzene, giving examples. (6.75)
6. (a) Give complete and balanced chemical reactions for the following:
- Reaction of silicon tetrachloride with water.
 - Reaction of SO_2 with acidified $\text{K}_2\text{Cr}_2\text{O}_7$ solution.
 - Reaction between XeF_4 with water. (2,2,2)
- (b) Give reasons for the following:
- Graphite is a good conductor of electricity while diamond is not.
 - Which is more ionic? PbCl_2 or PbCl_4 (3,3)
- (c) What is vapour phase refining? Give details of Mond's process and Van Arkel de Boer process. (6.75)

