(ii) Hydrides of elements of group 15

(iii) The oxo-acids of chlorine (5×2)

Room - 11 (3)

[This question paper contains 8 printed pages.]

'26 JUL 2023 Your Roll No.....

Sr. No. of Question Paper : 1196

Unique Paper Code : 2172011201

Name of the Paper : Chemistry of S- and P- Block Elements

Name of the Course : **B.Sc. (Hons.) Chemistry**

Semester : II

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **any Six** questions.
3. **All** questions carry equal marks.

1. Explain the following: (3×5)

(a) Graphite is a good conductor of electricity while diamond is not.

(b) Ionisation energy decreases from B to A1 but increases from A1 to Ga.

(c) Dilute solution of alkali metals in liquid ammonia is blue coloured and paramagnetic in nature.

(d) The bond angle in NH_3 is 107°C while in PH_3 is 93°C.

(e) Na_2CO_3 is more soluble than $NaHC0_3$ in water.

2. (a) Explain why most lines in the Ellingham diagram slope upward from left to right. What happens when line crosses $\Delta G = 0$? (5)

(b) Chemistry of Lithium is different from other alkali metals. Give examples in support of the statement. (5)

(c) Oxygen exists as an O_2 molecule while sulfur exists as an S_8 molecule. Explain. (5)

8. (a) Discuss briefly the following-

(i) Variation of the atomic radii and electronegativity among the elements of the main group.

(ii) Although the ionization energy of Li is maximum amongst alkali metals it is the strongest reducing agent in the aqueous solution. Why? (5)

(b) Write a short note on any two of the following:

(i) Allotropes of Carbon

(b) Discuss the structure of XeF_2 using MOT. What are the advantages of this theory over V BT for XeF_2? (5)

(c) Give details of Electrolytic reduction and Van Arkel de Boer process. (5)

7. (a) Explain the following according to Ellingham Diagram:

(i) For extraction of metals from HgO and Ag_2O, no need to add a reductant.

(ii) Cr_2O_3 can be reduced by A1, but $A1_2O_3$ can not be reduced by Cr. (5)

(b) Arrange the following hydrides in increasing order of their boiling points and bond angle. Give reasons for the same H_2Se, H_2O, H_2Te, and H_2S. (5)

(c) Why is white phosphorous very reactive in comparison to red phosphorous? Phosphoric acid is syrupy and viscous. Explain. (5)

3. (a) Explain briefly the complex formation tendency of the alkali metals with special reference to crown ethers and cryptands. (5)

(b) When heated sulfur melts to a mobile liquid, but on further heating the viscosity increases sharply and then decreases again. Explain. Give the structure and oxidation state of sulfur in H_2SO_3. (5)

(c) What are clathrates compounds of noble gases? Why do helium and neon not form clathrates? (5)

P.T.O.

4. (a) Write a short note on Hydrometallurgy and Zone Refining. (5)

(b) Complete and balance the following reactions:

(i) $XeF_4 + H_2O \longrightarrow$

(ii) $Mg(NO_3)_2$ (s) $\Delta \longrightarrow$

(iii) $P_4 + HNO_3 \longrightarrow$

(iv) $B_2H_6 + H_2O \longrightarrow$

(v) $SiH_4 + AgNO_3 + H_2O \longrightarrow$ (5)

(c) What is the inert pair effect? $PbCl_4$ is a stronger oxidizing agent than $SnCl_4$. Explain. (5)

5. (a) Among alkaline earth metals (except Beryllium), which will be the softest metal and have the most insoluble sulfate? Give reason. (5)

(b) Discuss the structure and bonding in Diborane. What are the products formed when diborane reacts with excess ammonia at low and at high temperatures? (5)

(c) Draw and explain the structure of the following compounds:

(i) ICl_3

(ii) Basic beryllium acetate. (5)

6. (a) What are interhalogen compounds? Why are they more reactive as compared to halogens? (5)