Unique Paper Code : 32171301

Name of the Paper : 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) Give reason for the following:
   (i) Arrange the following in order of their increasing Lewis acid strength:
   BBr_3, BCl_3, BF_3
   (ii) As rubidium is added in liquid ammonia gradually, a blue coloured solution is obtained initially, but with more addition of rubidium, a bronze colored layer is formed, which floats on blue colored solution. (3x2)

   (b) (i) Give the principle and procedure of Mond's Process.
   (ii) Using Ellingham diagram, explain why the slope of most of the lines move in upward direction with increase in temperature. (3x2)

   (c) Why is white phosphorus more reactive than red phosphorus? Draw the structure of P_4O_{10} and give the stepwise mechanism of its hydrolysis. (2,1,3.75)

2. (a) (i) Which is more basic? KOH or $Ca(OH)_2$. Why?
   (ii) Arrange the following hydrides in increasing order of their boiling points. Give reason for the same.
   H_2Se, H_2O, H_2Te, H_2S (3x2)

   (b) (i) Oxygen is a gas and exists as O_2, while sulphur is a solid and exists as S_8. Why?
   (ii) Which one will have higher negative electron gain enthalpy: Fluorine or chlorine? Give reason. (3x2)

   (c) (i) On burning Li in air, two compounds **(A)** and **(B)** are obtained. When treated with water, **(A)** liberates NH_3 gas, while aqueous solution of **(B)** is basic in nature. Identify **(A)** and **(B)** and give the balanced chemical reaction(s) involved.
   (ii) What is crown ether? Draw the structure of dibenzo-18-crown-6. (4,2.75)

3. (a) (i) Give the chemical reaction involved on heating: (A) Lithium nitrate, (B) Potassium nitrate and explain the same.
   (ii) Though HF is more ionic than HCl, but it is a weaker acid than HCl in aqueous solution. Why? (3x2)

   (b) (i) Silanes are more reactive than alkanes. Why? Explain your answer with a suitable

example.

(ii) Which will have greater complex forming tendency**:** Rubidium or Strontium? Why? (3x2)

(c) What are interhalogen compounds? How are they different from halogens? Discuss the structures of I_2Cl_6 and BrF_5. (1.75,1,4)

4. (a) Explain the following:

(i) PCl_5 is a Lewis acid while PCl_3 is a Lewis base.

(ii) Alkali metals impart characteristic colour in the Bunsen flame. (3x2)

(b) (i) Give the balanced chemical reactions of the following metals, when heated initially with Carbon, followed by hydrolysis of the products formed:

(A) Beryllium (B) Calcium

(ii) Compare the structures of dimeric beryllium chloride and diborane with respect to bridging bonds present in them. (3x2)

(c) Which type of metals can be purified by Zone refining process. Explain its principle and procedure with diagram. (6.75)

5. (a) (i) Large number of silicates and polyphosphates are known, lesser number of polysulphates are known, but no polychlorates are known. Explain.

(ii) Why IF_7 is not stored in glass bottles? Explain with the help of chemical reaction. (3x2)

(b) Complete the following equations:

(i) $H_2S_2O_8 + H_2O \rightarrow$

(ii) $Cl_2O + NaOH \rightarrow$

(iii) $PCl_3 + H_2O \rightarrow$

(iv) $BrF_5 + H_2O \rightarrow$

(v) $B_2H_6 + O_2 \rightarrow$

(vi) $XeF_6 + NaOH \rightarrow$ (1x6)

(c) Name the different oxoacids of Chlorine. Draw their structures and arrange them in increasing order of their acid strength, giving reason(s). (6.75)

6. (a) Describe the chief modes of occurrence of metals based on standard electrode potentials. (6)

(b) Explain the following:

(i) Which has a greater bond angle? NH_3 or PH_3

(ii) $SO_2(g)$ and $SO_3(g)$ have the same hybridization but different structures. (3x2)

(c) What are silicates? Briefly discuss the different types of silicates. Give their structures and uses. (6.75)