

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:

- Arrange the following in order of their increasing Lewis acid strength:  
 $\text{BBr}_3$ ,  $\text{BCl}_3$ ,  $\text{BF}_3$
  - 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  $\text{P}_4\text{O}_{10}$  and give the stepwise mechanism of its hydrolysis. (2,1,3.75)

2. (a) (i) Which is more basic?  $\text{KOH}$  or  $\text{Ca}(\text{OH})_2$ . Why?

- (ii) Arrange the following hydrides in increasing order of their boiling points. Give reason for the same.



- (b) (i) Oxygen is a gas and exists as  $\text{O}_2$ , while sulphur is a solid and exists as  $\text{S}_8$ . 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  $\text{NH}_3$  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  $\text{HF}$  is more ionic than  $\text{HCl}$ , but it is a weaker acid than  $\text{HCl}$  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

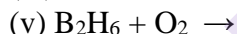
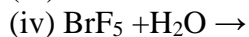
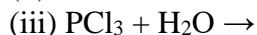
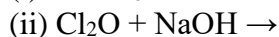
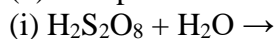
- (ii) Compare the structures of dimeric beryllium chloride and diborane with respect to bridging bonds present in them. (3x2)

- (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:



- (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)