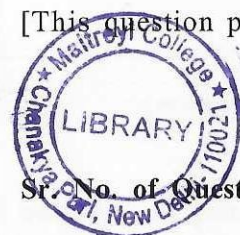


4342

8

(iv) Lithium nitrate is heated. (3×5)

[This question paper contains 8 printed pages.]



28.12.2023 (M)  
Your Roll No.....

Sr. No. of Question Paper : 4342

G

Unique Paper Code : 32171301

Name of the Paper : Inorganic Chemistry-II: s- and p- Block Elements

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

Semester : III

Duration : 3 Hours

Maximum Marks : 75

**Instructions for Candidates**

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all. Question No. 1 is compulsory.
3. All Questions carry equal marks.

1. Explain the following giving reasons : **(any five)**

(a)  $\text{CCl}_4$  does not act as a Lewis acid while  $\text{SiCl}_4$  does.

(1000)

P.T.O.

- (b) Borazine is more reactive than Benzene.
- (c) Amongst the alkali metals Lithium has got the highest ionisation enthalpy, despite this it is as good a reducing agent as cesium in aqueous solution.
- (d) Carbon is a versatile reducing agent used in the extraction of metals, but it is unsuitable sometimes as a reducing agent.
- (e) Phosphorus, arsenic and antimony form pentahalides, but nitrogen and bismuth do not.
- (f)  $B^{3+}$  ion doesn't exist in solid or solution state.
- (g) Zeolites are used as water softeners. (3×5)

2. (a) Select the correct answer in each category given below and justify your answer. (any four)

- (b) Which is oxidising in nature and why?  $PbO$  or  $PbO_2$
- (c) Discuss the structure of  $XeF_2$  using Molecular orbital theory.
- (d) Justify the statement: Unlike ethane, diborane is an electron deficient compound. How do you explain the structure of diborane then?
- (e) Write balanced chemical reactions for **any three** of the following :
- (i) Diborane reacts with ammonia in the ratio 1:2 at  $200^\circ C$ .
- (ii) Borazine reacts with methanol.
- (iii) Sulphur dioxide reacts with acidified solution of potassium dichromate.

(c) A group 2 metal (M) occurs naturally in great abundance as carbonate. Metal (M) reacts with cold water forming compound (A), which is a strong base. Aqueous solution of (A) is used in the qualitative test for carbonate ion. Metal (M) combines with  $H_2$  to give a saline hydride (B), which behaves as a drying agent. Identify (M), (A) and (B) giving balanced chemical reactions.

(d) Write short notes on **any two** of the following :

(i) van Arkel de Boer Method

(ii) Clathrate compounds

(iii) Phosphonitrilic halides (3,3,3,6)

6. (a) Potassium permanganate which is insoluble in benzene, dissolves readily in it in the presence of 18-crown-6-ether. Explain giving reason.

(i) A halogen which does not exhibit positive oxidation state: Fluorine or chlorine

(ii) Better Lewis base: Trimethylamine or trisilylamine

(iii) Stronger reducing agent:  $CH_4$  or  $SiH_4$

(iv) Hydride having higher thermal stability:  $NH_3$  or  $PH_3$

(v) Stronger oxidising agent:  $HOCl$  or  $HClO_4$

(b) Explain with the help of Ellingham diagram, the reducing nature of carbon and carbon monoxide.

(c) Graphite is soft, has low density and is a good conductor of electricity but diamond is extremely hard, has high density and is a non-conductor of electricity. Explain why? (6,4,5)

3. Justify the following statements, giving reason :

- (a) Methane, ammonia and water have same hybridisation but different structures.
- (b) Nitrogen is an inert gas while phosphorous is a highly reactive solid.
- (c)  $\text{CO}_2$  is a gas while  $\text{SiO}_2$  is a high melting solid.
- (d) Rubidium as compared to sodium has greater electrical conductivity in aqueous solution.
- (e) Dilute solution of sodium in liquid ammonia is blue coloured, paramagnetic in nature and behaves as a true solution. (3×5)

4. (a) What is Inert pair effect? How does it vary down the group 14 elements? Explain.

(b) Draw the structure of  $\text{S}_8$  molecule and explain the effect of heating on Sulphur.

(c) Discuss the structures of **any two** of the following :

- (i) Phosphorous pentoxide
  - (ii) Basic beryllium acetate
  - (iii) Xenon hexafluoride
- (d) Silicon analogues of alkene and alkyne are not known. Give reason. (4,4,4,3)
5. (a) Which has greater bond angle and why?  $\text{NH}_3$  or  $\text{NF}_3$ .
- (b) Which will have greater ionic radius and why? Gallium or Aluminium.