

Total number of printed pages-4

3 (Sem-3/CBCS) CHE HC 1

2021

(Held in 2022)

CHEMISTRY

(Honours)

Paper : CHE-HC-3016

(Inorganic Chemistry-II)

Full Marks : 60

Time : Three hours

**The figures in the margin indicate
full marks for the questions.**

1. Answer the following as directed : 1×7=7
 - (i) F^- is a hard base.
(State True **or** False)
 - (ii) Predict the shape of XeF_2 with the help of the VSEPR model.
 - (iii) Why does nitrogen not form any pentahalide in contrast to phosphorus ?

Contd.

(iv) Why is the dipole moment of NF_3 very low compared to that of NH_3 ?

(v) $NaCl$ and KCl are anhydrous whereas $MgCl_2 \cdot 6H_2O$ and $CaCl_2 \cdot 6H_2O$ have water of crystallization. Give a reason.

(vi) $MgSO_4$ is soluble in water but $BaSO_4$ is insoluble. Why?

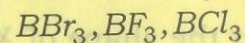
(vii) FeS is much less soluble than $Fe(OH)_2$. Explain.

2. Answer the following questions: $2 \times 4 = 8$

(i) Briefly discuss the structural differences of BeH_2 and CaH_2 .

(ii) What are pseudohalogens? Write two similar properties of CN^- and Cl^- .

(iii) Arrange the following molecules in increasing order of their acid strengths and give reasons for your choice:



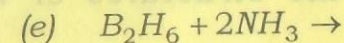
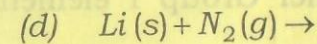
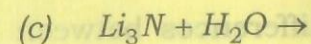
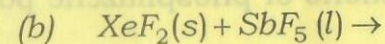
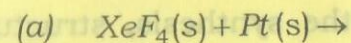
(iv) What happens when sodium hydrogencarbonate ($NaHCO_3$) is heated? Why is it used as the fire extinguisher?

3. Answer **any three** of the following questions: $5 \times 3 = 15$

(i) Define Lewis base. Lewis acids may be classified into four categories. Discuss these four categories of Lewis acids.

$1 + 4 = 5$

(ii) Identify the products: $1 \times 5 = 5$



(iii) Applying Wade's rule, rationalize why the cage structure of $C_2B_4H_6$ is an octahedron. How many cage isomers are possible for it? $3 + 2 = 5$

(iv) Write the preparation method, structure and application of polysiloxanes.

$2 + 2 + 1 = 5$

(v) What is inert-pair effect? Give two examples where the inert-pair effect is seen. $1 + 2 + 2 = 5$

4. Answer **any three** of the following questions : $10 \times 3 = 30$

(i) Discuss the Ellingham diagram. 10

(ii) Discuss the layer structure of boron nitride. Write *one* method for the preparation of boron nitride. Write *two* dissimilarities between the boron nitride and the graphite. $7+1+2=10$

(iii) Discuss the synthesis, structure and applications of phosphazene polymers. 10

(iv) Write the differences between lithium and the other Group 1 elements. 10

(v) Discuss the structures of various silicates. 10

(vi) Write about — $5+5=10$

(a) the allotropes of phosphorus and

(b) the structure of carbon nanotubes.