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3 (Sem-3/CBCS) CHE HC 1

2023

**CHEMISTRY**

(Honours Core)

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 :  $1 \times 7 = 7$ 
  - (a) Name the graph of Gibbs Energy ( $\Delta G$ ) versus Temperature (T) for the formation of oxide of metal.
  - (b) "Group-I elements gets oxidized easily"  
- State whether *True* or *False*.
  - (c) Write the structural formula of borazine.
  - (d) What is "basicity of an acid" ?

Contd.



(e) Which one of the following species is conjugate base of  $\text{OH}^-$ ?

(i)  $\text{H}_2\text{O}$

(ii)  $\text{O}^{2-}$

(iii)  $\text{O}_2$

(iv)  $\text{O}_2^{2-}$

(f) "The name inert gas is improper" - Explain the statement.

(g) Calculate the hardness of  $\text{Al}^{3+}$  for the ionization energy, 119.99 eV and electron affinity 28.45 eV.

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

(a) Describe the structure of boric acid.

(b) What is inert pair effect? Arrange the stability of +1 oxidation states of  $\text{Ca}^+$ ,  $\text{Al}^+$ ,  $\text{In}^+$  and  $\text{Tl}^+$  in their increasing order.

(c) Applying Wade's rule, predict and draw the structure of  $\text{CB}_5\text{H}_9$ .

(d) Arrange the following compounds in ascending order of their solubility in water.

$\text{AgF}$ ,  $\text{AgCl}$ ,  $\text{AgBr}$ ,  $\text{AgI}$

Give explanation.

3. Answer **any three** of the following :

$5 \times 3 = 15$

(a) Briefly discuss the bonding and structure of diborane.

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(b) What is diagonal relationship? Write **any four** similar properties of  $\text{Be}$  and  $\text{Al}$ .  $1+4=5$

(c) Discuss the Mond's process used in metal refining.

(d) What are polyhalides? Give example. How they are different from Interhalogen Compounds?  $1+1+3=5$

(e) Write constructing properties of the borazine and benzene.

4. Answer **any three** of the following :

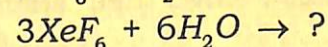
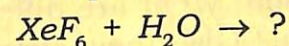
$10 \times 3 = 30$

(a) What is Allotropism? Name Different allotropes of carbon. Discuss bonding in graphite. Explain the high thermal and electrical conductivity of graphite. What is intercalation compounds? Give examples.  $2+2+2+2+1+1=10$

(b) (i) What happens when Xenon is heated in presence of flourine? How the amount of flourine affect the nature of product?  $2+2=4$

(ii) Discuss the bonding in  $\text{XeF}_6$ . 4

(iii) Complete the following reaction



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- (c) (i) Give the formula, structure and method of preparation of basic beryllium acetate. 1+2+2=5
- (ii) How are poly siloxanes formed? Distinguish between silicon fluids and silicon rubbers. 2+3=5
- (d) Write notes on : (**any two**) 5+5=10
- (i) Pseudohalogens
- (ii) Pasting process
- (iii) Catenation
- (e) (i) State the Pauling's rules for determination of strength of mononuclear oxoacids. 3
- (ii) Arrange the following in order of descending acid strengths in aqueous solution -  
 $\text{HClO}_4$  ,  $\text{HOCl}$ ,  $\text{HClO}_3$ ,  $\text{HClO}_2$   
 Give explanation. 3
- (iii) Pauling's rule is useful in detecting structural anomalies, explain. 2
- (iv) What is symbiosis? Explain. 2
- (f) What are silicates? Explain the bonding and structure of  $\text{SiO}_4^{4-}$  unit using hybridization. What are different types of silicates? Give their structure. 1+4+3+2=10