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 : 1×7=7

   (a) Name the graph of Gibbs Energy (ΔG) 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"?

(e) Which one of the following species is conjugate base of OH^-?

(i) H_2O

(ii) O^{2-}

(iii) O_2

(iv) O_2^{2-}

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

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

2. Answer the following : 2×4=8

(a) Describe the structure of boric acid.

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

(c) Applying Wade's rule, predict and draw the structure of CB_5H_9.

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

AgF, AgCl, AgBr, AgI

Give explanation.

3. Answer ***any three*** of the following : 5×3=15

(a) Briefly discuss the bonding and structure of diborane. 5

(b) What is diagonal relationship? Write *any four* similar properties of *Be* and *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 : 10×3=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 XeF_6. 4

(iii) Complete the following reaction

$XeF_6 + H_2O \rightarrow ?$

$3XeF_6 + 6H_2O \rightarrow ?$ 2

(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 –

$HClO_4$, $HOCl$, $HClO_3$, $HClO_2$

Give explanation. 3

(iii) Pauling's rule is useful in detecting structural anomalles, explain. 2

(iv) What is symbiosis? Explain. 2

(f) What is silicates? Explain the bonding and structure of SiO_4^{4-} unit using hybridization. What are different types of silicates? Give their structure. 1+4+3+2=10
