FYUG/Sem-4/CH-CE2

2026
(Regular)
Chemistry (Core)
Paper Code : CH-CE-4224
Paper Name : Inorganic Chemistry-I

Time : 2 hours ***Full Marks : 45***

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

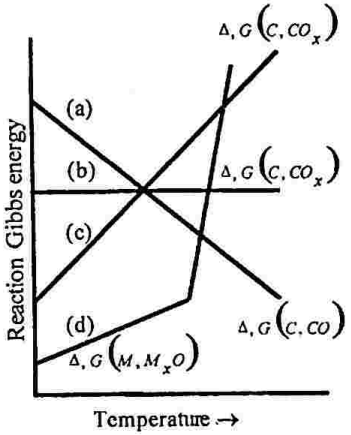
1. Answer the following questions as directed : 1×4=4
   a) Metals like gold and platinum occur in native state because they have :
      i) High density
      ii) High melting point
      iii) Positive electrode potentials
      iv) Low atomic umber

      (Choose the correct answer)
   b) Why Tl shows +1 oxidation state more frequently than +3.
   c) What is the utility of distribution diagram used in acid base terminology ?
   d) Which of the noble gas element is most abandant in the Earth's crust ?
2. Answer the following questions : 2×3=6
   a) Why does Sn^{2+} act as a reducing agent while Pb^{2+} does not, though both are same group member ?
   b) State the conditions to identify the strength of acid and base by solvent levelling.
   c) State how noble gases are used in making light sources.

Contd.

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

a) A part of an Ellingham diagram showing the standard Gibbs energy for the formation of a metal oxide and three-carbon oxidation Gibbs energies. Explain the thermodynamic feasibility of those reactions with the help of the diagram. 5



b) What is meant by the diagonal relationship in the periodic table? Discuss the similarities between Beryllium and Aluminium in terms of 2+3=5

i) oxides ii) hydroxides iii) halides

c) i) The order of thermodynamic stability of complexes of : $N(CH_3)_3$ with BX_3 is $BF_3 < BCl_3 < BBr_3$. Explain the trend. 3

ii) Give the structural aspect of hydronium ion. 2

d) What is hydrides ? Classify hydrides with examples based on bonding. 2+3=5

e) Write a preparative method of boric acid. Discuss and draw the structure of boric acid. 1+4=5

f) What is the Lewis concept of acid and base ? Explain with examples. 5

4. Answer ***any two*** questions from the following : 10×2=20

a) i) What is Van Arkel-De Boer process of metal extraction ? How it differ from Kroll's process ? 2+2=4

ii) Describe the examples of metathesis and redox reactions involved with xenon fluoride compound. 3

iii) Explain the MO treatment to explain the bonding of XeF_2 molecule. 3

b) i) What is hard soft acid and base classification for the behaviour of acids and bases ? Explain the following with the help of HSAB principle.

A) Is OH^- or S^{2-} more likely to form insoluble salts with +3 transition metal ions (M^{3+}) ?

B) AgI_2 is a stable compound where as AgF^{2-} is unstable. 3+4=7

ii) What is distribution diagram ? Explain how it helps to predict the ionization of polyprotic acid. 1+2=3

c) i) Explain the following :

A) Carbon exhibit maximum catenation among all elements in group 14. 2

B) Lithium carbonate decomposes on heating, but sodium carbonate does not. 2

ii) Give a preparative description of the xenon fluoride compounds. 3

iii) Describe the variation in oxidation states of group 15 elements with examples. 3

d) Write short notes :

i) Anomalous behaviour of first member of each group. 3

ii) Shape of $XeOF_4$, XeO_2F_2 and XeF_6 molecule with the help of VSEPR theory. 4

iii) Zone refining. 3

■■■