

TDC (CBCS) Odd Semester Exam., 2023

CHEMISTRY

(Honours)

(3rd Semester)

Course No. : CHMHCC-301T

(s-, p-block Elements and Metallurgy)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

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

SECTION—A

Answer *ten* questions, taking *two* from each

Unit : 2×10=20

UNIT—I

1. Define allotropy. Write the allotropic forms of phosphorus. 1+1=2
2. What are cage compounds? Cite one example. 1+1=2
3. What are carboranes? Write the formula of a *closo*-carborane. 1+1=2

(2)

UNIT—II

4. Noble gases are mostly chemically inert. Give reason. 2
5. Draw the structure of XeOF_4 . Mention the hybridization state of central atom. 1+1=2
6. Write the balanced equation for the complete hydrolysis of XeF_6 . 2

UNIT—III

7. What are conjugate acids and bases? Give one example of each. 2
8. What do you mean by levelling effect of a solvent? 2
9. " CO_2 acts as a Lewis acid." Explain. 2

UNIT—IV

10. What are inorganic polymers? Write the different types of inorganic polymers. 1+1=2
11. Draw the structure of $(\text{BN})_n$. 2
12. What are phosphazenes? Give one example of cyclic polymer. 1+1=2

(3)

UNIT—V

13. What is meant by the term 'metallurgy'? 2
14. Define flux and slag with suitable examples. 2
15. Write a short note on zone refining. 2

SECTION—B

Answer five questions, taking one from each Unit :

6×5=30

UNIT—I

16. (a) How is IF_5 prepared? Explain its structure on the basis of hybridization scheme. 1+2=3
- (b) Write the structure of *closo*-, *nido*- and *arachno*-type of boron compounds or ions with suitable examples of each. 1+1+1=3
17. (a) How is peroxydisulphuric acid $\text{H}_2\text{S}_2\text{O}_8$ prepared? Draw its structure. 2+1=3
- (b) Write one method for the preparation of boric acid. Why is H_3PO_3 dibasic acid? Mention one application of boric acid in medicine. 1+1+1=3

(4)

UNIT—II

18. (a) How is XeF_6 prepared? Draw the shape of the molecule and mention the state of hybridization of Xe-atom in it. $1+1+1=3$
- (b) Complete the following chemical equations : $1 \times 3 = 3$
- (i) $\text{XeF}_4 + \text{O}_2\text{F}_2 \longrightarrow$
- (ii) $\text{XeO}_3 + \text{HF} \longrightarrow$
- (iii) $\text{XeF}_2 + \text{H}_2\text{O} \longrightarrow$
19. (a) Define clathrates. Write the important uses of clathrates. $1+2=3$
- (b) Draw and explain the structure of xenon oxydifluoride (XeOF_2). 3

UNIT—III

20. (a) Explain why hard acids coordinate with hard bases and soft acids with soft bases. 3
- (b) Explain Brönsted-Lowry theory of acids and bases with suitable examples. 3
21. (a) What are protic and aprotic solvents? Is liquid NH_3 a protic or an aprotic solvent? Give reasons. $2+1=3$

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(Continued)

(5)

- (b) What is HSAB principle? Explain why AgI_2^\ominus is stable but AgF_2^\ominus is non-existence. $1+2=3$

UNIT—IV

22. (a) Write the preparation and draw the structure of a cage compound of each of P and B. $1\frac{1}{2}+1\frac{1}{2}=3$
- (b) Draw the open and closed structures of silicones. $1\frac{1}{2}+1\frac{1}{2}=3$
23. (a) How is SiH_4 prepared? Draw its structure. $2+1=3$
- (b) Briefly describe the silicones, their general formula and one characteristic property. $1+1+1=3$

UNIT—V

24. (a) Explain the electrolytic process for the extraction of zinc. 3
- (b) What are Ellingham diagrams? Write the uses of Ellingham diagram. $1+2=3$
25. (a) Give an outline of extraction of chromium from its ore. 3
- (b) How is the metal obtained from its oxide ores electrolytically? 3

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