

2021/TDC/CBCS/ODD/
CHMHCC-301T/288

TDC (CBCS) Odd Semester Exam., 2021
held in March, 2022

CHEMISTRY

(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 any *ten* questions : 2×10=20

1. What is inert pair effect? Illustrate with an example.
2. Draw and discuss the resonance structures of chlorine dioxide.

22J/718

(Turn Over)



3. What do you mean by interhalogen compounds?
4. State with equations, what happens when XeF_6 is treated with aqueous NaOH .
5. Which of the noble gases is most abundant in the universe? Mention two uses of the gas.
6. Explain the shape of XeF_4 .
7. Arrange the following in order of increasing base strength and explain reasons :
 $\text{NH}_3, \text{NCl}_3, \text{NF}_3$
8. What is soft base? What are its characteristics?
9. Which of the following is Bronsted acid and/or Bronsted base? 1+1=2
(a) NH_3
(b) H_2PO_4^-
10. What are inorganic chain compounds?
11. What are phosphazenes? Give one example.
12. What is the valence state of P in P_4O_6 ?
Depict its structure.

13. Define gangue.
14. Write an application of Ellingham diagram.
15. What is meant by the term 'concentration of the ore'?

SECTION—B

Answer any *five* questions : 6×5=30

16. (a) Arrange the oxyacids of chlorine in the increasing order of their acidity and oxidizing power. Justify your answer. 3
- (b) Discuss the structure of diborane molecule. 3
17. (a) How is IF_5 prepared? Explain its structure on the basis of hybridization of I-atom. 2+2=4
- (b) How is Caro's acid synthesized? 2
18. (a) Name the first real compound of any of the noble gases. Discuss the preparation and properties of XeF_2 and establish its linear structure with the help of hybridization of orbitals of xenon and fluorine. 1+1+1+1=4
- (b) Write the important uses of clathrates. 2

19. (a) Draw and discuss the structure of xenon oxide difluoride (XeOF_2). 3
- (b) The 'xenate' ion disproportionates in basic solution to yield xenon, perxenate ion and oxygen. Give a balanced equation for this reaction. 3
20. (a) Explain why hard acids coordinate with hard bases and soft acids coordinate with soft bases. 3
- (b) Discuss Cady and Elsey concept of acids and bases citing illustrative examples. 3
21. (a) What are protic and aprotic solvents? Is liquid NH_3 a protic or an aprotic solvent? Give reasons. 1+1=2
- (b) Applying the HSAB principle, complete the following reactions and give reasons : 2+2=4
- (i) $\text{CuI}_2 + \text{CuF} \longrightarrow ?$
- (ii) $\text{CdCl}_2 + \text{H}_2\text{S} \longrightarrow ?$
22. (a) How SiH_4 may be synthesized? What is its structure? How does it react with (i) O_2 and (ii) heat? 2+1+1=4
- (b) How is P_4O_4 prepared? What happens when it reacts with water? 2

(5)

23. (a) Write the preparation and structure of a cage compound of each of P and B. 4
- (b) Draw the open and closed structures of silicons. 2
24. (a) Explain the electrolytic process for the extraction of zinc. 3
- (b) Discuss the principle of extraction of nickel by Mond's process from purified matte. 3
25. Name the principal ore of chromium and give its chemical formula. Give an outline of extraction of chromium from its ore. 2+4=6
