

2020/TDC(CBCS)/ODD/SEM/
CHMHCC-301T/288

TDC (CBCS) Odd Semester Exam., 2020
held in March, 2021

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

1. Answer any *ten* of the following questions :

2×10=20

- (a) Write one method of preparation of
HClO₂. Draw its structure. 1+1=2
- (b) What are cage compounds? Cite one
example. 1+1=2

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(Turn Over)



(c) How many terminal hydrogen atoms and banana bonds are there in diborane? $1+1=2$

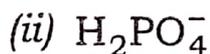
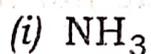
(d) Define catenation. Cite one example. $1\frac{1}{2}+\frac{1}{2}=2$

(e) What are noble gases? Which of the noble gases is radioactive? $1+1=2$

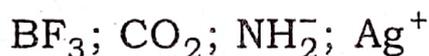
(f) Explain why it is difficult to liquefy helium (He).

(g) Write two applications of noble gas compounds.

(h) Which of the following is Bronsted acid and/or Bronsted base? $1+1=2$



(i) Find the Lewis acids and bases from the following : $\frac{1}{2} \times 4 = 2$



(j) Why is HNO_3 stronger acid than HNO_2 ?

(k) Define HSAB principle with appropriate example.

(3)

- (l) What are the inorganic polymers?
Write the different types of inorganic polymer. 1+1=2
- (m) Draw the layer structure of boron nitride.
- (n) Write two examples of silicon-based polymer. 1+1=2
- (o) Write a short note on 'borazine'.
- (p) Define gangue with suitable example.
- (q) What is an Ellingham diagram?
- (r) Distinguish between calcination and roasting.
- (s) What is hydrometallurgy?
- (t) How will you explain the inertness of noble gases?

SECTION—B

Answer *any five* questions

2. (a) What are carboranes? How are boranes and carboranes classified? 1+2=3
- (b) How can Marshall's acid be prepared? Write the structure and applications of Marshall's acid. 1+2=3

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3. (a) What are pseudohalogen compounds?
How are they prepared? 1+2=3
- (b) Furnish the structure of closo-, nido-
and archno-type of boron compounds
or ions with suitable examples. 1+1+1=3
4. (a) How is XeF_4 prepared? Draw the shape
of the molecule and the state of
hybridization of Xe-atom in it. 1+1+1=3
- (b) Discuss the position of noble gases in
the periodic table. 3
5. (a) What are clathrate compounds of noble
gases? Cite an example. 2+1=3
- (b) Explain why the shape of XeF_2 is linear.
What happens when XeF_2 reacts with
iodine molecule? 2+1=3
6. (a) Explain the amphoteric behaviour of
 H_2SO_4 . 2
- (b) Which one is a stronger base, NH_3 or
 $(\text{CH}_3)_3\text{N}$ and why? 2
- (c) Mention the limitations of HSAB
principle. 2

(5)

7. (a) What do you mean by levelling effect of a solvent? 2
- (b) How does HSAB principle give account on the stability of product formed in a reaction? 2
- (c) What are the characteristics of hard metals? 2
8. (a) What are phosphazenes? How is cyclic $(\text{NPCl}_2)_3$ prepared? Draw its structure and explain the bonding in it. 1+1+2=4
- (b) Draw the structure of $[\text{Si}_2\text{O}_7]^{6-}$. 2
9. (a) What are silicones? How are cross-linked silicones prepared? 1+2=3
- (b) What happens when diborane reacts with excess of ammonia at high temperature? 1
- (c) Write a brief note on silicone rubber. 2
10. (a) What is metallurgy? How is the metal obtained from its oxide ores electrolytically? 1+3=4
- (b) Explain the basic principle of zone refining. 2

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(Turn Over)



(6)

11. (a) What is pentlandite ore? Explain how nickel (Ni) can be extracted from the pentlandite ore by Mond process. 1+3=4

(b) Name two important ores of zinc with formulas. 2
