

Bs/CHEM.M-3 (T)

2024

(FYUGP)

(3rd Semester)

CHEMISTRY

(Minor)



Paper Code : CHEM.M-3 (T)

**(Inorganic Chemistry—II :
s- and p-Block Elements)**

Full Marks : 75

Pass Marks : 40%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 50)

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

1. (a) Explain how water can behave as an acid and a base under suitable conditions. 3
- (b) How does Lewis concept define acids and bases? Give suitable examples. 3
- (c) What is the HSAB principle? Discuss its applications. 4

OR

2. (a) What are the advantages and limitations of the Bronsted-Lowry concept of acids and bases? 3
- (b) Explain the relative strength of acids and bases with regard to K_a , pK_a , K_b and pK_b values. 4
- (c) Describe the different views to explain the basis of hard-hard and soft-soft interactions. 3
3. (a) Explain inert-pair effect giving suitable examples. 3
- (b) Give one preparation and structure of basic beryllium acetate. 1+2=3
- (c) Discuss the different allotropes of phosphorus. 4

OR

4. (a) Give the preparation of diborane and discuss its reaction with ammonia under different reaction conditions. 1+3=4
- (b) Discuss anomalous behaviour of nitrogen with other members of group 15 elements. 3
- (c) Give the preparation of any three interhalogen compounds. 3

5. (a) Write a note on the uses of krypton and xenon. 3
- (b) Explain the clathrates of the noble gases. 3
- (c) Discuss the valence bond treatment and MO treatment of XeF_2 . 4

OR

6. (a) Discuss the structure and bonding of XeO_3 . 3
- (b) Give one preparation of XeF_4 . Write the reactions of XeF_4 with hydrogen and water. $1+3=4$
- (c) Write a note on the uses of helium and radon. 3

7. (a) Discuss with examples, the various steps involved in the preparation of silicones. 6
- (b) Give one synthesis each and structures of $[\text{N}(\text{PCl}_2)_3]$ and $[\text{N}(\text{PCl}_2)_4]$. $2+2=4$

OR

8. (a) Discuss briefly any four types of silicone. $2 \times 4 = 8$
- (b) Write a short note on the different types of inorganic polymer. 2

9. (a) Give the reaction of boric acid with—
- (i) ethanol in the presence of conc. H_2SO_4 ;
 - (ii) sodium carbonate;
 - (iii) acetic anhydride. 1×3=3
- (b) Illustrate the effect of solvents on the relative strength of acid and base. 4
- (c) Discuss the VSEPR theory of XeOF_4 . 3

OR

10. (a) Give one preparation each and structures of any three oxoacids of phosphorus. 2×3=6
- (b) Discuss the structure and bonding of XeF_6 . 4

Subject Code : Bs/CHEM.M-3 (T)

To be filled in by the Candidate

BA / BSc / BCom / BBA / BCA
3rd Semester End Term
Examination, 2024 (FYUGP)

Subject

Paper

INSTRUCTIONS TO CANDIDATES

1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
2. This paper should be ANSWERED FIRST and submitted within 1 (one) Hour of the commencement of the Examination.
3. While answering the questions of this booklet, any cutting, erasing, over-writing or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

Signature of
Scrutiniser(s)

Signature of
Examiner(s)



Booklet No. A 77

Date Stamp

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To be filled in by the
Candidate

BA / BSc / BCom / BBA / BCA
3rd Semester End Term
Examination, 2024 (FYUGP)

Roll No.

Regn. No.

Subject

Paper

DESCRIPTIVE TYPE

Booklet No. B

Signature of
Invigilator(s)

2024

(FYUGP)

(3rd Semester)

CHEMISTRY

(Minor)

Paper Code : CHEM.M-3(T)

(Inorganic Chemistry—II : s- and p-Block Elements)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

SECTION—I

(Marks : 15)

Put a Tick (✓) mark against the correct answer in the brackets provided : 1×15=15

1. The conjugate acid of NH_3 is

(a) NH_4^+ ()

(b) NH_4 ()

(c) NH_2^- ()

(d) NH^{-2} ()

2. AlCl_3 and BF_3 are the examples of

- (a) Bronsted-Lowry bases ()
- (b) Bronsted-Lowry acids ()
- (c) Lewis acids ()
- (d) Lewis bases ()

3. The correct order of the strength of halogen acids is

- (a) $\text{HF} < \text{HCl} < \text{HBr} < \text{HI}$ ()
- (b) $\text{HI} < \text{HBr} < \text{HCl} < \text{HF}$ ()
- (c) $\text{HBr} < \text{HI} < \text{HCl} < \text{HF}$ ()
- (d) $\text{HCl} < \text{HF} < \text{HBr} < \text{HI}$ ()

4. Lewis acids, which are small in size and whose electron charge clouds are not easily polarizable, are

- (a) soft acids ()
- (b) hard acids ()
- (c) borderline acids ()
- (d) None of the above ()

5. The general outer shell electronic configuration of the noble gases is

(a) $ns^2(n-1)p^6$ ()

(b) $(n-1)s^2np^6$ ()

(c) ns^2np^6 ()

(d) $(n-2)s^2np^6$ ()

6. Which noble gas is used along with oxygen in the modern diving apparatus?

(a) Helium ()

(b) Neon ()

(c) Argon ()

(d) Krypton ()

7. Xenon oxodifluoride (XeOF_2) has

- (a) square planar structure ()
- (b) T-shaped structure ()
- (c) octahedral structure ()
- (d) trigonal bipyramidal structure ()

8. Which of the following pairs is not an example of diagonal relationship?

- (a) Li, Mg ()
- (b) K, Ca ()
- (c) Be, Al ()
- (d) B, Si ()

9. Which of the following is not a characteristic of diamond?

- (a) Colourless transparent ()
- (b) Hardest substance ()
- (c) Bad conductor of electricity ()
- (d) Each carbon sp^2 hybridized ()

10. Which of the following is an allotrope of carbon?

- (a) Diamond ()
- (b) Graphite ()
- (c) Bucky balls ()
- (d) All of the above ()

11. Allotrope of sulphur with needle shaped crystals is

(a) α -sulphur ()

(b) β -sulphur ()

(c) γ -sulphur ()

(d) δ -sulphur ()

12. Which of the following is not a pseudohalide?

(a) CN^- ()

(b) SCN^- ()

(c) NO_3^- ()

(d) N_3^- ()

13. In peroxyborates, there are _____ bridging peroxy groups.

(a) 1 ()

(b) 2 ()

(c) 3 ()

(d) 4 ()

14. The molecular formula of borazine is

(a) C_6H_6 ()

(b) $C_3N_3H_6$ ()

(c) $B_3N_3H_6$ ()

(d) $C_3B_3H_6$ ()

15. Cyclic silicates are formed by the sharing of _____ oxygen(s) per silicon atoms.

(a) 1 ()

(b) 2 ()

(c) 3 ()

(d) 4 ()

SECTION—II

(Marks : 10)

Answer the following questions in brief :

2×5=10

1. Why do noble gases have little tendency to form compounds with other elements?

2. Write a short note on the uses of argon.

(10)

3. What are the advantages of Lewis concept of acids and bases?

1. Why do noble gases have little tendency to form compounds with other elements?

4. Write a short note on pseudohalogens.

(12)

5. Draw the molecular structure of boron nitride.
