

ASSIGNMENT BOOKLET**Bachelor's Degree Programme (B.Sc.)****INORGANIC CHEMISTRY****Valid from January 1, 2024 to December 31, 2024****Please Note**

- You can take electives (56 to 64 credits) from a minimum of TWO and a maximum of FOUR science disciplines, viz. Physics, Chemistry, Life Sciences and Mathematics.
- You can opt for elective courses worth a **MINIMUM OF 8 CREDITS** and a **MAXIMUM OF 48 CREDITS** from any of these four disciplines.
- At least 25% of the total credits that you register for in the elective courses from Life Sciences, Chemistry and Physics disciplines must be from the laboratory courses. For example, if you opt for a total of 64 credits of electives in these 3 disciplines, at least 16 credits should be from lab courses.
- You cannot appear in the Term-End Examination of any course without registering for the course. Otherwise, your result will not be declared and the onus will be on you.



School of Sciences
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Maidan Garhi, New Delhi-110068
(2024)

Dear Student,

We hope, you are familiar with the system of evaluation to be followed for the Bachelor's Degree Programme. At this stage you may probably like to re-read the section on assignments in the Programme Guide that we sent you after your enrolment. A weightage of 30 percent, as you are aware, has been earmarked for continuous evaluation, which would consist of one tutor-marked assignment. The assignment is based on Blocks 1, 2, 3 and 4.

Instructions for Formatting Your Assignments

Before attempting the assignments, please read the following instructions carefully.

- 1 On top of the first page of your answer sheet, please write the details exactly in the following format:

ENROLMENT NO:.....
NAME:.....
ADDRESS:.....
.....
.....

COURSE CODE :

COURSE TITLE :

ASSIGNMENT NO.:

STUDY CENTRE : DATE:.....

(NAME AND CODE)

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

- 2 Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
- 3 Leave 4 cm margin on the left, top and bottom of your answer sheet.
- 4 Your answers should be precise.
- 5 While writing answers, clearly indicate the Question No. and part of the question being solved.
- 6 Please note that:
 - (i) Last date for submission of Assignment is December 31, 2024.
 - (ii) The response to this assignment is to be submitted to the Study Centre Coordinator within eight weeks of the receipt of this booklet in order to get the feedback and comments on the evaluated assignment.
 - (iii) In any case, you have to submit the assignment response before appearing in the term end examination.
- 7 **We strongly suggest that you should retain a copy of your assignment responses.**

Wishing you all good luck.

Tutor Marked Assignment
Inorganic Chemistry
Elective Course in Chemistry

Course Code: CHE-02
Assignment Code: CHE-02/TMA/2024
Maximum Marks: 100

Answer all the questions given below.

1. a) Give the names of the chemists who discovered scandium and germanium. (1)
- b) Explain Pauli's exclusion principle and Hund's rule. (5)
- c) What is the difference between electron affinity and ionisation energy. (4)
2. Explain the following: (2×5)
 - a) Atomic size generally decreases across the period and increases down the group in the periodic table.
 - b) The difference between the 1st and the 2nd ionisation energy of Li is much higher than that of Be.
 - c) In Group 17, HF has abnormally high melting and boiling points as compared to other hydrides of the group.
 - d) Intermolecular hydrogen bonding does not take place in *p*-nitrophenol.
 - e) Physical properties of isotopes of hydrogen are different.
3. a) Give the structure of the following complex ions: (5)
 - i) $[\text{BeF}_4]^{2-}$
 - ii) $[\text{Be}(\text{C}_2\text{O}_4)_2]^{2-}$
- b) Give the reaction of aqua regia with gold. (2)
- c) Explain giving suitable reactions whether NaNH_2 acts as an acid or a base in liquid ammonia. (3)
4. a) Give the method of preparation of pure crystalline boron. (2)
- b) Why corundum finds many applications in abrasives, refractories and ceramics? (4)
- c) Explain the structure of diborane. (4)
5. a) Explain the differences in structure and bonding in trimethylamine and trisilylamine. (6)
- b) Give the process of extraction of phosphorous. (4)
6. a) What are the two allotropic forms of oxygen? Differentiate between them and write the method of preparation of each of these. (6)
- b) Explain why there is large difference in the melting and boiling points of oxygen and sulphur. (4)

7. a) How did Moissan prepare fluorine? What are the modifications done to his method? (5)
- b) Describe the following in brief:
- i) Basic properties of halogens
- ii) Nature and stability of halogen oxides (5)
8. a) What are clathrates? What is the criteria of formation of clathrates? (5)
- b) What is the significance of beneficiation of ores? List various methods used for the same. (5)
9. a) What factors determine whether a complex is high spin or low spin? (3)
- b) Describe the difference between a high spin and a low spin d^6 complex. (4)
- c) Explain which one of $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ and $[\text{Fe}(\text{CN})_6]^{4-}$ complex ions is high spin and which one is low spin? (3)
10. a) Chemical properties of the transition metals vary widely from element to element. In contrast, the inner-transition metals markedly resemble each other chemically. Explain. (5)
- b) All the lanthanide elements form generally stable compounds in +3 oxidation state. Then, why do cerium and europium form most stable compounds in + 4 and + 2 oxidation states, respectively? (3)
- c) Why do many transition metals exhibit a +2 oxidation state in their compounds? (2)