

ASSIGNMENT BOOKLET**Bachelor's Degree Programme (B.Sc.)****INORGANIC CHEMISTRY****(Valid from 1st January, 2022 to 31st December, 2022)****It is Compulsory to submit the Assignment before filling in the
Term-End Examination Form.****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
Indira Gandhi National Open University
New Delhi
(2022)

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 per cent, 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 Assignment

Before attempting the assignment, 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 :

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 answered.
 6. Please note that:
 - i) The Assignment is valid from 1st January, 2022 to 31st December, 2022.
 - ii) The response to this assignment is to be submitted to the Study Centre Coordinator within 12 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 submission of examination form for 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/2022
Maximum Marks: 100

Note: Answer all the questions given below.

1. a) Answer the following in brief: (5)
- i) Who developed the periodic law?
 - ii) Who discovered the concept of atomic number and when?
 - iii) Who discovered eka-silicon and when?
 - iv) Write the full form of IUPAC.
 - v) What is a 'triad'?
- b) Explain the following. (5)
- i) van der Waals radii are larger than the covalent radii.
 - ii) Second ionisation energy of an element is larger than the first.
 - iii) Electron affinity of nitrogen is lower than that of oxygen.
 - iv) Electronegativity decreases down the group.
 - v) Covalent radii decrease across the period.
2. a) i) What is the difference between intermolecular and intramolecular hydrogen bonding? Explain with suitable examples. (5)
- ii) Explain briefly *ortho* and *para* hydrogen.
- b) Fill in the following blanks: (5)
- i) Lepidolite is an ore of
 - ii) Solubility of alkali metal fluorides in water down the group.
 - iii) Lithium hydride on reaction with AlCl_3 gives.....
- Write down the electronic configuration of the following.
- i) Li ii) Na iii) K iv) Cs
3. a) i) Discuss briefly the anomalous nature of beryllium. (5)
- ii) Complete the following reactions:
- $$\text{Ca (OH)}_2 + \text{CO}_2 \xrightarrow{\text{chlorophyll}} \dots\dots\dots + \dots\dots\dots$$
- $$6 \text{CO}_2 + 6 \text{H}_2\text{O} \xrightarrow{\text{Sunlight}} \dots\dots\dots + \dots\dots\dots$$
- b) Answer the following questions in brief. (5)
- i) For what purpose boranes are used?
 - ii) What are borides?
 - iii) Give the (best) preparation of borazole.
 - iv) Give the reaction of aluminum hydride with water.

4. a) Fill in the blanks in the following: (5)
-electrodes are used in the extraction of aluminium.
 - tends to dissolve lead and may cause lead poisoning.
 - is the amorphous form of silica.
 - are layer structured silicates.
 - Tetrafluoroethene can be polymerised thermally to a chemically inert plastic, commercially known as
- b) Show the different ways of representing a $[\text{SiO}_4]^{4-}$ tetrahedron. (5)
5. a) Answer the following questions. (5)
- Which compounds of phosphorus are used in match industry ?
 - Which compound of arsenic is used to decolourise bottle glass?
 - What is phosphorescence?
 - Why a high pressure is maintained during the preparation of ammonia?
- b) Draw the structures of PCl_5 in both gaseous and solid state. (5)
6. a) Give two important uses each for sulphur, selenium and tellurium. (5)
- b) Explain the following: (5)
- The bonds between sulphur and oxygen are much shorter than expected for a single bond in its oxides and may be considered as double bond.
 - SO_2 is a strong reducing agent in aqueous solution (Illustrate with the help of reactions).
7. a) Answer the following questions in brief. (5)
- The bond dissociation energy decreases going down the group from chlorine to iodine. However, contrary to this trend the bond dissociation energy of fluorine is less than that of chlorine. Explain why?
 - How are chlorine, bromine and iodine able to exhibit oxidation states of + 3, + 5 and + 7.
 - Which will be more acidic in the following pairs of oxoacids and why?
 HOClO_2 and HOClO_3
 HOCl and HOBr
- b) i) What are pseudohalogens? Explain with the help of an example. (5)
ii) Write down the reaction of fluorine and chlorine with water.
8. a) Explain the structure of xenon difluoride molecule with the help of Valence Bond Theory. (5)
- b) Chromium and copper in the ground state have $3d^5 4s^1$ and $3d^{10} 4s^1$ electronic configurations respectively. Explain? (5)
9. a) Lanthanide elements in general exhibit stable oxidation state of + 3 in their compounds. However, for cerium and ytterbium, the + 4 and + 2 oxidation states, respectively are more stable than their + 3 oxidation state. Explain. (5)
- b) Discuss the splitting of d orbitals in a square planar crystal field. (5)
10. a) Explain the structure of $[\text{FeF}_6]^{3-}$ ion on the basis of Valence Bond Theory. Discuss the weaknesses of the Valence Bond Theory. (5)
- b) Discuss the application of hydrometallurgy for the extraction of metals from low grade ores. (5)