BCHCT-131

ASSIGNMENT BOOKLET

Bachelor's Degree Programme
(BSCG)

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY AND ALIPHATIC HYDROCARBONS

Valid from 1st January, 2022 to 31st December, 2022

School of Sciences
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110068
(2022)

Dear Student,

Please read the section on assignments in the Programme Guide for B. Sc. 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** for this course. The assignment is in this booklet, and it consists of two parts, Part A and B. It covers all blocks of the course. The total marks of all the parts are 100, of which 35% are needed to pass it.

Instructions for Formatting Your Assignments

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:

ROLL NO.: ……

NAME: ……

ADDRESS: ……

……

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COURSE CODE: …….

COURSE TITLE: …….

ASSIGNMENT NO.: ……..…

STUDY CENTRE: ……..….. **DATE:** …….……...

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) Solve Part (A) and Part (B) of this assignment, and **submit the complete assignment answer sheets within the due date.**

6) The assignment answer sheets are to be submitted to your Study Centre within the due date. **Answer sheets received after the due date shall not be accepted.**

   We strongly suggest that you retain a copy of your answer sheets.

7) This assignment is **valid from 1st Januarey, 2022 to 31st December, 2022**. If you have failed in this assignment or fail to submit it by December**, 2022**, then you need to get the assignment for the year **2023**, and submit it as per the instructions given in the Programme Guide.

8) **You cannot fill the examination form for this course** until you have submitted this assignment.

We wish you good luck.

ASSIGNMENT

Atomic Structure, Bonding, General Organic Chemistry and Aliphatic Hydrocarbons
Core Course in Chemistry

Course Code: BCHCT-131
Assignment Code: BCHCT-131/TMA/2022
Maximum Marks: 100

Note: Attempt all questions. The marks for each question are indicated against it.

PART-(A) (50)

1. What were the expected and observed results of Geiger and Marsden's α-particle experiment? Explain with the help of suitable diagrams. (5)

2. What is photoelectric effect? How did Einstein explain it? (5)

3. (i) What are eigenfunctions and eigenvalues? (2)

   (ii)What is a well behaved function? Illustrate using a suitable diagram. (3)

4. Write the values of four quantum numbers for the electrons present in the following orbitals. (1+2+2)

   (i) 2*p* (ii) 3*d* (iii) 4*f*

5. (a) Write the electronic configuration of the elements platinum and gold. Also give reasons in support of your answer. (5)

6. Predict the coordination number of Mg^{2+} in MgO crystal and the crystal structure of MgO, if the ionic radius for Mg^{2+} is 65 pm and that for O^{2-} is 140 pm. (5)

7. (a) State Fajan's rules. Explain all the rules with suitable examples. (3)

   (b) Why are alkali metal chlorides more soluble than alkaline earth chlorides? Explain. (2)

8. Draw the Lewis structures of the following ions giving all the steps. (5)

   (i) S_2^{2-} (ii) OCl^- (iii) CN^-

9. Draw the resonance structures of cyanate ion. Out of them which one is less important as a resonance structure and why? (5)

10. Write the molecular orbital configuration of NO molecule and draw its energy level diagram. Also calculate its bond order. (5)

PART B

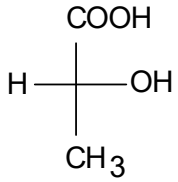
11. Draw the *cis*- and *trans*- forms of 1, 3-dimethylcyclobutane. Which one of these (5)

    (i) will be polar in nature?

(ii) has higher melting point?

Explain your answer giving reasons.

12. Write the enantiomer of the following compound: (5)



Assign *R*/*S* configuration to both the compounds.

13. Write the possible conformations of butane. Arrange these conformations in the increasing order of their stability giving reasons. (5)

14. Give reason for the following: (5)

(i) Ethanoic acid is more acidic than ethanol.

(ii) Aniline is less basic than ammonia.

15. With the help of two examples, compare the terms basicity and nucleophilicity. (5)

16. Give one example of each of the following: (5)

(i) Halogenation of alkane

(ii) Nitration of alkane

(iii) Isomerisation of alkane

(iv) Aromatization of alkane

(v) Pyrolysis of alkane

17. Explain the structures of a momoene and a diene. (5)

18. Explain Markovnikoff's rule giving suitable examples. (5)

19. Give mechanism of the following: (5)

(i) Hydrohalogenation of an alkyne

(ii) Ozonolysis of an alkyne

20. Give the molecular structure of the following compounds: (5)

(i) 2-Phenyl-1-octene

(ii) 2-Phenylbromoethane

(iii) 4-Bromotoluene

(iv) 1-Bromo-2-chlorobenzene

(v) Propylbenzene