BCHET-147

ASSIGNMENT BOOKLET

Bachelor's Degree Programme
(BSCG)

ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

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 January, 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

ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Course Code: BCHCET-147
Assignment Code: BCHET-147/TMA/2022
Maximum Marks: 100

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

PART A: ORGANOMETALLICS, BIOINORGANIC CHEMISTRY

1 Give the difference between organometallic and coordination compounds. (5)

2 Give the structure of dimeric trialkylaluminium. (5)

3 What is meant by hapticity regarding organometallic compounds? (5)

4 Explain the structure of $Mn_2(CO)_{10}$ based on valence bond approach. (5)

5 Calculate the total number of electrons for the compound $Co_2(CO)_8$. (5)

6 With suitable diagrams explain the polarity of the free CO molecule as well as when it binds with a transition metal cation. (5)

7 Arrange the following in decreasing order of C-O bond lengths giving justifications: (5)
$Ni(CO)_4$, $[Co(CO)_4]^-$, $[Fe(CO)_4]^{2-}$.

8 Give a short account of the essential elements occurring in biological systems. (5)

9 What is the role of magnesium ions in chlorophyll? Discuss. (5)

10 Describe the structure of hemoglobin along with a suitable diagram. (5)

PART B: POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

11 What are active methylene compounds? Give their two examples. Why are they named so? (5)

12 a) Give the reaction for following conversions : (2)
   i) Furfural to furan
   ii) Pyridine to 2-hydroxypyridine
   iii) Thiophene to 2,5-dihydrothiophene

   b) Give various resonance structures of carbocation formed during electrophilic substitution of furan. (3)

13 a) Why the 1st position of naphthalene is more reactive than 2nd position? Explain giving mechanism. (3)

   b) What are different classes of polynuclear hydrocarbons? Explain each of them with suitable examples. (2)

14 a) Compare the basicities of pyrrole and pyridine. (2)

   b) Give mechanism of Friedel Crafts acylation of anthracene. (3)

15 With the help of a suitable diagram explain the order of molecular orbital energies observed in small organic molecules. (5)

16 a) Explain blue shift. (3)

   b) Predict the shift in absorption intensity observed in chloroethylene. (2)
   CH_2=CHCl

17 Give the transitions that are observed in the electronic spectra of the acetylenic and (5)

the benzenoid chromophore.

18 Explain the solvent effect on electronic spectra for $n - \pi^*$ transitions. In which solvents are they particularly seen? (5)

19 Give the normal modes of vibrations of a triatomic linear and triatomic angular molecule with suitable diagrams. (5)

20 Explain the main bands appearing in the IR spectra of alkanes and alkenes. What are the differences in the IR spectra of these two classes of compounds? (5)