ASSIGNMENT BOOKLET

**Bachelor's Degree Programme
(BSCG)**

**SOLUTIONS, PHASE EQUILIBRIUM, CONDUCTANCE,
ELECTROCHEMISTRY & FUNCTIONAL GROUP ORGANIC
CHEMISTRY-II**

Valid from 1st January, 2023 to 31st December, 2023

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THE PEOPLE'S
UNIVERSITY

**School of Sciences
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110068
(2023)**

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, 2023 to 31st December, 2023**. If you have failed in this assignment or fail to submit it by June, 2023, then you need to get the assignment for the year 2024, 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

Solutions, Phase Equilibrium, Conductance, Electrochemistry & Functional Group Organic Chemistry-II
Core Course in Chemistry

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

Maximum Marks: 100

PART-(A) **(50)**

1. (a) What are ideal solutions? Give two examples of such solutions. (2)

    (b) Draw and explain the vapour pressure curves for an ideal solution. (3)

2. Draw and explain the mutual solubility curve for the phenol-water system. (5)

3. (a) How do the impurities Affect the CST values? Explain. (2)

    (b) Explain the stability of different phases of a pure substance in terms of chemical potential versus temperature curves. (3)

4. Define any five of the following terms: (5)
    (i)   Phase
    (ii) Azeotropes
    (iii) Congruent melting
    (iv) Concentration cell
    (v)   Conductometric titration
    (vi) Galvanic cells

5. (a) What is the criterion for phase equilibrium for a heterogeneous system at constant pressure and temperature? (2)

    (b) Define components in the context of phase rule. Calculate the number of components for the sublimation equilibrium of NH4Cl assuming that $NH_3(g)$ and $HCl(g)$ are produced from the sublimation of $NH_4Cl(s)$ only. (3)

6. (a) What is the triple point for a one component system? What is the degrees of freedom at the triple point? (2)

    (b) Draw and explain the phase diagram for a simple eutectic system and give an industrial application for the same. (3)

7. (a) Define molar conductivity and give its significance. (2)

    (b) In a conductivity cell, the two platinum electrodes, each having an area of 2 cm^2 are 1 cm apart. Using this cell the resistance of a 0.1 M solution of acetic acid is found to be 470Ω. Calculate the molar conductivity of the solution. (3)

8. (a) List the requirements for an electrolyte to be indicator electrolyte in the moving boundary method for the determination of transference numbers' (2)

    (b) In the determination of transference numbers of HCl by moving boundary method a 0.10 M solution of HCl was taken in a cell having uniform area of cross section of 1.0 cm^2. At the end of experiment the boundary moved by 10.3 cm and 0.132 g of silver was deposited on the cathode of silver coulometer. Calculate the transference numbers of ions of HCl. (3)

9. (a) Differentiate between reversible and irreversible cells. (2)

(b) Write the cell diagram for a galvanic cell in which the following reaction takes place. (3)

$$Sn(s) + 2\ Ag^+(aq) \rightarrow Sn^{2+}(aq) + 2\ Ag(s)$$
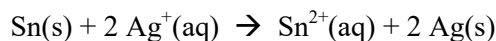
Assume that potassium nitrate is used as electrolyte in the salt bridge and the concentrations of tin ions and silver ions are c_1 and c_2 respectively.

10. (a) Define electrolysis. Name the gases evolved in the electrolysis of brine. (5)
    (b) Define liquid junction potential and describe its development.
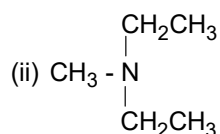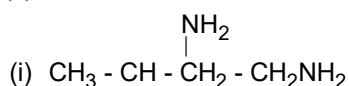
PART-(B) (50)

11. Discuss the mechanism of Hell-Vohlard-Zelinsky reaction. (5)

12. Write the mechanism and the products formed for the following reactions: (5)
    (5)

    (i) Reaction between $CH_3 - \overset{\displaystyle O}{\overset{\|}{C}} - Cl$ and CH_3NH_2

    (ii) Reaction between $C_2H_5 - \overset{\displaystyle O}{\overset{\|}{C}} - Cl$ and $(CH_3)_3N$

13. (a) Give the IUPAC names of the following compounds: (2)

    (i) $CH_3 - \overset{\displaystyle NH_2}{\overset{|}{CH}} - CH_2 - CH_2NH_2$

    (ii) $CH_3 - \overset{\displaystyle CH_2CH_3}{\underset{\displaystyle CH_2CH_3}{\overset{|}{\underset{|}{N}}}}$

    (b) Briefly explain the following reactions: (3)
    (i) Hofmann rearrangement
    (ii) Schmidt rearrangement

14. (a) How will you prepare the following compounds? Give reactions. (3)
    (i) 4-methylbiphenyl
    (ii) 4-hydroxyazobenzene
    (iii) butter yellow dye
    (b) How will you convert 4-bronobenzenmine to 4-bromobenzenol? (2)

15. (a) Discuss the nitrosation reaction of primary amines. (3)
    (b) Discuss the nitration reaction of aniline. How would you account for the formation of different products? (2)

16. (a) What is electrophoresis? Briefly explain. Also give its importance. (3)
    (b) What BOC-group? Which reagent is used to introduce this group? (2)

17. How will you synthesise valine using Gabriel phthalimide synthesis? (5)

18. Discuss the secondary structure of peptides. (5)

19. (a) Briefly explain the phenyl osazone formation by monosaccharides. (3)
    (b) Why do D-(+)-glucose and D-(+)-mannose give the same osazone? (2)

20. (a) What are polysaccharides? Give examples. (2)
    (b) Briefly explain the structure aspects of starch. (3)