

ASSIGNMENT BOOKLET**Bachelor's Degree Programme (B.Sc.)****PHYSICAL CHEMISTRY**

It is Compulsory to submit the Assignment before filling in the Term-End Examination Form.

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

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 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) 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 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 filling the exam for 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
CHE-04: PHYSICAL CHEMISTRY

Course Code: CHE-04
Assignment Code: CHE-04/TMA/2022
Maximum Marks: 100

Note: Answer all the questions given below. The marks are indicated in the brackets.

1. (a) Write the value of the acceleration due to gravity, g , in non-SI units. Convert this value in SI units. (2)
- (b) What are three types of catalysis? Give one reaction for each type to illustrate them. (2)
2. Derive the following relation for a gas: (5)
$$pV = \frac{1}{3} m N \bar{u}^2$$
3. What are critical constants? Derive the relationship between critical constants and van der Waals constants. (5)
4. Differentiate between boiling point and normal boiling point. Draw a diagram for the apparatus used for distillation and distillation under reduced pressure and explain its applications. (5)
5. Using suitable diagram, explain the face centred cubic (fcc) structure of sodium chloride. (5)
6. Derive temperature-volume relationship in a reversible adiabatic process. (5)
7. Explain the following terms: (5)
 - (i) Enthalpy of solution
 - (ii) Enthalpy of dilution
 - (iii) Enthalpy of neutralisation.
8. Calculate the following:
 - (i) Entropy of mixing of 2.00 mol of H_2 with 4.00 mol of O_2 assuming that no chemical reaction occurs. $\left(2\frac{1}{2}\right)$
 - (ii) Standard entropy of formation of H_2O (l) at 298.15 K using the data given the course material. $\left(2\frac{1}{2}\right)$
9. Derive the integrated form of Clausius - Clapeyron equation. (5)
10. Define the following terms: (5)
 - (i) Molality
 - (ii) Molarity
 - (iii) Normality
 - (iv) Mole fraction
 - (v) Parts per million
11. Derive the distribution coefficient when the solute associates in one of the solvents. (5)
12. Briefly explain laws of osmotic pressure. (5)
13. Giving suitable diagram, discuss the simple eutectic system highlighting its important features. (5)

14. Calculate the equilibrium concentrations of all the species at 613 K for the reaction, (5)

$$\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$$
 If the initial concentrations of the three gases is 0.30 M each and $K_c = 0.800$ M at 613 K. The volume of the vessel is 1 dm³.
15. At 298 K, the solubility product of Bi(OH)₃ is 4.0×10^{-31} . Calculate its solubility (5)
16. Calculate the degree of dissociation of water. You can use the data given in the course material for this purpose. (5)
17. Briefly discuss Weston cell using a suitable diagram. (5)
18. Derive the rate equations for second order reaction when (5)
 (i) a single reactant is reacting
 (ii) two different reactant molecules react.
 Also, give a suitable example for the above reactions.
19. For the photo chemical dissociation of hydrogen iodide, derive the following expression. (5)

$$-\frac{d[\text{HI}]}{dt} = 2I_a$$
20. Discuss protection of colloids giving importance of gold number. (5)