

ASSIGNMENT BOOKLET**Bachelor's Degree Programme (B.Sc.)****PHYSICAL CHEMISTRY****(Valid from 1st January, 2024 to 31st December, 2024)****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
(2024)

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, 2024 to 31st December, 2024.
 - 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/2024
Maximum Marks: 100

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

1. (a) Express the height of mercury column and density of mercury in SI Units. (2)
(b) Differentiate between lyophilic and lyophobic sols. (3)
2. Derive the following equation for the collision frequency: (5)
$$Z_{11} = \frac{1}{2} z_{11} n_0 = \frac{1}{\sqrt{2}} \pi \sigma^2 \bar{u} n_0^2$$
3. Show that for real gases (5)
$$V_c = 3b, P_c = \frac{a}{27b^2} \text{ and } T_c = \frac{a}{27Rb}$$
4. (a) Discuss the factors affecting surface tension of liquids. (3)
(b) Arrange the following in the increasing order of their viscosity: (2)
Glycerol, Benzene, Water
Give reason for your answer.
5. Draw and name fourteen Bravais lattices. (5)
6. Show that for a reversible adiabatic process, $TV^{\gamma-t}$ is constant. (5)
7. Calculate the standard enthalpy of formation of acetone vapour and acetone liquid. (5)
(Enthalpy of vapourisation of liquid acetone is 29 kJ mol^{-1}).
8. Write all the statements of the second law of thermodynamics. (5)
9. The free energy change ΔG for a reaction is $-221.00 \text{ kJ mol}^{-1}$ at 298 K and -201.00 kJ at 318 K. Calculate the enthalpy change for the reaction at 308 K. (5)
10. Discuss the boiling point-composition diagram of a liquid mixture showing positive deviation from Raoult's law. (5)
11. Discuss the principle of steam distillation. Also draw a suitable diagram for this process. (5)
12. Briefly discuss van't Hoff's laws of osmotic pressure. (5)
13. Draw and explain the phase diagram for KI-H₂O system. (5)
14. Derive the following equation: (5)
$$\frac{K_{p_2}}{K_{p_1}} = \frac{\Delta_r H^0 (T_2 - T_1)}{2.303 RT_1 T_2}$$
15. Show that for the hydrolysis of a salt of a weak acid and a weak base, (5)
$$K_h = \frac{K_w}{K_a K_b}$$
16. What is transference number? Discuss the Hittorf method of determination of transport number. (5)
17. What is standard hydrogen electrode? Explain with the help of a suitable diagram. (5)

Give the IUPAC rules for the sign convention in reporting the standard state half cell potentials.

18. For a second order reaction, show that (5)

$$\frac{1}{[A]_t} = \frac{1}{[A]_0} + kT$$

Also give one example of such a reaction.

19. What is quantum efficiency. Explain its calculation using chemical action meters. (5)

20. Explain the following terms: (5)

(i) Peptisation

(ii) Dialysis.