

## **ASSIGNMENT BOOKLET**

### **Post Graduate Diploma in Analytical Chemistry (PGDAC)**

<b>Basic Analytical Chemistry</b>	<b>(MCH – 001)</b>
<b>Separation Methods</b>	<b>(MCH – 002)</b>
<b>Spectroscopic Methods</b>	<b>(MCH – 003)</b>
<b>Electroanalytical &amp; Other Methods</b>	<b>(MCH – 004)</b>

**(Valid from January 1, 2026 to December 31, 2026)**

**It is compulsory to submit the assignment before filling in the examination form.**



**School of Sciences**  
**Indira Gandhi National Open University**  
Maidan Garhi, New Delhi-110068  
(2026)

Dear Learner,

This assignment booklet consists of the tutor marked assignments of MCH- 001, MCH- 002, MCH – 003 and MCH – 004 courses of the Post Graduate Diploma in Analytical Chemistry (PGDAC) programme. We hope, you are familiar with the system of evaluation to be followed for this Programme. You may probably like to re-read the section on assignments in the Programme Guide that was sent to you earlier. As you are aware, a weightage of 30 percent has been earmarked for continuous evaluation component. For this you have to submit the responses of the enclosed tutor marked assignments to the Study Centre Coordinator. The assignments are based on the content of all the blocks of all the courses.

Before attempting the assignment, please read the following instructions carefully.

- 1 On top of the first page of your assignment response, please write the details exactly in the following format; write your answers from second page onwards.

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**ENROLMENT NO. :** .....

**NAME :** .....

**ADDRESS :** .....

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**COURSE CODE :** .....

**COURSE TITLE :** .....

**ASSIGNMENT NO. :** .....

**STUDY CENTRE :** .....

**DATE :** .....

**(NAME AND CODE)**

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**PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.**

- 2 Use only foolscap size paper (but not of very thin variety) for writing your answers.
- 3 Leave about 4 cm margin on the left, top and bottom of your assignment response sheet.
- 4 Your answers should be precise.
- 5 While writing answers, clearly indicate the Question No. and part of the question being solved.
- 6 Though the validity of assignment is for one year, we advise you to submit the assignment response within 12 weeks after receiving it.
- 7 **We strongly suggest that you should retain a copy of your assignment responses.**

Wishing you good luck

# TUTOR MARKED ASSIGNMENT

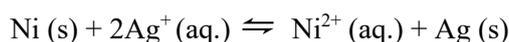
## BASIC ANALYTICAL CHEMISTRY

Course Code: MCH-001  
Assignment Code: MCH-001/TMA/2026  
Maximum Marks: 100

**Note:** Answer all the questions given below.

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1. a) What are optical methods of analysis? List different optical methods of analysis and explain the principle of fluorophotometry. (5)  
b) Discuss different means of minimizing errors and improving the accuracy of an analytical determination. (5)
2. a) The precision of a population of data is indicated in terms of standard deviation. Explain the meaning of standard deviation and illustrate the same with the help of an example. (5)  
b) What is meant by confidence level of an analytical data? The measurements of glucose levels in a patient suffering from diabetes gave the following results: 1.108, 1.100, 1.122, 1.088, 1.115, 1.099 and 1.075 g/L. Calculate the 95% confidence interval for the set; you may assume the value of  $C_n$  to be = 0.4 (5)
3. a) Why do we need to reject some data? Explain the '4d' rule for the rejection of a data. (5)  
b) What is meant by a 'sample' for analytical determination? Discuss the sampling of food materials. (5)
4. a) Why is it essential to consider the safety aspect at the time of the construction of the laboratory building? List any three requirements that must be met as per the norms in a chemical laboratory. (5)  
b) What is meant by incompatibility of chemicals? List different methods of storage of chemicals and state the recommendations for the safe storage of chemicals in a laboratory. (5)
5. a) A reactant A gives a product P in a first order irreversible reaction. Derive an integrated rate equation for the reaction. Calculate the time required for 90 % conversion of A to P if the time for 50% conversion is 30 s. (5)  
b) What is meant by the leveling effect of a solvent? Explain with the help of a suitable example. (5)
6. a) Which is more basic; 0.10 M NaOCl or 0.001M KOH. Justify your answer with calculations. (5)  
b) What is meant by buffer capacity? Calculate the buffer capacity of a solution, which is 0.10 M in formic acid and 0.10 M in sodium formate. ( $pK_a$  of acetic acid = 3.74). (5)
7. a) What are indicators? Discuss the Ostwald's theory of acid base indicators and derive an expression relating the pH and the concentration of two forms of the indicator. (5)  
b) Discuss the role of non-aqueous solvents in acid base titrations. (5)
8. a) Calculate the equilibrium constant of the following reaction and predict the direction of the reaction. (5)



Given:  $E^0_{Ni^{2+}/Ni} = -0.25$  and  $E^0_{Ag^+/Ag} = 0.80$

- b) What are oxidimetric reagents? Illustrate the use of potassium bromate as an oxidimetric reagent with the help of a suitable example. (5)
9. a) Differentiate between stepwise formation constants and overall formation constants for the formation of a complex with the help of an example. (5)
- b) What is Mohr titration? Explain the principle of Mohr's titration explaining the equilibria involved in end point determination. (5)
10. a) Organic reagents play an important role in gravimetric analysis. Describe the different types of reactions involved in such determinations. (5)
- b) Give a brief account of the role of computers in analytical instrumentation. (5)