

Ministry of Higher Education and Scientific research



**Department of Chemistry**

**College of Education**

**Salahaddin University-Erbil**

**Subject: Practical Physical Chemistry-Kinetics**

**Course Book – Stage three**

**Lecturer's name: Prof. Dr. Hassan H. Abdallah**

**Academic Year: 2023/2024**

# Course Book

<b>1. Course name</b>	<b>Practical Physical Chemistry</b>
<b>2. Lecturer in charge</b>	<b>Dr. Hassan H. Abdallah</b>
<b>3. Department/ College</b>	<b>Chemistry Dep. College of Education</b>
<b>4. Contact</b>	e-mail: <a href="mailto:Hassan.abdullah@su.edu.krd">Hassan.abdullah@su.edu.krd</a> Tel: (optional)
<b>5. Time (in hours) per week</b>	<b>Practical: 2</b>
<b>6. Office hours</b>	<b>Monday 9.30 am - 11.30 am Tuesday 10.30 am - 12.30 pm Wednesday 8.30 am – 11.30 am or by appointment</b>
<b>7. Course code</b>	
<b>8. Teacher's academic profile</b>	<a href="https://scholar.google.com/citations?user=hassan=en">https://scholar.google.com/citations?user=hassan=en</a>
<b>9. Keywords</b>	<b>Physical chemistry, kinetics, order or reactions, reaction mechanism</b>
<b>10. Course overview:</b>	
<p>The physical chemistry course is an important course that aims for a thorough understanding of the principle laws of kinetics, its applications and the thermodynamic functions of state in a chemical context. The application of kinetics in chemical reactions and industry and the role of surfaces and interfaces. In addition, the connection between thermodynamic quantities and the molecular structure of matter. The focus lies on a knowledge of chemical kinetics and the connection between physics and chemistry. It also introduces basic concepts that will form the foundation for topics like statistical thermodynamics, kinetics, and quantum chemical concepts. At the end of this course, student will have gained a thorough understanding and practical knowledge of kinetics.</p>	
<b>11. Course objective:</b>	
<p>To introduce intensive and extensive knowledge of the physical chemistry. To enrich students to understand the role of kinetics chemistry in science. To inculcate habit of scientific reasoning to do the task rationally. To develop skill and capabilities of students in solving problem of daily routine using reaction kinetics and Statistical thermodynamic Chemistry in Life.</p>	
<b>12. Student's obligation</b>	
<p>The students should attend all the practical, should submit reports and do all the tests and quizzes, should participate in discussion and question and answer activity.</p>	

### 13. Forms of teaching

Practical manual (hand out); Tutorials; Discussions; Independent study; Individual assignments

### 14. Assessment scheme

The students are required to submit reports of experiments, do at least two tests during the course and a number of quizzes and home work.

### 15. Student learning outcome:

Learning outcomes are:

- ✓ getting knowledge about chemical kinetics.
- ✓ applications of kinetics in chemistry and physics.
- ✓ describe the theories of kinetics.
- ✓ describe the rate of reactions and reaction order.
- ✓ how to explain the chemical potential of a chemical substance to describe the physical properties of mixtures.

### 16. Course Reading List and References:

1. Alberty, R.J., 2005. Physical chemistry. John Wiley & Sons, Inc..
2. Atkins, P. and De Paula, J., 2011. Physical chemistry for the life sciences. Oxford University Press, USA.
3. Castellan, G.W., 1983. Physical chemistry. Wesley Publishing Company.
4. Borgnakke, C. and Sonntag, R.E., 2022. Fundamentals of thermodynamics. John Wiley & Sons.
5. Fu, X.C., Shen, W.X., Yao, T.Y. and Hou, W.H., 1990. Physical chemistry. Higher Education, Beijing.
6. Internet.

<b>Practical Topics:</b>	<b>Lecturer's Name:</b>
Subject's Titles	Week
Introduction and safety arrangements	1
Effect of temperature on the rate of the reaction and determining the activating energy	2
Kinetics Catalysed Decomposition of Hydrogen Peroxide I	3
Kinetics Catalysed Decomposition of Hydrogen Peroxide II	4

Hydrolysis of methyl acetate in acidic medium	5
Reaction kinetic study of Potassium per sulfate with potassium iodide	6
<b>Midterm Examination</b>	7
Reaction kinetic study of acetone with iodine I	8
Reaction kinetic study of acetone with iodine II	9
Adsorption of acetic acid on activated animal charcoal I	10
Adsorption of acetic acid on activated animal charcoal II	11
Determination of the activation energy for the reaction of bromide and bromate ions in acid solution	12
Effect of ionic strength on the rate of reaction of persulfate – iodide reaction	13
Revision	14
Final Examination	15
<b>17. Extra notes:</b>	
<b>18. Peer review</b>	