

**Wollo University**  
**College of Natural Sciences**  
**Department of Chemistry**

**Course Title: Chemical Kinetics and Electrochemistry**

**Course Code: Chem2062**

**Credit Hours: 3**

**Instructor: FekaduChekol (PhD)**

**Contact Hours: 3 Lec.Hr./week**

**Pre-requisite: Chem2061**

**Academic year: 2012 E.C (2020 G.C)**

**Target group: 2<sup>nd</sup> year chemistry students**

**Semester: II**

**Learning Outcomes**

By the end of this course students should be able to:

- Explain electrochemistry
- apply the concept of conductance for analysis
- indicate the principle of electrolytic conduction
- apply the concept of chemical kinetics to predict mechanism of reaction

**Course outline**

**Chapter-One: Electrolytic Solutions**

- 1.1. Introduction
- 1.2. Transport properties and conductance
- 1.3. Activity and activity Coefficients
- 1.4. Chemical equilibria
- 1.5. Application of electrolytic cells

**Chapter-Two: Electrochemical Cells**

- 2.1. Introduction
- 2.2. Reversible electrodes
- 2.3. Thermodynamics of electrochemical cells
- 2.4. Determination of standard electrode potential
- 2.5. Classes of electrochemical cells
- 2.6. Liquid junction potential
- 2.7. Measurement of pH
- 2.8. Membrane potentials
- 2.9. Examples of electrochemical cells

**Chapter-Three: Interfacial Electrochemistry**

- 3.1. Potential differences across interfaces
- 3.2. The electrical double layer
- 3.3. Thermodynamics of electrified interface
- 3.4.
- 3.5. Electrochemical kinetics

**Chapter-Four: Kinetics Theory of Gases**

- 4.1. Postulates of the kinetic theory of gases
- 4.2. Ideal gas laws
- 4.3. Barometric formula
- 4.4. Distribution of molecular velocities
- 4.5. Molecular collisions
  - 4.5.1. Collisions with a surface or hole
  - 4.5.2. Transport phenomena

**Chapter-Five: Chemical kinetics**

- 5.1. The rates of chemical reactions
  - 5.1.1. Reaction rate laws: 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and zero order reactions
  - 5.1.2. Reversible or opposing reactions
  - 5.1.3. Consecutive or sequential reactions
  - 5.1.4. Parallel or side reactions
- 5.2. Chain reactions
- 5.3. Acid-base catalysed reactions
- 5.4. Enzyme catalysed reactions
- 5.5. Analysis of kinetic results
- 5.6. Reaction rate theories
  - 5.6.1. Collision theory
  - 5.6.2. Transition state theory

### Mode of Assessment

continuous assessment (not more than 10% for each assessments)	50%
End of Semester Examination	50%

### Course policy

Beside the university's policy on course delivery and evaluation, students are expected to actively participate in learning process by obeying the following course policies:

- Coming class on time (punctuality)
- Attend all class sessions
- Be prepared to learn and actively participate during class discussion
- Do all assignments, group works, project works, and presentations on time

- All students are expected to complete their own work to the best of their ability and cheating is strictly forbidden
- Do not miss quizzes, assignments, and exams unless you are forced due to health and other reasonable problems
- Cite all sources consulted to any extent (including material from the internet), whether or not assigned and whether or not quoted directly. It is strictly forbidden to take others work and present as own.
- Make-up class shall be conducted if classes are missed due to national holidays and/or when unpredicted conditions result in class dismissal

### Reference

1. P.W. Atkins, Physical Chemistry, Oxford University Press, Oxford-New York, 2002.
2. T.R. Forester, Introductory Physical Chemistry, Addis Ababa University, 1990.
3. G.M. Barrow, Physical Chemistry, 5<sup>th</sup> ed., TATA McGraw-Hill Edition, New Delhi, 1992.
4. K. K. Sharma, A textbook of physical chemistry, Vicas Publishing House, New Delhi, 1981.
5. R.A. Alberty and R.J. Silbey, Physical chemistry, Wiley and Sons Inc., New York, 1997.