

**CHEMISTRY LAB TOPISC**  
**for Students of Faculty of Mechanical Engineering**  
**Biomedical Engineering**  
**Semester I, year. 2025/2026**

**PHASE EQUILIBRIUM**

Gibbs phase rule. Phase diagrams: liquid - solid for the two component systems. Two and multi component systems. Thermal analysis. Cooling curves.

**ELECTROCHEMISTRY**

Corrosion. Protection from Corrosion. Chemical and electrochemical depositions of metal coating. Electrolysis. Types of half-cells. Standard Electrochemical potentials series. Methods of EMF (electromotive force) determination. Primary and Secondary Cells.

**WATER PHYSICS AND CHEMISTRY**

Water hardness and its types. Thermal and chemical methods of water softening. Ionites. Boiler feedwater treatment.

**CHEMICAL KINETICS**

Rate of chemical reaction. Collision Theory, Activated-Complex Theory. Rate constant. Order of the Chemical Reaction. Mechanisms of the Chemical Reactions – unimolecular, bimolecular and termolecular reactions. First and second-order rate equations. Temperature dependence of the rate constant. Activation Energy.

Complex Reactions: reversible, parallel, competitive. Oscillatory Reactions.

**CHEMICAL EQUILIBRIUM**

Chemical equilibrium and thermodynamics functions. Thermal dependency of chemical equilibrium. Heat reaction and temperature dependence. Solubility equilibrium. Conductometry. Conductivity measurements of the electrolytes. Measurement cell construction.

**REFERENCES**

1. P. Atkins, Physical Chemistry, Oxford University Press,
2. RS. Barry, SA. Rice, J. Ross, Physical Chemistry, Wiley & Sons, New York 1980.
3. A. Bard, Electrochemical Methods, Fundamentals and Application, Wiley & Sons, New York, 2001
4. A.P Gast, A.W. Adamson, Physical Chemistry of Surfaces, Wiley & Sons Inc. New York, 1997
5. Physical Chemistry Instructions: <http://zchf.fct.put.poznan.pl>.