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**THERMODYNAMICS LAB TOPIC**  
**For Students of Faculty of Chemical Technology**  
**Chemical Technology**  
**Semester III, year. 2023/2024**

### **PHASE EQUILIBRIUM**

Liquid – Vapour transition. Temperature dependence of vapour pressure, Clausius-Clapeyron equation. Raoult's law and Henry's law. Phase diagrams: liquid – vapour. Distillation, fractional distillation. Azeotropes. Gibbs phase rule. Phase diagrams: liquid - solid for the two component systems. Two and multi component systems. Thermal analysis. Cooling curves. Chemical potential of a component in ideal and real solution. Activity coefficients. Nernst's distribution law. Three component system. Phase diagrams: liquid – liquid. Extraction. Application of extraction process.

### **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.

Structure of coordination complexes. Chemical bonds. Creating and building complexes and types of complexes. Stability constants of complexes. Determination of the composition and stability constant of the complex. Spectrophotometry. Construction and operation of a spectrophotometer. Lambert-Beer's law. Deviations from Beer-Lambert Law. Heat reaction and determination. General principles of thermodynamics. Laws of thermodynamics. Internal energy and enthalpy. Molar enthalpy of formation, combustion, dissolution dilution. Calorimetry. Construction and types of calorimeters.

**Warning: Lab coat and safety glasses are required!**

### **REFERENCES**

1. P. Atkins, Physical Chemistry, Oxford University Press,
2. RS. Barry, SA. Rice, J. Ross, Physical Chemistry, Wiley & Sons, New York 1980.
3. Physical Chemistry Instructions: <http://zchf.fct.put.poznan.pl>.
4. Thermodynamics Lab Instructions <http://moodle.put.poznan.pl>