Type of study : Bacheleor

Module title: Molecular-kinetic theory of gasses

Module type: Elective

No ESPB: 6

Prerequisites :

Module aims:

Introduce the students to the microscopic behavior of molecules and interactions which lead to macroscopic relationships like the ideal gas law. Provide the main aspects of this phase transition.

Learning outcomes:

On completion of this module, student should be able to understand basic ideas and reasoning behind the microscopic behavior of molecules and the phase transitions. After completing the course content and learned student should have developed:

- General skills: Reading professional literatures. Writing term papers and presentations: Skilled performing experiments in laboratory conditions.
- Subject-specific skills: Successful adoption of the basic concepts of the molecular structure of matter, the forces of intermolecular interactions, phase transitions. Adoption of the basic concepts of classical statistics as an introduction to the understanding for further statistical physics courses.

Syllabus:

Macroscopic vs. Atomistic Description of a Gas. Atoms, Moles, and Avogadro's Number. Temperature and Thermal Equilibrium. Internal Energy of a Gas. Ideal Gas. Maxwell-Boltzmann distribution to predict trends in molecular speeds with temperature and mass. Relationship between energy, molecular speed, and temperature Relationship between energy, molecular speed, and temperature. Description physical basis of the van der Waal's equation and apply to real gases. Tabular thermal equations of state. Work and heat. The first and second low of thermodynamics. The phase transitions in molecular structure.The first- order phase transition. The second-order phase tranistion.

practical teaching:

A collection of experimental classes: Determination of latent heat of vaporization. The dependence of vapor pressure of the liquid temperature. Determination of surface tension by drops method. Temperature-dependence of the coefficient of viscosity. Boyle's Law in drooping pressures. Newton's law of cooling. Worked examples. Seminary from selected chapters of molecular physics and kinetic theory of gases.

Reading list:

1. Some chapters from the http://onlinelibrary.wiley.com/doi/10.1002/9783527618118.fmatter/pdf
2. Kuehn K. (2016) The Kinetic Theory of Gases. In: A Student's Guide Through the Great Physics Texts. Undergraduate Lecture Notes in Physics. Springer, Cham

Contact hours: 3+2	**Lectures:** 3	**Practical part:** 2

Methods of delivery: Lectures (3 hours per week), computational tasks (1 hours per week) and lab exercises (1 hours per week)