Level: bachelor

Course title: Kinetic theory of gasses

Status: elective

ECTS: 6

Requirements: none

Learning objectives

Introduction to the basic notions of the kinetics theory of gasses as well as to the laws governing the behaviour of the many particle system.

Learning outcomes

After completing the course, students should develop:

General abilities: capability of following professional literature, Internet search and preparation and presentation of a seminar paper.

Specific abilities: understanding the basic concepts of classical statistics and probability as introduction to understanding all higher courses using statistical physics.

Syllabus

Theoretical instruction

The basic assumptions of the molecular-kinetic theory of gasses. Dynamic and statistical laws. Basic equation of the kinetic theory of gasses. Gas laws: Boyle-Mariotte, Gay-Lussac, Avogadro's and Dalton's law. Equation of state of ideal gas and gas constant. The mean square molecular velocity. Boltzman constant and kinetic energy of the single molecule. Maxwell's molecular velocity distribution. The most probable velocity. Arithmetic average molecular velocity. The determination of the part of molecules possessing velocities in the given range and possessing energy higher than the given one. Number of molecules striking at vessel walls. Mean free path of the molecule. Boltzmann distribution. The determination of Avogadro's number. Transport processes in gasses. The foundations of the classical Boltzmann statistics. Entropy and probability. The application of Boltzmann statistics.

Practical instruction

Selected experimental exercises. Boyle-Mariotte's law for higher pressures. Newton's law of cooling. Temperature dependence of the coefficient of viscosity. The determination of the latent heat of evaporation. Temperature dependence of vapour pressure.

Weekly teaching load				Other:
Lectures: 3	Exercises: 1	Other forms of teaching: 1	Student research:	