Colloidal and Physical Chemistry (Ist year of study, Ist Semester)

Credit value (ECTS) 4

Course category
Domain (Imposed)

Course holder:
Lecturer PhD. Elena UNGUREANU

Discipline objectives (course and practical works)

Characterization of the matter aggregation states in the context of the structure-properties relationship;

• Defining and the proper understanding of the thermodynamic measures together with their measurement units and their application in calculating the energy variations of the reversible and irreversible physicochemical and biological processes;

• Defining the state of thermodynamic equilibrium and applying the information acquired in the characterization of physical phenomena, such as boiling, melting, sublimation, dissolution, solvent extraction, osmotic pressure, etc;

• Knowledge of kinetic parameters based on which the role and influence of factors in increasing the speed of physico-chemical phenomena (concentration, temperature, catalysts) are interpreted ;

• Defining and characterizing the interphase phenomena with applications in the food industry, such as: corrosion, surface tension, adsorption, capillarity etc;

Practical works seek to familiarize students with technical work in chemistry laboratories and knowledge of general notions relating to physical and chemical processes of substances with implications in food science and biotechnology.

Contents (syllabus)

Course (chapters/subchapters)
Introduction to colloid physical-chemistry. Sates of aggregation, macroscopic and microscopic properties
Thermodynamics (thermodynamic parameters: enthalpy, entropy, Gibbs energy)
Kinetics (reaction speed, chemical equilibrium)
Homogeneous dispersed systems (properties, solubility, transport phenomena)
Electrochemistry (electrolysis, electrode processes, corrosion)
Chromatography
Colloidal systems (interphase phenomena- adsorption, colloidal micelle)
Heterogeneous dispersed systems (colloidal soils and gels)
Food-complex colloidal systems

Practicum
Processing the working security and fire security regulations in the chemistry lab. Laboratory operations Lab tools. Weighing with the technical and analytical scale.
Substances purification methods: crystallization, dissolution, filtration, precipitation

Determining physical constants of liquids: density
pH: potentiometric determination of pH
Polarimetry: determining the optical activity of various solutions
Paper chromatography: ions separation and identification Cu^{2+}, Fe^{3+}, Co^{2+}
The acetic acid adsorption on coal
Analysis colorimetric methods. Qualitative and quantitative determination of the phosphate ion.
Peptidezing study of the ferric hydroxide precipitate
Identification and dosing the nitrates and nitrites
Soils preparation methods
Gels preparation methods
Final colloquium of knowledge evaluation

References

1. Price Nicholas C., Dwek R.A., Wormald M., Ratcliffe R.G. - *Principles and Problems in Physical Chemistry for Biochemists*, Ed. University of Oxford, 2017.
2. Smith Brian E. - *Basic Physical Chemistry*, Ed. Imperial College Press, 2013.
3. Teixeira-Dias, Jose J.C. - *Molecular Physical Chemistry*, Ed.Springer International Publishing AG, 2017.
4. **Ungureanu E.,** Trofin A. - *Bazele experimentale ale chimiei fizice şi coloidale,* Ed. Pim, 2013.
5. **Ungureanu E.,** Trofin A. - *Chimia fizică şi coloidală prin probleme*, Ed. Pim, Iaşi, 2014.
6. **Ungureanu E.,** Trofin A. - *Fundamentele chimiei fizice şi coloidale*, Ed. Pim, Iaşi, 2015.
7. **Ungureanu E.** - *Coloizi în industria alimentară*, Ed. Pim, Iaşi, 2017.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written examination	70%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	30%

Contact

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