Chemistry (Ist year of study, IInd Semester)

Credit value (ECTS) 4

Course category
Domain (Imposed)

Course holder:
Lecturer PhD. Elena UNGUREANU

Discipline objectives (course and practical works)

• The course is aimed at acquiring basic knowledge of general chemistry, the study of chemical elements and combinations, and the properties and importance of the main types of chemical systems found in living organisms and soil or directly related to them.

• 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, knowledge of general notions relating to physical and chemical processes of substances with implications in food science and biotechnology and interpretation of results.

Contents (syllabus)

Course (chapters/subchapters)
Introduction: atom, substance, chemical formulas and reactions
Chemical bonds: ionic, covalent, coordinative, metallic, specific and non-specific intermolecular bonds
Chemical reaction: electron transfer and proton transfer reactions
Homogeneous disperse systems: properties, solubility, methods for separation and purification, principles, solution concentrations
Electrochemistry: electrode processes
Elements and combinations: characterization of the elements in the periodic table groups
Sates of aggregation: macroscopic and microscopic properties
Chemical thermodynamics: characteristic values, principles of thermodynamics
Chemical kinetics: reaction rate, chemical equilibria in homogeneous and heterogeneous systems
Colloidal systems: classification, methods of obtaining and purification, properties

Practicum
Processing work safety and firefighting rules in chemistry lab. Introduction to general chemistry lab. Laboratory operations
The concentrations of the solutions
Volumetric neutralization reactions: determination of a sulfuric acid solution concentration
Volumetric oxidation-reduction reactions: permanganometry
Volumetric oxidation-reduction reactions: iodometry - determination of the concentration of a solution of iodine
Complexometry: determination of water hardness.
Substances purification methods: crystallization, dissolution, filtration, precipitation
Analytical balance. **Determining physical constants of liquids:** density
pH: potentiometric determination
Soils preparation methods
Gels preparation methods
Final colloquium of knowledge evaluation

References

1. Birzu A., Dumitraş M. - *Cinetica chimică. Aspecte fundamentale*, Ed. Matrixrom, 2008.
2. Goanta M., Gorodea I.- *Fundamentele Chimiei* Ed. Stef, Iasi, 2012.
3. Hiementz P. C., Rajagopolan R. - *Principles of Colloid and Surface Chemistry*, Ed.M. Deker Ink. New York, 1997.
4. Nemţoi Gh. - *Electrochimie. Aspecte fundamentale*, Ed. Tehnopress, Iaşi, 2011.
5. Onu A. - *Termodinamica chimică,* Ed. Tehnopress, Iasi, 2005
6. Price Nicholas C., Dwek R.A., Wormald M., Ratcliffe R.G. - *Principles and Problems in Physical Chemistry for Biochemists*, Ed. University of Oxford, 2017.
7. Trofin A., **Ungureanu E.** – *Aplicații de chimie generală*, Ed. Pim, Iaşi, 2013
8. Trofin A., **Ungureanu E.** - *Alfabetul elementelor chimice*, Ed. Pim, Iaşi, 2015.
9. **Ungureanu E.** - *Chimia prin experimente*, Ed. Pim Iaşi, 2012.
10. **Ungureanu E.,** Trofin A. - *Fundamentele chimiei fizice şi coloidale*, Ed. Pim, Iaşi, 2015.

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Exam	Written examination	60%
Appreciation of the activity during the semester	Oral assessment during the semester, verification tests and final laboratory colloquium.	40%

Contact

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