TEACHING DISCIPLINE: CHEMISTRY, Environmental Engineering, Ist year, 1st semester

Credit value (ECTS): 4

Course category: mandatory

Course holder: Trofin Alina Elena

Discipline objectives (course and practical works)

accumulation of general chemistry knowledge and the ability to apply them in understanding the specialized disciplines

• acquiring the fundamental notions of chemistry regarding the classification and properties of substances and their role in the soil-water-plant circuit;

Contents (syllabus)

Course (chapters/subchapters)
1. Introductory notions: matter, body, substance, atom, formulas and chemical reactions
2. The structure of the atom: general notions
2.1. The electronic structure of the atom
2.2. Atomic models
3. The periodic system
3.1. Structure, models of systems
3.2. Periodic and non-periodic properties of the elements
4. Chemical bonds
4.1. Ionic bond (electrovalence)
4.2. Covalent (covalence) and coordinative bond
4.3. Metallic bond
4.4. Specific and nonspecific intermolecular bonds
5. Chemical reaction
5.1. Electron transfer reactions
5.2. Proton transfer reactions
6. Homogeneous disperssed systems
6.1. Dissolution
6.2. Concentrations of solutions
7. Elements and combinations
7.1. Distribution of elements
7.2. Types of combinations
7.3. Characterization of the elements of the periodic system groups

Practical works
1. Processing of labor protection norms and P.S.I. in the chemistry lab. Introduction to analytical chemistry
2. Solutions concentrations
3. Volumetry by neutralization reactions. Determination of the concentration of a solution of sodium hydroxide

4. Volumetry by neutralization reactions. Determination of the concentration of a sulfuric acid solution
5. Volumetry by neutralization reactions. Determination of the concentration of an acetic acid solution
6. Volumetry by oxidation-reduction reactions: permanganometry
7. Volumetry by oxidation-reduction reactions. Dosage of Fe^{+2} ion from compounds. Identification of Fe^{+2}, Fe^{+3} ions
8. Volumetry by oxidation-reduction reactions: iodometry. Determination of the concentration of a solution of sodium thiosulphate
9. Volumetry by oxidation-reduction reactions: iodometry. Determination of the concentration of an iodine solution
10. Volumetry by oxidation-reduction reactions. Determination of the concentration of a sulphite solution (SO_3^{2-})
11. Complexometry. Determination of water hardness.
12. Volumetry by precipitation reactions. Chlorine ion dosing by the Mohr method.
13. Volumetry by precipitation reactions. Chlorine ion dosing by the Volhard method.
14. Knowledge verification test

Bibliography

1. **Neniţescu D.C. -** ***Chimie generală,*** **Ed. Did. Ped. Buc., 1980**
2. **Trofin A. –** ***Chimie generală,*** **Ed. StudIS, Iasi, 2018**
3. **Trofin A., Ungureanu E. –** ***Chimie anorganica si analitica,*** **Ed. PIM, 2011**
4. **Trofin A., Ungureanu E. –** ***Aplicații de chimie generală*****, lucrări practice, Editura PIM, Iaşi, 2013**

Evaluation

Evaluation form	Evaluation Methods	Percentage of the final grade
Course	Exam	60 %
	presence	10 %
Practical works	Tests (theory and practice)	30 %

Contact

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TEACHING DISCIPLINE: CHEMISTRY, Environmental Engineering, Ist year, 2nd semester

Credit value (ECTS): 4

Course category: mandatory

Course holder: Trofin Alina Elena

Discipline objectives (course and practical works)

• accumulation of general chemistry knowledge and the ability to apply them in understanding the specialized disciplines
• acquiring the fundamental notions of chemistry regarding the classification and properties of substances and their role in the soil-water-plant circuit;
• the correlation of the notions of chemistry with those of physiology, oenology, genetics
• acquiring laboratory techniques and interpreting chemical analyzes.

Contents (syllabus)

Course (chapters/subchapters)
1. Aggregation states
1.1. The gaseous state. Gas laws
1.2. Liquid state. Vapor pressure
1.3. Solid state. Characteristic sizes, crystalline systems
1.4. Plasma
2. Chemical thermodynamics
2.1. Thermodynamic principles
2.2. The laws of thermochemistry
3. Chemical kinetics
3.1. Reaction speed
3.2. Chemical equilibria in homogeneous and heterogeneous systems
4. Homogeneous dispersive systems
4.1. Properties, solubility
4.2. Methods of separation and purification
5. Electrochemistry
5.1. Electrode processes
5.2. Characteristic factors
5.3. Electrometric methods of measurement
5.4. Corrosion
6. Interphase phenomena
6.1. Adsorption - characteristic sizes, types of adsorption, applications
6.2. Chromatographic processes
7. Heterogeneous dispersed systems
7.1. Classification
7.2. Methods of preparation
7.3. Characteristic properties
7.4. Methods of purification
8. Micro-heterogeneous systems (aerosols, emulsions, foams, capillary structured systems and compact solids)

Practical works
1. Inorganic qualitative analysis. Dry analysis
2. Analytical balance weighing. Preparation of solutions of different concentrations
3. Physico-chemical processes: dissolution, filtration, crystallization
4. Determination of physical constants of liquids: density.
5. Colorimetric and potentiometric methods for pH determination.
6. Polarimetric methods of analysis. Determination of the concentration of some solutions: glucose, fructose, sucrose, maltose
7. Paper chromatography (Cu^{2+}, Fe^{3+} and Co^{2+})
8. Reactions in solution for anions: nitrate (NO_3^-), acetate (CH_3COO^-), carbonate (CO_3^{2-}), chloride (Cl^-)
9. Reactions in solution for anions: phosphate (PO_4^{3-}), oxalate ($C_2O_4^{2-}$) and sulfate (SO_4^{2-}) anions
10. Methods for preparing ultramicro heterogeneous dispersed systems (colloids)
11. Methods of gel preparation
12. Dosage of the phosphate ion (PO_4^{3-}) by the colorimetric method.
13. Dosage of manganese from vegetable products
14. Knowledge verification test

Bibliography

1. Nenițescu D.C. - *Chimie generală*, Ed. Did. Ped. Buc., 1980

2 Trofin A. – *Chimie generală*, Ed. StudIS, Iasi, 2018

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	presence	10 %
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