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| Course: Analytical Chemistry | | |
| Language: English | | |
| Lecturer: Assist. Prof. Šime Ukić, Ph. D. | | |
| TEACHING | WEEKLY | SEMESTER |
| Lectures | 2 | 30 |
| Laboratory | 1 | 15 |
| Seminar | 0 | 0 |
| | | Overall: 45 |
| | | ECTS: 5 |

PURPOSE: Collection, determination and interpretation of sample's information. Familiarising with classical qualitative and quantitative methods of chemical analysis.

THE CONTENTS OF THE COURSE:

1. Introduction to analytical chemistry. Basics. Sample-analyte-matrix-signal-information. Planning of the analytical work.
2. Chemical equilibrium and its role in controlling of the analytical system.
3. Acid-base reactions. Dissociation of acids and bases. Hydrolyzes of salt. Ampholites. Determination of pH value in solutions. Calculation examples.
4. Influence of pH value on composition of polyprotic acids and polyfunctional bases. Calculation examples.
5. Equilibrium of complexes. Precipitation reactions. Solubility product constant. Redox reactions. Electrode potential. Nernst equation. Constant of redox equilibrium.
6. Qualitative analysis. Dissolving of solid sample. Systematic analysis of cations. Systematic analysis of anions.
7. Gravimetry. Gravimetric methods. Weighting of analytical sample. Precipitation. Varieties and properties of precipitate.
8. Solubility of precipitate. Precipitate pollution. Avoiding the pollution and performing the purification. Drying and annealing of precipitate. Calculation examples.
9. Titrimetric methods of analysis. Indicators. Titration curve. End-point of titration. Equivalence point. Direct and back titration. Primary and secondary standards, characteristics. Standardization.
10. Acid-base titrations. Nature and applicability of acid-base indicators. Standards. Titration of strong and weak acids. Titration of strong and weak bases. Calculation examples.
11. Titration of polyprotic acids and polyfunctional bases. Acid-base titrations in non-aqueous media. Selection of solvent and indicator. Calculation examples.
12. Complexometric titration. EDTA complexes. Calculation examples.

13. Redox titrations. Regulation of electrode potential. Indicators for redox titrations. Varieties of redox titrations. Calculation examples.
14. Precipitation titrimetry. Mohr's, Volhard's and Fajans's titration methods. Calculation examples.
15. Gravimetric titrimetry. Culometric titrimetry.

GENERAL AND SPECIFIC COMPETENCE:

Student acquires basic knowledge relating analytical chemistry, prerequisite for solving analytical problems independently.

KNOWLEDGE TESTING AND EVALUATION:

Three (3) partial tests during the semester. Students can be released from exam if they collect sufficient points from the tests. If not, they need to pass written and oral exam.

MONITORING OF THE COURSE QUALITY AND SUCCESSFULNESS:

Student survey.

LITERATURE:

- Z. Šoljić, Kvalitativna kemijska analiza anorganskih tvari, FKIT, Zagreb, 2003.
- Z. Šoljić, Osnove kvantitativne kemijske analize, FKIT, Zagreb, 2003.
- M. Kaštelan-Macan, Analitička kemija, I dio (Gravimetrija), Sveučilište u Zagrebu, Zagreb, 1991.
- Z. Šoljić, M. Kaštelan-Macan, Analitička kemija: Volumetrija, FKIT, Zagreb, 2002.
- D. A. Skoog, D. M. West, F. J. Holler, Osnove analitičke kemije, 1st ed., Školska knjiga, Zagreb, 1999.
- D. C. Harris: Quantitative Chemical Analysis, W. H. Freedman and Co., New York, 2001.