Study program: Integrated academic studies of Pharmacy

Type and level of the study program: integrated academic studies

Course title: Preparative analytical chemistry in pharmacy (PhIII-PACH)

Teacher: Nataša B. Milić, Nataša P. Milošević , Mira P. Mikulić

Course status: elective

ECTS Credits: 3

Condition: Organic Chemistry 2; Analytical Chemistry 2; Instrumental Pharmaceutical Analysis

Course aim

The aim of this course is to introduce students with preparatory analytical methods and give them the knowledge necessary to select the best method to prepare samples for analysis.

Expected outcome of the course:

Mastering the theoretical aspects of analytical methods for sample preparation, introduction to the basic principles of instruments used in preparative chemistry analysis and their advantages and disadvantages.
Knowledge of various preparative and analytical methods for selection of the most appropriate methods for sample preparation.

Course description

Theoretical education

1. Errors in the quantitative analysis. The accuracy and precision.
2. Sample preparation. Sample storage.
3. Quality control in the process of sample preparation.
4. Extraction and preconcentration of the diluted sample.
5. Principles of extraction and the extraction of semi-volatile organic compounds from liquid samples.
6. Liquid-liquid extraction. Liquid-solid extraction.
7. Solid phase extraction-SPE.
8. Solid phase microextraction.
9. Stir bar sorptive extraction - SBSE.
10. Principles of extraction and the extraction of semi-volatile organic compounds from solid samples.
11. Soxhlet extraction.
12. Ultrasonic extraction.
13. Supercritical fluid extraction.
14. Microwave extraction.
15. Extraction with high pressure and temperature (Accelerated Solvent Extraction -ASE)
16. Extraction of volatile organic compounds from solid and liquid samples.
17. Static headspace extraction.
18. Dynamic headspace extraction of purge and trap.
19. Liquid-liquid extraction of large volume.
20. Membrane extraction.
21. Preparation of samples for analysis of metals.
22. Wet digestion.
23. Dry ashing method.
24. Preparation of water samples.
25. Methods of precipitation.
26. Preparation of sediment for direct atomic absorption spectroscopy.
27. Colorimetric methods.
28. Contamination of the sample during the analysis of metals.

Practical education: exercises, other forms of education, research related activities

Selected examples of theoretical and experimental exercises:

1. Theoretical comparison of extraction methods of semi-volatile organic compounds from liquid samples.
2. Theoretical comparison of extraction methods of semi-volatile organic compounds from solid samples.
3. Theoretical comparison of methods for extraction of volatile organic compounds from solid and liquid samples.
4. Theoretical comparison of methods of sample preparations for analysis of metals.
5. Selected experimental exercises of the extraction method for semi-volatile organic compounds from liquid samples.
6. Selected experimental exercises of the extraction method for semi-volatile organic compounds from solid samples.
7. Selected experimental exercises of the extraction method for volatile organic compounds from solid and liquid samples.
8. Selected experimental exercises of the sample preparation method for the analysis of metals.

Literature

Compulsory

1. Somenath M. Sample preparation techniques in analytical chemistry. John Wiley & sons, Inc, Publication Hoboken, New Jersey, 2003,

Additional

1. Internal script for practical education.

Number of active classes				Other:
Lectures: 30	Practice: 15	Other types of teaching:	Research related activities:	

Teaching methods: lectures, interactive classes, experiments, demonstrations

Student activity assessment (maximally 100 points)

Pre-exam activities	**points**	**Final exam**	**points**
Lectures	5	Written	50
Practices	20	Oral	
Colloquium		.....	
Essay	25		