

**Course title:** Chromatographic separation of phytochemicals – regular course

**Number of contact hours:** 30 hours (30 h laboratory)

**ETCS credits:** 2

**Course description:** The laboratory consists of exercises utilizing chromatographic techniques in characterization of phytochemicals in selected plant samples. For the aim of separation, the analytical and preparative techniques, including liquid chromatography (high-performance liquid chromatography, thin-layer chromatography and countercurrent liquid chromatography) will be applied. The aspect of hyphenation of liquid chromatography with detection will be presented on example of a liquid chromatographic-optical detection-mass spectrometric system. For the exercises, samples containing different phytochemical groups of polyphenolic metabolites will be prepared (e.g., flavonoids such as anthocyanins and flavonols, betalains, phenolic acids). The following chromatographic aspects will be exercised and discussed: basic chromatographic parameters, normal and reversed phase systems, kinds of chromatographic techniques, isocratic and gradient elution, eluent selection, types of analytical and preparative columns, types of chromatographic sorbents, setting of optimal preparative separation conditions, and modern liquid chromatographic devices.

**Education effects (P7S\_UW, P7S\_WG):**

- **knowledge:** student knows the most important types of liquid chromatographic techniques; knows the main phytochemical groups of compounds and methods of their determination, basic chromatographic parameters, normal and reversed phase systems, isocratic and gradient elution modes, eluent selection, types of analytical and preparative columns, types of chromatographic sorbents, setting of optimal preparative separation conditions, and modern liquid chromatographic devices.

- **skills:** Operation on modern devices of liquid chromatography. Preparation of samples for chromatographic analyses and for preparative isolation of compounds. Selection of eluent composition and planning eluent gradient. Selection of basic parameters for chromatographic separation and compound detection. Prediction of influence of chromatographic parameters on separation of compounds. Efficient monitoring of composition of obtained preparative fractions. Preparative isolation of natural compounds from complex matrices. Learning of techniques of eluate concentration. Computer assisted elaboration of obtained chromatograms in simple and complex chromatographic programs.

- **social:** student is able to work independently and in the group both at the laboratories and during preparation of the report; understands the economical aspects of the use of the chromatographic systems

**Literature:**

[1 ] J. Cazes (ed), Encyclopedia of Chromatography, New York, 2001, Marcel Dekker.

[2 ] K. Hostettman, A. Morston, Preparative Chromatography: Techniques, Applications, Berlin, 1998, Springer.

[3] O. M. Andersen, K. R. Markham (eds), Flavonoids: Chemistry, Biochemistry and Applications, Boca Raton, London, New York, 2005 CRC Press.

[4] A.J. Harborne, Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis, London, Chapman & Hall, 2013.

**Assessment method:** Final test, completing the laboratories (presence and delivering of reports from each performed exercise)

**Prerequisites:** Basic knowledge in organic and analytical chemistry

**Primary target group:** All specialties students

**Lecturer:** dr hab. inż. S. Wybraniec, Contact person: dr hab. inż. S. Wybraniec

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