Study Programme: Master Academic Studies in Chemistry

Course Unit Title: Thermal analysis of coordination compounds

Course Unit Code: IHN-512

Name of Lecturer(s): Associate professor Berta Barta Holló

Type and Level of Studies: Master of Science Degree

Course Status (compulsory/elective): Elective

Semester (winter/summer): Summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 5

Prerequisites: None

Course Aims: Obtaining knowledge on thermoanalytical techniques used for characterization of inorganic and coordination compounds. Enabling students to apply the theoretical principles of analysis in practice to choose the adequate thermoanalytical technique to characterize the coordination compounds.

Learning Outcomes:
After completing this course, student is able to:
- understand the principles of thermal analysis,
- apply thermoanalytical techniques for characterization of coordination compounds,
- to combine thermoanalytical techniques,
- interpret the obtained results
- estimate the temperature interval of stability/applicability of the compounds

Syllabus:
Theory The effect of temperature change on the physical and chemical properties of coordination compounds. Different thermoanalytical techniques in characterization of coordination complexes: thermogravimetry (TG), derivative thermogravimetry (DTG), differential thermal analysis (DTA), differential scanning calorimetry (DSC), thermomechanical and dynamic mechanical analysis (TMA and DMA). Simultaneous methods of thermal analysis. Detection
and analysis of evolved gases (EGD and EGA).
Practice Determination of thermal stability of known and new selected coordination complexes. Detecting the solvents in coordination compounds, observing the phase changes (melting, polymorphic forms, etc.) and determining the corresponding temperatures. Thermal methods for purity check. Solid state synthesis of new compounds. Explaining the mechanism of thermal decomposition.

Required Reading:
1. Principles of Thermal Analysis and Calorimetry, P. J. Haines (ed.), RSC Paperbacks, 2002.
2. Introduction to Thermal Analysis – Techniques and Applications, M. E. Brown (ed.) Kluwer Academic Publishers, New York, Boston, Dordrecht, London, Moscow, 2001.
3. Principles and Applications of Thermal Analysis, P. Gabbott (ed.) Blackwell Publishing Ltd., 2008.
4. Journal of Thermal Analysis and Calorimetry
5. Thermochimica Acta
6. Journal of Analytical and Applied Pyrolysis

Weekly Contact Hours:	**Lectures:** 2 (30)	**Practical work: 2** (30)

Teaching Methods:
Lectures, laboratory work, desk study projects, seminar(s)

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation	5	written exam	30
Practical work	15	oral exam	30
Preliminary exam(s)	20	…….	