Subject: equilibria in analytical chemistry
Teacher or teachers : Djurdjevic T. Predrag
Status of course: Obligatory
Number of ECTS: 10
Condition: Admitted semester and a certificate from modern electrochemical and optical methods in analytical chemistry
The goal of course Getting to know the characteristics of equilibrium states of various types of chemical reactions and the importance of balance for the separation of elements and their quantitative determination. Introducing mathematical methods to calculate the equilibrium concentration of components in complex mixtures. Studying the possibility of identifying the components of complex mixtures based on thermodynamic properties of equilibrium reaction of the analyte and the added reagent (titrant). Getting to know the instrumental determination of analytes in mixtures on the basis of equilibrium of the reaction of the analyte and the reagent added.
The outcome of cases After completing this course students should acquire the ability to choose the most appropriate analytical method for analyzing mixtures of components in different types of matrix determined equilibrium constants of different types of chemical reactions and on the basis of calculating the concentration distribution of components in complex mixtures.
Outline Thermodynamic characteristics of steady state. The change of Gibbs free energy of reaction and chemical potential of the components of the mixture. The thermodynamic equilibrium constant. Dissociation constants and constant formation. Total and successively equilibrium constants. Macro and micro equilibrium constants. Acid-base equilibria in aqueous solutions. The dissociation constants of ampholytes. Correlation between Gibbs energy of acid base reactions and equilibrium constants. The distribution of ionized species in solution. Equilibria in buffer solutions. Equilibria in complex acid-base systems. Potentiometric titration of mixtures of weak acids or bases. Heterogeneous equilibrium. The influence of the concentration of hydrogen ions and complexing agents on solubility. Differential precipitation and solubility. Calculating the distribution of soluble and insoluble species in heterogeneous systems. Complexation equilibria. Complexing agents. Conditional equilibrium constants. Utility concentration variables: average ligand number, mole fraction, alpha faction. Froneausova function. The curves forming. Education ordinary and mixed complex. Polynuclear complexes. Electrometrically and spectral test methods complexation reactions. Redox balance. Voltammetric study of the redox balance. The extraction and ion exchange.
Recommended reading : 1. J. Inzedy, Analytical Applications of Complex Equilibria, London, Chichester, 1976.

Number of active classes	Lectures: 5	Research work: /
Teaching methods: Lectures, seminars and colloquium.		

Evaluation of knowledge (maximum score 100)

Pre exam duties	**Points**	**Final exam**	**Points**
Activity during the lectures	10	Test paper	-
Practical classes	-	Oral exam	30
Colloquium	20	.....	
Seminar	40		