UNIVERSITÀ DI PISA

ANALYTICAL CHEMISTRY I + LABORATORY

STEFANIA GIANNARELLI

Anno accademico	2020/21
CdS	CHEMISTRY
Codice	225CC
CFU	9

Moduli	Settore/i	Tipo	Ore	Docente/i
CHIMICA ANALITICA I + LABORATORIO	CHIM/01	LEZIONI	180	ILARIA BONADUCE STEFANIA GIANNARELLI JEANNETTE JACQUELINE LUCEJKO

Learning outcomes

Knowledge
The student who successfully completes the course will be able to demonstrate a solid knowledge of fundamental concepts and principles of quantitative chemical analysis including quantitative chemical equilibrium calculations and error analysis applied to the evaluation of experimental measurements and data, focusing on topics which are fundamental for the subsequent use of instrumental analytical techniques. The introductory course in analytical chemistry emphasizes quantitative methods of analysis coupled with a heavy dose of equilibrium chemistry. Analytical chemistry, however, is more than Equilibrium chemistry and a collection of analytical methods; it is an approach to solving chemical problems.

Assessment criteria of knowledge
In the written exam (3 hours), the student must demonstrate his/her knowledge of the course material and to organise an effective and correctly written reply. During the oral exam the student the student will be assessed on his/her demonstrated ability to discuss the main course contents using the appropriate terminology.
Methods:

- Final oral exam
- Final written exam
- Final lab test

Teaching methods
Delivery: face to face
Learning activities:

- attending lectures
- participation in discussions
- individual study
- Laboratory work
- Practical

Attendance: Mandatory
Teaching methods:

- Lectures
- Seminar
- Task-based learning/problem-based learning/inquiry-based learning
- laboratory

Syllabus
Acid-base equilibria: Acid and base definition. Autoprotolysis of solvent and pH definition. Constants, pH calculation of acids, bases and salts solutions. Acid-base titrations. Acid-base buffer solutions. Choice of one-colour, two-colour indicators. Calculation of titration error. Complexometric equilibria: Definition of complex and stepwise formation of complex in solution. Equilibrium and stability costants. Conditional stability constants.Complexometric titrations. Metallochromic indicators. Solubility equilibria: Solubility and solubility constants. Influence of side reactions (effect of common ion and pH) on solubility. Precipitation titration. Precipitation indicators. Redox equilibria:Nernst equation. Standard and conditional potential. Influence of pH and formation of precipitates and complexes. Redox titrations and theoretical titration curve.

Evaluation of the equivalence point by redox, metallochromic, autoindicators and and potentiometric measurements. Potenziometry

Bibliography

Recommended reading includes the following works: - Chimica analitica quantitativa, Daniel C. Harris, Zanichelli, 2 Edizione,2005 ISBN: 8808075419 ISBN-13: 9788808075413 - Elementi di chimica analitica, Daniel C. Harris, Zanichelli, 1999 ISBN: 8808099814 ISBN-13: 9788808099815 - Chimica Analitica - una introduzione, Skoog - West - Holler, EdiSES, 3 Edizione, 1996 ISBN: 8879590847 ISBN-13: 9788879590846 - Fondamenti di chimica analitica, Douglas A. Skoog, Donald M. West, Edises, 2 Edizione, 2005 ISBN: 8879593005 ISBN-13: 9788879593007 Further bibliography will be indicated.

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