UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Aquatic Chemistry

2021-3-E3201Q087

Aims

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Study of the processes that regulate the chemical composition of a water body.

The student acquires knowledge of the chemical parameters useful for assessing water quality.

Knowledge and understanding
At the end of the course the student knows:
The main chemical reactions in the water: the hydrolysis reactions, the ox-red reactions, the precipitation reactions of the salts applied to closed and open systems.

Water purification processes.

Applied knowledge and understanding

At the end of the course the student is able to:
Calculate the chemical composition of a water as a function of pH in an open and closed system
Calculate the total alkalinity of a water
Calculate the electronic activity of a water

Autonomy of judgment

At the end of the course the student is able to:
Identify the main chemical species of water in open and closed systems
Identify water purification processes.

Communication skills

Exposing, in a clear and concise manner, the main chemical reactions in the water compartment.

Learning skills

Apply the acquired knowledge of water chemistry to the different types of water. Understanding the topics of environmental chemistry in past and present scientific literature.

Contents

The overall aim of the AQUATIC CHEMISTRY course is to provide an understanding of equilibria in aqueous solution. Applications for the water quality characterization and water treatments.

Detailed program

pH and buffer intensity, CO_2,HCO_3^-, CO_3^{2-} equilibria in natural waters;

Acidity and alkalinity of water:

Coordination compounds; metal ions speciation;

Redox reactions, redox conditions in aqueous solution;

redox potentials; standard redox potentials and Nerst equation; water composition as a function of the redox potential;

Solubility product; common ion effect; solubility of metal hydroxides; solubility of carbonates; solubility-pH diagrams; the control of alkalinity and metal ion concentration;

Adsorption of ions and organic compounds; ionic exchange; colloids, coagulation and flocculation processes;

Water quality characterization; chemical processes in wastewater treatments.

Prerequisites

Fundamentals of general and organic chemistry.

Teaching form

Lessons, online, recorded videos, 6 credit, 48 hours

The course includes 6 credits of online lectures by presenting slides and topics.The teaching method develops the topics through a historical time.

Textbook and teaching resource

Teaching material can be available on the e-learning platform: http://elearning.unimib.it/course

Suggested reading:

W. Stumm, J. J. Morgan Aquatic Chemistry, Wiley, 1996

Semester

Second semester

Assessment method

Oral examination via web for COVID-19

Mark range 18-30/30

The exam consists in the assessment of the knowledge acquired by the student in the field of water chemistry, with particular attention to logC-pH charts, alkalinity, salt dissolution and Ox-Red reactions.

In the oral examination via web, the student will be assessed on the basis of the following criteria: 1) knowledge and understanding; 2) connection of the different concepts; 3) reasoning autonomy.

Office hours

The professor. Ezio Giovanni Bolzacchini receives the students by appointment by email: ezio.bolzacchini@unimib.it