

COURSE SYLLABUS

Chemistry of Marine Environment

2223-1-F7502Q001

Aims

The course aims at providing fundamental knowledges concerning the processes and mechanisms that regulate the chemical composition of the sea and oceans. A special attention is given to climate change impact on the chemistry of the Oceans.

Contents

The course CHEMISTRY OF MARINE ENVIRONMENT provides an understanding of the chemical composition of seawater and related chemical reactions. Equilibrium and steady state conditions in aqueous solution are discussed. A particular attention is also given to priority and emerging pollutants.

Detailed program

Properties of Water. Isotopes in seawater. Salinity and major constituents of seawater. Acoustic wave transmission in the sea, osmosis. Air-sea exchange of gases. Equilibrium and steady state models. Acid-base reactions. pH, chemical composition, buffer intensity in the oceans. CO_2 , HCO_3^- , CO_3^{2-} equilibria in oceans and seawater. Log C – pH diagrams. Acidity and alkalinity. Concept of ocean acidification. Solubility, solubility-pH. Trace metals; metal ions speciation. Organic matter in the sea. Nutrients. Microplastics. Organic pollutants (i.e. hydrocarbons, pesticides, dioxins and PCBs, flame retardants, and endocrine substances). Reaction in anoxic environment. Atmospheric-ocean interaction: marine aerosols and their photochemistry and atmospheric aerosol as a source of nutrients. Geo-engineering climate and the oceans.

Prerequisites

Basics of inorganic and organic chemistry.

Teaching form

Frontal lessons

Textbook and teaching resource

Slides and two textbooks:

- 1- An Introduction to the Chemistry of the Sea, 2?? ed., Michael EQ Pilson, Cambridge University Press, 2013.
- 2- Chemical Oceanography, 4th Ed., Frank J. Millero, CRC press, Taylor & Francis Group, 2013

Semester

Second semester

Assessment method

Oral exam with written parts. The written parts are part of the oral exam during which the students have to demonstrate the capability to manage the most important chemical equilibrium equations concerning the chemistry of the sea or they have to write the most important equations concerning the Alkalinity or draw the vertical profile behaviour of the most important chemical components of seawater in different oceans.

Office hours

Office at 3rd floor of U1 building (Piazza della Scienza 1, Milano). Office hours usually 10:30-12:30 a.m. on tuesday.

Sustainable Development Goals

CLIMATE ACTION
