

Module Title: Potentiometric techniques
Module Code: AM0915
Maximum Number of Students: 20
Total ECTS Credits 2
Notional Learning Hours (a) Contact Time - 15h (b) Private Study - 35h Format of Teaching: Lectures 10 h Laboratories or Practicals 5 h Other 0 h Teaching Strategy: Formal lectures in 60/90 min timetable. Two 2h 30m laboratory practicals.
Convener: J.P. Pinheiro
University: University of Algarve
Language of Tuition: English
Module Description - The Purpose or Aims: <ol style="list-style-type: none"> To describe the fundamental concepts of potentiometry. To introduce analytical potentiometric techniques their operation and applications.
Learning Outcomes: At the end of the module the learner is expected to be able to: <ol style="list-style-type: none"> understand the fundamentals of potentiometric measurements and their practical application correctly identify and describe the principles and instrumentation in potentiometry critically analyze and evaluate the results of a potentiometric measurement especially the associated errors
Summary of Course Content: Definition of electrochemical potential and explanation of Nernst equation. The electrochemical cell and the determination of electrode potentials. Potentiometric techniques with emphasis on pH measurement and the operation of the different classes of selective electrodes. New potentiometric sensors and recent applications of potentiometric techniques.
Transferable Skills Taught: <i>Communication:</i> Writing chemical analysis reports <i>Information Technology:</i> Literature search tools and methodologies

Assessment Methods:

1. LO1 – Written Examination (40%)
2. LO2 – Laboratory Work Assignment (30%)
3. LO3 – Literature search assignment (30%)

Assessment Criteria:Threshold

- LO1 – to understand the concept of electrochemical potential and be able to explain the Nernst equation
LO2 – to understand the operation of an electrochemical cell and the determination of electrode potentials
LO3 – to correctly perform a potentiometric analysis using a method already implemented
LO4 – to be able to find relevant literature to set up a potentiometric analysis methodology for a given sample

Good

- LO1 – to critically analyze the operation of an electrochemical cell and the determination of electrode potentials and discuss the errors involved
LO2 – to develop and optimize a potentiometric analysis method for a given analysis
LO3 – to be able to find in the literature the most adequate potentiometric analysis methodology for a given sample

Excellent

- LO1 – to relate the fundamental concepts of potentiometry with the experimental set-up and the functioning of the different electrodes, and from there to propose the best strategy to minimize the time and optimize the cost of analysis
LO2 – given a set of samples, to choose the best available potentiometric analysis method to analyze each sample

Resource Implications of Proposal and Proposed Solutions:

Lecture notes will be available for students.

Recommended reading:

Basic:

"Quantitative Chemical Analysis", Daniel C. Harris, Freeman, 6th ed., 2003.

"Electrode Potentials", Richard G. Compton, Giles H.W. Sanders, Oxford Chemistry Primers, Oxford Science, 1996

"Electrode Dynamics", Giles H.W. Sanders, Oxford Chemistry Primers, Oxford Science, 1996

Advanced:

"Electrochemical Methods: Fundamentals and applications", A.J. Bard, L.R. Faulkner, Wiley, 2nd ed. 2001."