CHEM 2010 PHYSICAL CHEMISTRY

Credit Points 10

Legacy Code 300849

Coordinator Abhishek Gupta (https://directory.westernsydney.edu.au/search/name/Abhishek Gupta/)

Description Physical Chemistry describes the fundamentals of energy changes in chemical systems (thermodynamics), the rates and mechanisms of chemical reactions (kinetics), and electrochemistry and/or ion and electron transport. These concepts will be applied to a range of chemical and/or biochemical processes. A major focus of the unit will be to develop the ability to study quantitative chemical/biochemical problems, and develop useful physical chemistry experimental and data-analysis skills.

School Science

Discipline Chemical Sciences, Not Elsewhere Classified.

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 2 subject

Pre-requisite(s) CHEM 1003 OR
CHEM 1008 AND
CHEM 1005

Equivalent Subjects LGYB 6359 - Chemistry 2 LGYB 9672 - Physical Chemistry 2 CHEM 2011 - Physical Chemistry 2 LGYA 6135 - Bimolecular Dynamics

Assumed Knowledge

This subject requires a knowledge of introductory concepts in differential and integral calculus.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Apply the First Law of thermodynamics to a system and its surroundings.
2. Explain the Second Law of thermodynamics and relate it to the physical meaning of entropy of a system.
3. Gather data, synthesise and calculate changes in state functions such as enthalpy, entropy, and Gibbs free energy.
4. Relate thermodynamic quantities to the potential of an electrochemical cell.
5. Determine rate laws from kinetic data and relate these to mechanisms and the determination of theoretical rate equations.
6. Conduct basic chemistry experiments, individually or as a member of a team, showing familiarity with scientific instrumentation, identifying accuracy and reliability, and carrying out risk assessments.
7. Analyse and communicate experimental data correctly in a Lab Report and/or record of the results of investigations, using the conventions of scientific writing.

Subject Content

1. The First Law of Thermodynamics and transfer of energy as work and/or heat due to some simple physical and biological processes
2. The difference between thermodynamically reversible and irreversible processes
3. Heat capacities, and the relationships between heat and enthalpy change
4. The Second Law of Thermodynamics, its applications, and the calculation of entropy of the system, and surroundings
5. Calculation of Gibbs free energy and their effect on (1) the direction of chemical change; (2) the equilibrium constant of a chemical reaction; and (3) the reversible potential of an electrochemical cell and/or ion transport across a biological membrane
6. Calculation of equilibrium constants using thermodynamic quantities, with applications to a range of chemical/biological processes, and how chemical equilibria are affected by changed reaction conditions and/or inter- and intramolecular interactions
7. Use of van?ft Hoff plots for calculating enthalpy and entropy changes
8. The relationship between thermodynamic quantities and the equilibrium potential of an electrochemical cell, and/or ion and electron transport in biological systems (for example, ion channels and ion pumps)
9. Thermodynamic nonideality and its modelling using activities and activity coefficients
10. Rate equations, reaction orders and rate constants and determination of simple rate laws from experimental kinetic data using integrated rate equations and initial rate methods
11. The relationships between reaction mechanisms and rate equations, and the effects of temperature on reaction rates
12. Use of the steady-state and pre-equilibrium approximations in a range of kinetic calculations; and/or enzyme catalysis and inhibition as illustrated by Michaelis-Menten model
13. Laboratory skills and techniques in

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/ Group Task
Assignment	Up to 1000 words	30	N	Individual
Practical	Lab report about 200 words each (x5)	30	Y	Individual
Final Exam	2 hours	40	Y	Individual

Teaching Periods

Spring

Parramatta - Victoria Rd

Day

Subject Contact Abhishek Gupta (https://directory.westernsydney.edu.au/search/name/Abhishek Gupta/)

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=CHEM2010_22-SPR_PS_D#subjects)