

Physical Chemistry 1

Module Code:	CFS4024-B
Academic Year:	2018-19
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Chemistry and Forensic Science (ceases 2016)
FHEQ Level:	FHEQ Level 4

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	44
Tutorials	6
Directed Study	150

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

This module will introduce you to undergraduate level physical chemistry. Physical chemistry has its own language, and way of presenting information. By the end of this module you will be confident in using the language of physical chemistry to discuss the concepts of changes in matter and energy. Through lectures, workshops and tutorial sessions you will develop your understanding and appreciation of physical chemistry.

Outline Syllabus

The language of physical chemistry: magnitudes & units. Ideal Gas Behaviour, Boyles, Avogadro, Charles law, ideal gas equation, pressure & its units, SATP. Kinetic Molecular Theory: derivation of the ideal gas equation, distribution of molecular speeds effusion &

diffusion of gases. Real Gas Behaviour: collisions, real gases, equations of state. Kinetics 1: monitoring reaction progress, rate equations of elementary reactions, half-lives, studying elementary reactions. Temperature Effects: Arrhenius, distribution of energies, activation energy for a complex reaction. Complex Reactions: determination of mechanistic pathways, reversible, parallel & consecutive reactions, steady state approximation, reversible step mechanisms, chain reactions. Heat, Work & Energy: system versus surroundings, reversible & non-reversible change, state functions & their importance, heat capacity, enthalpy, internal energy, first law of thermodynamics. Hess's Law: enthalpy changes in selected processes, the Kirchoff equation, measurement of energy changes, introduction to entropy. Spontaneity: spontaneous processes, entropy & disorder, Boltzmann's Law & the role of probability, the 2nd law of thermodynamics, entropy changes & the connection with phase transitions, the role of temperature, Gibbs energy. Spectroscopy: EM Spectrum: principles of spectroscopy, energy-wavelength relationship, quantisation of rotational, vibrational & electronic energy, absorption & emission processes, population of energy levels, selection rules. Library Skills: Accessing the literature

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 1 Recognise competing mathematical descriptions of the world.
- 2 Understand the effect of P, V, T and amount of matter on the idealised behaviour of gases.
- 3 Appreciate the limitations of the ideal gas law and discuss the real behaviour of gasses.
- 4 Explain basic kinetics and interpret the data from 0, 1st and 2nd order reactions.
- 5 Comprehend the thermodynamic properties of simple systems.
- 6 Converse using the language of physical chemistry.
- 7 Use bibliographic and other specialist software packages to prepare a scientific account.
- 8 Use bibliographic and other specialist software packages to present ideas and concepts to a group of your peers.
- 9 Use library resources to find a variety of relevant sources and appraise the quality of the source materials.

Learning, Teaching and Assessment Strategy

Lectures will deliver core content, providing students with the opportunity to acquire the information to enhance their knowledge and understanding of basic undergraduate-level physical chemistry. This will be complemented by seminars, group discussions and tutorials to allow students to apply this learning to specific exemplar problems.

The students will undertake a miniproject on environmental/green chemistry specifically that of the spectroscopic detection of pollutants within the environment (land, sea or air). They will then be assessed with respect to their understanding of the environmental impact

of the pollutant, the quantification of the pollutant as well as their assessment of the literature and the trustworthiness of their sources they have used.

Directed study provides students with the opportunity to undertake guided reading and to develop their own portfolio of learning to enhance transferable skills and knowledge relating to evaluation of own role and subject provision.

The VLE will be used to provide access to online resources, lecture notes and external links to websites of interest.

Assessment 1: A report will cover LO's 8 and 9

Assessment 2: An examination in January will cover LO's 1, 2, 3, 4 and 5

Assessment 3: Summative examination in May to cover the whole module, apart from LO's 8 and 9

Assessment 4: Tutorial sheets.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Examination - closed book	Summative assessment: closed book examination	2 hours	50%	Yes
Summative	Coursework	Mini-project using Library resources	0-1000 words	20%	No
Summative	Classroom test	Work Sheets		10%	No
Summative	Classroom test	Classroom test	1 hour	20%	No

Legacy Code (if applicable)

CT-1017L

Reading List

To view Reading List, please go to [rebus:list](#).