

Inorganic Chemistry 1 (at distance)

Module Code:	CFS4029-B
Academic Year:	2018-19
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Chemistry
FHEQ Level:	FHEQ Level 4
Module Leader:	Dr Colin Seaton

Additional Tutors:
Dr Rianne Lord

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Seminar	4
Tutorials	40
Directed Study	156

Availability Periods

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

Module Aims

Introduce students to the language and terminology of inorganic chemistry, while building an understanding of the underlying principles that govern chemical & physical properties of atoms and simple molecules. Introduce different models describing chemical bond formation between atoms and relate these to the physical & chemical properties of simple molecules. Give a perspective on physical & chemical properties of the main group

elements. Introduce the concepts of crystalline materials, lattice systems & the basic principles of X-ray diffraction. Introduce the skills required for working in a group situations.

Outline Syllabus

Language of inorganic chemistry, measurements, units and nomenclature, balancing equations, oxidation states.

Atomic structure and properties

classical concepts of atomic structure, the Bohr model of the atom, the nature of the electron, wavefunctions, many electron atoms.

Molecular Structure

Diatomic molecules - Lewis model, Valence Bond theory, Molecular Orbital theory, energy level diagrams, heteronuclear diatomic molecules.

Polyatomic molecules - Lewis model, VSEPR, Polarity, resonance, molecular orbitals.

Basics of symmetry and group theory:

Symmetry elements, symmetry operations, point group symmetry. Relationships between symmetry and vibrational spectroscopy.

Acid and Base Chemistry

Brønsted Lowry theory, strengths of acids and bases, buffer solutions, pH changes in acid / base titrations, indicators, oxoacids, acidic and basic oxides and Lewis acids and bases.

Periodic table and periodicity

Atomic properties and periodicity, Hydrogen,

s -block chemistry

Group 1 elements, compounds and ions in solutions, Group 1 metals in liquid ammonia

Group 2 elements, compounds, biominerals, diagonal relationships

p - block chemistry

general aspects and trends, descriptive chemistry of Group 13, 14, 15, 16, 17 and 18.

Nuclear Chemistry

A general introduction to the d and f-group elements. Synthesis and application of radioactive materials – nuclear fission, nuclear fuel cycle, radiopharmaceuticals and isotopes

Solid State Chemistry

Structures based on the packing of spheres, metallic and ionic bonding, lattice energies.

Metals and band theory, semi conductors and insulators.

Group work - Different roles in a group, presentation skills.

Module Learning Outcomes

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

- 1
 - 1.1 Express chemical formulae, equation, & oxidation states with proper use of units & terminology.
 - 1.2 Describe the basic principles of atomic structure & quantum numbers.
 - 1.3 Appraise & compare different models of bonding for diatomic molecules.
 - 1.4 Describe different models to predict shapes & stability of polyatomic molecules.
 - 1.5 Name & describe different theories of acids & bases & the underlying principles.
 - 1.6 Interpret the periodic table & justify periodic trends.
 - 1.7 Recognise & describe the general chemistry of the s, & p-group elements.
 - 1.8 Recognise and identify the d & f-group elements.
 - 1.9 Describe the preparation and application of radioactive materials.
 - 1.10 Explain basic structural aspects of solids, crystal packing, metallic & ionic bonding, & lattice energies.
 - 1.11 Recognize different symmetry elements and symmetry operations.
 - 1.12 Use the symmetry of molecules to predict and distinguish Infrared and Raman active bonds for simple molecules.

- 2
 - 2.1 Recognise, interpret and converse using the language of inorganic chemistry.
 - 2.2 Identify and relate the knowledge of fundamental inorganic chemistry with applications in different areas of everyday applications and technologies.
 - 2.3 Express, present, and discuss basic concepts of inorganic chemistry.
- 3
 - 3.1 Use specialist software packages to prepare a scientific presentation.
 - 3.2 Work as a team to discuss, decide, and prepare a presentation on a given subject.

Learning, Teaching and Assessment Strategy

This module will be delivered using a 'flipped' learning and teaching strategy: this means you will be provided with taught material which you will need to study before the class takes place. This material will be presented in a range of media including podcasts, vodcasts, and directed reading and will be delivered through the University's VLE. On-line activities such as quizzes, discussions and wikis will support the taught material.

The majority of classes will be hosted and facilitated online using collaborative software.

These sessions will require you to use the knowledge you have gained through completion of the pre-work and apply it to real world problems in the discipline of inorganic chemistry. Furthermore, the problems will require you to take a collaborative approach to solving them, helping you develop key employability skills in a peer-learning environment.

You will interact with your course tutor and other group members on a regular, timetabled basis which will be supported via teleconferencing facilities. In these sessions, your group will be encouraged to explore both the core content and reflect on your approach to solving problems.

Your active engagement with the online discussions and activities will be crucial to success in this module and evaluation of engagement will inform the support you receive from your Supervisory Team.

In semester-1 students will work with their study group to prepare and present a given topic related to the knowledge developed in this module to the cohort in a seminar style. Support for group working will be provided by the careers service and additional resources will be made available through the VLE.

Assessment 1: An on-line group presentation, which will cover LOs 1.1, 2.1, 2.2, 2.3, 3.1, 3.2. The study groups will develop a joint presentation on a given relevant topic. Formative feedback on presentation will be given as part of the regular timetabled tutorial sessions.

Assessment 2: A remote on-line assessment in January will cover material from semester 1, supervised by the course tutor. This will cover LOs 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3.

Assessment 3: A summative examination in Bradford at the end of the module. Covers LOs 1.1 - 1.12, 2.1 - 2.3

Formative feedback on regular tutorial questions in the style of the assessment 2 and 3 will be provided throughout the year during the regular timetabled sessions.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Presentation	On-line presentation	20 minutes	20%	No
Summative	Examination - closed book	Summative exam in Bradford	2 hours	50%	Yes
Formative	Coursework	Tutorial Sheets		%	No
Summative	Computer-based assessment	Remote on-line assessment	1 hour	30%	No

Legacy Code (if applicable)

Reading List

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