

School of Chemistry

Aims and Objectives: Session 2023-2024, Semester 1

Module CH1401: Introductory Inorganic and Physical Chemistry

Course Title: Nuclear and Electronic Structure / Atoms and the Periodic Table

Duration: 12 hours

Lecturer: Professor R. E. Morris

Aims: To understand the structure of atoms.

To give elementary descriptions of the electronic structure of atoms leading to an understanding of the structure of the Periodic Table of the elements; of the properties of atoms and ions; and of the properties of simple ionic solids and of molecular compounds. To lay foundations of MO theory. To discuss the processes that have led to the range of elements that we see in the Universe and on Earth today.

Objectives:

1. To revise basic aspects of atomic structure and to understand the concept of electrons as waves.
2. To know of the basic nuclear reactions.
3. To know of the Big Bang synthesis of the lighter elements.
4. To understand concepts surrounding atomic structure and quantisation.
5. To know the allowed values of the quantum numbers n , l , m and s for multi-electron atoms, and to relate n , l and m to the shapes and multiplicities of atomic orbitals.
6. To know the relative energies of atomic orbitals and their filling order, and so to be able to derive, and write down, electronic configurations for atoms up to Kr.
7. To know and understand the structure of the Periodic Table in terms of the filling of atomic orbitals.
8. To understand the concept of electrons as waves and how it applies to atomic orbitals (including phases and nodes).
9. To begin to appreciate the way atomic orbitals can be combined to give molecular orbitals in simple diatomic systems.
10. To understand the notation associated with MO theory