

PH1530: Atomic Structure

Learning Outcomes:

After this course you are expected to:

- Describe the Rutherford Scattering experiment and how it led to the concept of a nucleus.
- Know the shortcomings of Rutherford's model of the atom.
- Define the three types of radioactive decay.
- Derive the exponential decay law for a radioactive nucleus.
- Define what is meant by half-life, activity, decay constant, lifetime.
- Define what is meant by atomic number, mass number, isotope.
- Know the basic properties of the nuclear force.
- Calculate the binding energy and mass defect for a given nuclide.

Reading:

All references refer to Young and Freedman, 'University Physics with Modern Physics', 11th Edition.

(Optional problems on the material in these chapters can be found at the end of the relevant chapter).

- Section 38.4 – The Nuclear Atom
- Section 43.1 – Properties of Nuclei (except the subsection on nuclear spin and magnetic moments).
- Section 43.2 – Nuclear Binding and Nuclear Structure (except subsections on the liquid drop model and the shell model)
- Section 43.3 – Nuclear Stability and Radioactivity
- Section 43.4 – Activities and Half-Lives