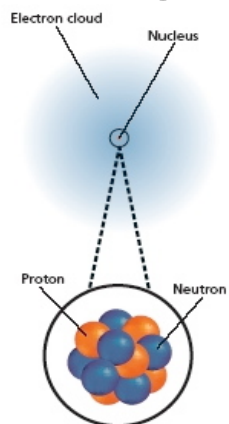


# Unit 1: Atomic Theory



## Text References

- The Atom (3.1)
- Structure of the Atom (3.2)
- Nuclear Decay (21.2)
- A New Atomic Model (4.1)
- The Quantum Mechanical Model (4.2)
- Electron Configurations (4.3)

**Focus Question: How does atomic structure differ for each of the chemical elements?**

## Unit Objectives (what you need to know and be able to do on the test):

1. State the position of protons, neutrons and electrons in the atom.
2. State the relative mass and charge of protons, neutrons and electrons.
3. Define the terms mass number, atomic number, ionic charge and isotope.
4. Write equations representing nuclear decay.
5. Deduce the symbol for an isotope given its mass number and atomic number.
6. Calculate the number of protons, neutrons and electrons in atoms and ions from the mass number, atomic number and charge.
7. Compare the physical and chemical properties of isotopes.
8. Describe the electromagnetic spectrum.
9. Distinguish between a continuous spectrum and an emission (line) spectrum.
10. Explain how the lines in the emission spectrum of hydrogen are related to its energy levels.
11. Draw the shapes of an s orbital and the shapes of the  $p_x$ ,  $p_y$  and  $p_z$  orbitals.
12. Apply the aufbau principle, Hund's rule and the Pauli exclusion principle to write electron configurations.
13. Compare and contrast historic models of the atom: John Dalton, JJ Thomson, Ernest Rutherford, and Niels Bohr.

## Vocabulary

alpha particle	excited state	law of multiple proportions
atom	fundamental forces of nature	mass number
atomic mass	frequency	nuclear radiation
atomic mass unit	gamma radiation	nucleon
atomic number	ground state	nuclide
beta particle	Heisenberg uncertainty principle	orbital
continuous spectrum	ion	quantum mechanical model
electromagnetic radiation	isotope	speed of light
electromagnetic spectrum	law of conservation of mass	wavelength
emission (bright line) spectrum	law of definite proportions	