

Inside the Atom

connections to the lower secondary (KS3) curriculum for England

Introduction

The statutory requirements of the KS3 curriculum in England can be enriched and enhanced through connections to particle and nuclear physics. Many of the stories from these research communities reinforce the aims of the national curriculum for science that pupils should:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Curriculum Connections

Atoms, elements and compounds.

Pupils are taught about:

- a simple (Dalton) atomic model
- differences between atoms, elements and compounds
- chemical symbols and formulae for elements and compounds
- conservation of mass changes of state and chemical reactions.

Most of the nuclear physics related content in the KS3 curriculum is taught in the chemistry modules. Students are introduced to a simple atomic model and chemical reactions as the rearrangements of atoms. Using this as a starting point students can be shown what is inside an atom – introducing the nucleus, protons and neutrons and beyond.

The periodic table

Pupils are taught about:

- the varying physical and chemical properties of different elements.

During KS3 students will learn about the Periodic Table and the properties of the periods and groups. This is a good link to how the discovery of the structure of the atom, led to the explanation of the chemical properties of the elements in the periodic table. It also makes a good analogy to the nuclear chart and the standard model of elementary particles.

Energy: Calculation of fuel uses and costs in the domestic context

Pupils are taught about:

- domestic fuel bills, fuel use and costs
- fuels and energy resources.

Students start to learn about the UK's energy resources in terms of the different fuels used and the costs to a household. Early secondary students can be taught about the importance of the energy supply from nuclear power stations and the basics of how nuclear energy is harnessed to produce electricity.

Forces

- forces as pushes or pulls, arising from the interaction between two objects
- non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.

Magnetism

- magnetic poles, attraction and repulsion.

The 'forces' and 'magnetism' units teach students how forces can act without direct contact and how they can be attractive and repulsive. This can be used to talk about the four fundamental forces, (using gravity as a link), and how they influence the fundamental particles.

