SP6 Radioactivity

SP6a Atomic models

Step	Learning outcome	Had a look	Nearly there	Nailed it!
7th	Describe the structure of an atom (in terms of nucleus and electrons).	☐	☐	☐
7th	State where most of the mass of an atom is found.	☐	☐	☐
7th	State the sizes of atoms and small molecules.	☐	☐	☐
8th	Describe an early model of the atom.	☐	☐	☐
8th	Describe how and why our model of the atom has changed over time, including the plum pudding model and the Rutherford alpha particle scattering.	☐	☐	☐

SP6b Inside atoms

Step	Learning outcome	Had a look	Nearly there	Nailed it!
7th	State what is meant by an isotope.	☐	☐	☐
8th	Represent isotopes using symbols.	☐	☐	☐
8th	Explain how atoms of different elements are different (in terms of numbers of electrons and protons).	☐	☐	☐
7th	Recall the charges and relative masses of the three subatomic particles.	☐	☐	☐
8th	Explain why all atoms have no overall charge.	☐	☐	☐

SP6c Electrons and orbits

Step	Learning outcome	Had a look	Nearly there	Nailed it!
7th	Describe where electrons are found inside atoms (in terms of shells).	☐	☐	☐
8th	Describe when electrons can change orbit.	☐	☐	☐
7th	Recall what an ion is.	☐	☐	☐
8th	Describe how ionisation occurs.	☐	☐	☐
8th	Describe some of the evidence for the Bohr model of the atom.	☐	☐	☐

SP6d Background radiation

Step	Learning outcome	Had a look	Nearly there	Nailed it!
9th	Explain what background radiation is.	☐	☐	☐
9th	Describe how radiation measurements need to be corrected for background radiation.	☐	☐	☐
8th	List some sources of background radiation.	☐	☐	☐
8th	Describe how photographic film can be used to detect radioactivity.	☐	☐	☐
9th	Describe how a Geiger-Müller tube works.	☐	☐	☐
8th	Describe how the amount of radioactivity can be measured (in terms of the darkness of photographic film or by attaching a counter to a GM tube).	☐	☐	☐

SP6e Types of radiation

Step	Learning outcome	Had a look	Nearly there	Nailed it!
7th	Recall the relative masses and relative electric charges of protons, neutrons, electrons and positrons.	☐	☐	☐
8th	List five types of radiation that are emitted in random processes from unstable nuclei.	☐	☐	☐
8th	State that the five types of radiation are ionising radiations.	☐	☐	☐
8th	Describe what alpha and beta particles are.	☐	☐	☐
8th	Describe the nature of gamma radiation.	☐	☐	☐
11th	Compare the penetrating abilities of alpha, beta and gamma radiation.	☐	☐	☐
11th	Compare the ionisation abilities of alpha, beta and gamma radiation.	☐	☐	☐

SP6f Radioactive decay

Step	Learning outcome	Had a look	Nearly there	Nailed it!
9th	Describe the process of β^- decay.	☐	☐	☐
9th	Describe the process of β^+ decay.	☐	☐	☐
10th	Explain how the proton and mass numbers are affected by different kinds of radioactive decay.	☐	☐	☐
9th	Describe what happens during nuclear rearrangement after radioactive decay.	☐	☐	☐
10th	Balance nuclear equations for mass and charge.	☐	☐	☐

SP6g Half-life

Step	Learning outcome	Had a look	Nearly there	Nailed it!
8th	Describe how the activity of a substance changes over time.	☐	☐	☐
8th	State how half-life can be used to describe the changing activity of a substance.	☐	☐	☐
8th	Recall the unit of activity.	☐	☐	☐
8th	Describe how half-life can be used to work out how much of a substance will decay in a certain time.	☐	☐	☐
10th	Carry out calculations involving half-life.	☐	☐	☐

SP6h Using radioactivity

Step	Learning outcome	Had a look	Nearly there	Nailed it!
7th	Describe how radioactivity is used in smoke alarms.	☐	☐	☐
7th	Describe how radioactivity is used in irradiating food.	☐	☐	☐
7th	Describe how radioactivity is used in sterilising equipment.	☐	☐	☐
7th	Describe how radioactivity is used in tracing and thickness gauging.	☐	☐	☐
6th	Recall that radioactivity is used in cancer diagnosis and treatment.	☐	☐	☐

SP6i Dangers of radioactivity

Step	Learning outcome	Had a look	Nearly there	Nailed it!
8th	Describe the hazards of ionising radiation in terms of tissue damage and possible mutations.	☐	☐	☐
9th	Explain how the dangers of ionising radiation depend on the half-life.	☐	☐	☐
11th	Explain the precautions taken to reduce the risks from radiation and ensure the safety of patients exposed to radiation, and link these to the half-lives of the sources used.	☐	☐	☐
9th	Explain the precautions taken to reduce the risks from radiation and protect people who work with radiation.	☐	☐	☐
9th	Describe the differences between contamination and irradiation effects.	☐	☐	☐
11th	Compare the hazards of contamination and irradiation.	☐	☐	☐

SP6j Radioactivity in medicine

Step	Learning outcome	Had a look	Nearly there	Nailed it!
9th	Describe the advantages and disadvantages of treating tumours with radiation applied internally.	☐	☐	☐
9th	Describe the advantages and disadvantages of treating tumours with radiation applied externally.	☐	☐	☐
8th	Explain the use of radioactive tracers in diagnosis.	☐	☐	☐
8th	Explain the use of PET scanners in diagnosis.	☐	☐	☐
8th	Explain why isotopes used in PET scanners have to be produced nearby.	☐	☐	☐

SP6k Nuclear energy

Step	Learning outcome	Had a look	Nearly there	Nailed it!
6th	Describe some advantages of using nuclear power to generate electricity.	☐	☐	☐
6th	Describe some disadvantages of using nuclear power to generate electricity.	☐	☐	☐
10th	Evaluate the use of nuclear power to generate electricity.	☐	☐	☐
7th	Describe three types of nuclear reaction.	☐	☐	☐
6th	Recall that nuclear reactions can be a source of energy.	☐	☐	☐

SP6l Nuclear fission

Step	Learning outcome	Had a look	Nearly there	Nailed it!
8th	Describe the products of the fission of U-235.	☐	☐	☐
7th	Describe what a chain reaction is.	☐	☐	☐
8th	Explain how a chain reaction is controlled in a nuclear power station.	☐	☐	☐
7th	Describe how the thermal energy from a chain reaction is converted to electrical energy.	☐	☐	☐
7th	Recall that the products of nuclear fission are radioactive.	☐	☐	☐

SP6m Nuclear fusion

Step	Learning outcome	Had a look	Nearly there	Nailed it!
7th	Describe what happens in nuclear fusion.	☐	☐	☐
7th	Recall that nuclear fusion is the energy source for stars.	☐	☐	☐

8th	Explain the difference between nuclear fusion and nuclear fission.	☐	☐	☐
9th	Explain why high temperatures and pressures are needed to make fusion happen.	☐	☐	☐
10th	Relate the conditions of fusion to the difficulty of making a practical and economic fusion power station.	☐	☐	☐