



| Lessons Sequence | | | | | | | |
|---|---|---|--|--|--|------------|--|
| TOPIC (S) ATOMIC STRUCTURE | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;"> <ol style="list-style-type: none"> 1. The structure of atoms 2. Mass number, atomic number and isotopes 3. Development of the model of the atom </td> <td style="width: 33%;"> <ol style="list-style-type: none"> 4. Radioactive Decay 5. Nuclear equations 6. Half-life 7. Contamination </td> <td style="width: 33%;"> <ol style="list-style-type: none"> 8. Background radiation 9. Uses of nuclear radiation 10. Nuclear Fission 11. Nuclear Fusion </td> </tr> </table> | <ol style="list-style-type: none"> 1. The structure of atoms 2. Mass number, atomic number and isotopes 3. Development of the model of the atom | <ol style="list-style-type: none"> 4. Radioactive Decay 5. Nuclear equations 6. Half-life 7. Contamination | <ol style="list-style-type: none"> 8. Background radiation 9. Uses of nuclear radiation 10. Nuclear Fission 11. Nuclear Fusion | | | |
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| Knowledge & Skills development | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> • Describe the structure of atoms in terms of their sub-atomic particles • Use mass number and atomic number to describe the atoms of specific elements • Knowledge of the contributions of JJ Thompson, Earnest Rutherford, Niels Bohn and James Chadwick towards the current model of the atom • Describe the structure and properties of alpha, beta and gamma radiation including penetration, range in air and ionising power • Apply knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation • Use the names and symbols of common nuclei and particles to write balanced equations that show single alpha (α) and beta (β) decay • Explain the concept of half-life and how it is related to the random nature of radioactive decay </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> • Determine the half-life of a radioactive isotope from given information • Compare the hazards associated with contamination and irradiation • Describe the natural and man-made sources of background radiation • Explain why the hazards associated with radioactive material differ according to the half-life involved • Describe and evaluate the uses of nuclear radiations for exploration of internal organs, and for control or destruction of unwanted tissue • Evaluate the perceived risks of using nuclear radiations in relation to given data and consequences • Describe the process of nuclear fission • Draw/interpret diagrams representing nuclear fission and how a chain reaction may occur • Describe the process of nuclear fusion </td> </tr> </table> | <ul style="list-style-type: none"> • Describe the structure of atoms in terms of their sub-atomic particles • Use mass number and atomic number to describe the atoms of specific elements • Knowledge of the contributions of JJ Thompson, Earnest Rutherford, Niels Bohn and James Chadwick towards the current model of the atom • Describe the structure and properties of alpha, beta and gamma radiation including penetration, range in air and ionising power • Apply knowledge to the uses of radiation and evaluate the best sources of radiation to use in a given situation • Use the names and symbols of common nuclei and particles to write balanced equations that show single alpha (α) and beta (β) decay • Explain the concept of half-life and how it is related to the random nature of radioactive decay | <ul style="list-style-type: none"> • Determine the half-life of a radioactive isotope from given information • Compare the hazards associated with contamination and irradiation • Describe the natural and man-made sources of background radiation • Explain why the hazards associated with radioactive material differ according to the half-life involved • Describe and evaluate the uses of nuclear radiations for exploration of internal organs, and for control or destruction of unwanted tissue • Evaluate the perceived risks of using nuclear radiations in relation to given data and consequences • Describe the process of nuclear fission • Draw/interpret diagrams representing nuclear fission and how a chain reaction may occur • Describe the process of nuclear fusion | | | | |
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| Assessment / Feedback Opportunities | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 16.6%;">Targeted questioning throughout topic</td> <td style="width: 16.6%;">Teacher assessment of practical skills during investigation - verbal</td> <td style="width: 16.6%;">Knowledge Recall Quizzes</td> <td style="width: 16.6%;">Deep marking of written task in students books</td> <td style="width: 16.6%;">Topic Test</td> <td style="width: 16.6%;">Targeted exam questions – teacher or self-assessed</td> </tr> </table> | Targeted questioning throughout topic | Teacher assessment of practical skills during investigation - verbal | Knowledge Recall Quizzes | Deep marking of written task in students books | Topic Test | Targeted exam questions – teacher or self-assessed |
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| Cultural Capital | <ul style="list-style-type: none"> • Encourage students to visit Science Museum in Manchester | | | | | | |
| SMSC / Promoting British Values <small>(Democracy, Liberty, Rule of Law, Tolerance & Respect)</small> | <ul style="list-style-type: none"> • Listening to others during presentations • Working in groups during practicals or research tasks | | | | | | |
| Reading opportunities | <ul style="list-style-type: none"> • Recommended Read: Particle Physics Brick by Brick (Dr Ben Still) • Recommended Read: The Atom: The building block of everything (Jack Challoner) • Recommended Read: All About Physics (Richard Hammond) • Recommended Read: Storm in a Teacup: The Physics of Everyday Life (Helen Czerski) | | | | | | |

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| Key Vocabulary | Independent Variable, Dependent Variable, Control Variables, Method, Conclusion, Precaution, Evaluation, Reliable, Precision, Valid, Anomaly, Describe, Explain, Compare, Analyse, Calculate, Suggest Atom, Sub-atomic, particle, model, radiation, penetration, ionising, isotope, nuclei, radioactive, hazard, half-life, decay, fission, fusion, chain reaction, contamination, irradiation |
| Digital Literacy | SharePoint resources including topic quizzes Possible use of excel to plot graphs and analyse data, powerpoint, word, etc to present information, internet for research |
| Cross-Curricular Links | Numeracy/Maths – averages (means), reading scales, graph plotting, lines of best fit, using and rearranging equations, using scientific calculators |
| Careers | Careers within the nuclear industry (nuclear engineers, technicians, safety advisors, surveyors), Medical careers (radiographer, x-ray technician, etc) |