



	Lessons Sequence					
<b>TOPIC (S)</b> <b>ENERGY CHANGES</b>	1. Endothermic and exothermic reactions 2. Temperature changes in reaction (required practical)		3. Reaction profiles 4. Bond energies 5. Cells and batteries		6. Fuel cells	
<b>Knowledge &amp; Skills development</b>	<ul style="list-style-type: none"> <li>Understanding that energy is conserved in chemical reactions</li> <li>Distinguish between exothermic and endothermic reactions on the basis of the temperature change of the surroundings</li> <li>Evaluate uses and applications of exothermic and endothermic reactions given appropriate information</li> <li>Draw simple reaction profiles (energy level diagrams) for exothermic and endothermic reactions</li> <li>Explain that the activation energy is the energy needed for a reaction to occur.</li> </ul>			<ul style="list-style-type: none"> <li>Be able to calculate the energy transferred in chemical reactions using bond energies supplied.</li> <li>Explain how cells produce a voltage</li> <li>Explain how some cells are rechargeable in terms of the chemical reactions that take place inside them</li> <li>Be able to interpret data for relative reactivity of different metals and evaluate the use of cells</li> <li>Evaluate the use of hydrogen fuel cells in comparison with rechargeable cells and batteries</li> <li>Write the half equations for the electrode reactions in the hydrogen fuel cell.</li> </ul>		
<b>Assessment / Feedback Opportunities</b>	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
<b>Cultural Capital</b>	<ul style="list-style-type: none"> <li>Local links – firework companies eg Black Cat Fireworks and link to making fireworks in the lab as an exothermic reaction</li> <li>Possible visit by “Tomorrow’s Engineers Energy Quest” funded by Shell or Power Plant Workers through STEM Ambassadors program</li> </ul>					
<b>SMSC / Promoting British Values</b> (Democracy, Liberty, Rule of Law, Tolerance & Respect)	<ul style="list-style-type: none"> <li>Listening to others during presentations</li> <li>Working in groups during practicals or research tasks</li> </ul>					
<b>Recommended Reading</b>	<ul style="list-style-type: none"> <li>Recommended Read: Reactions: An Illustrated Exploration of Elements, Molecules, and Change in the Universe (Theodore Gray)</li> <li>Recommended Read: Reactions: The private life of atoms (Peter Atkins)</li> <li>Recommended Read: All About Chemistry (Big Questions) (Robert Winston)</li> </ul>					
<b>Key Vocabulary</b>	Independent Variable, Dependent Variable, Control Variables, Method, Conclusion, Precaution, Evaluation, Reliable, Precision, Valid, Anomaly, Describe, Explain, Compare, Analyse, Calculate, Suggest, Evaluate  Endothermic, Exothermic, Surroundings, Reaction, Temperature, Profile, Activation, Bond, Interpret, Reactivity, Electrode, Electrolyte, Cell, Battery, Voltage, Rechargeable					
<b>Digital Literacy</b>	SharePoint resources including topic quizzes      Possible use of data loggers to record temperatures in reactions Possible use of excel to plot graphs and analyse data, powerpoint, word, etc to present information, internet for research					

<b>Cross-Curricular Links</b>	Numeracy/Maths – averages (means), reading scales, graph plotting, lines of best fit, using and rearranging equations, using scientific calculators
<b>Careers</b>	Product development careers (hand warmers, cool packs, self-heating cans, batteries, fuel cells)