Year 10
Subject: Chemistry
Topic/Unit: C5 Energy Changes
When: Half Term 1 B

Huntington School
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Overview: Why this? Why now?
This unit explores the fundamental principle that energy is conserved in chemical reactions. Understanding the transfer of energy between a reaction and its surroundings is essential for designing industrial processes and everyday products like self-heating cans and sports injury packs.

Building on...building to:
This unit builds upon prior knowledge of **atomic structure, covalent bonding, and the reactivity series**. It provides the conceptual framework for later studies in **rates of reaction and chemical equilibrium**, where energy changes influence how quickly and to what extent reactions occur.

Sequence summary:
- **Energy Transfer:** Students define **exothermic** reactions, which transfer energy to the surroundings, and **endothermic** reactions, which absorb energy.
- **Reaction Profiles:** Lessons focus on drawing and interpreting energy profile diagrams, identifying the **activation energy**—the minimum energy required for a reaction to occur.
- **Practical Investigation:** Students conduct a **Required Practical** to measure temperature changes when an acid is neutralised by an alkali, using a polystyrene cup for insulation.
- **Bond Energies:** The unit introduces the concept that **bond breaking is endothermic** while **bond making is exothermic**. Students perform calculations to determine the overall energy change of a reaction.

  Separate Chemistry only:
- **Chemical Cells and Batteries:** Learners explore how the reactivity difference between two metals in an electrolyte produces a **potential difference**.
- **Fuel Cells:** The sequence concludes with an analysis of **hydrogen fuel cells**, including their half-equations and an evaluation of their advantages over traditional batteries.

Key Vocabulary:
Exothermic, Endothermic, Activation Energy, Reaction Profile, Bond Energy, Electrolyte, Potential Difference, Fuel Cell, Oxidation, Reduction.

Assessments:
- **Formative:** Retrieval "Do Now" tasks focusing on energy profile labels and counting bonds in molecules.
- **Summative:** A formal end-of-unit assessment covering bond energy calculations and the comparison of fuel cells to rechargeable batteries.

Able and interested:
Learners will practice **predicting the voltages** of different chemical cells using reactivity series data. They will also solve complex bond energy problems involving the calculation of specific unknown bond strengths.

Inclusion, Personal Development and Wider Skills:
Students develop **safety awareness** by creating risk assessments for corrosive chemicals. They evaluate the **environmental and ethical impacts** of different energy sources, such as the pollution from toxic metal compounds in batteries versus the safety concerns of explosive hydrogen gas.

Homework and Independent Learning:
Students will complete a task set on the SPARX online program. The task is based on the current topic but also includes consolidation on previous topics. It will automatically adjust the level of challenge as the student complete the activities.