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**Knowledge Rich Curriculum Plan**

SCIENCE- Exothermic and Endothermic Reactions



| **Lesson/Learning Sequence**  | **Intended Knowledge:***Students will know that…* | **Prior Knowledge:***In order to know this, students need to already know that…* | **Working Scientifically** | **Tiered Vocabulary and Reading Activity** | **Assessment**  | **Support** |
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| ***01******Exothermic and Endothermic Reactions*** | *Students will know that an exothermic reaction is when energy is released into the surroundings. Examples of exothermic reactions are; hand warmer, combustion, respiration. Students will recognise that energy is conserved during exothermic reactions. Students will able to describe how the temperature of chemicals will increase in exothermic reactions. Students will know that an endothermic reaction is when energy enters a substance from the surroundings. Examples of endothermic reaction are; photosynthesis, ice packs and thermal decomposition. Students will able to describe how the temperature of chemicals will decrease in endothermic reactions.* | *Students will know that temperatures change are a way of observing if a chemical reaction has happened.*  | *Analyse: draw conclusions from data.*  | *Exothermic- heat energy is released into the surroundings**Endothermic- heat energy enters a substance from the surroundings* | *Retrieval questions**Simple exam questions**End of topic test* *Summative assessment 1**Cold call questions:*1. *How might we distinguish between an endothermic and exothermic reaction?*

*“Exothermic reactions feel hotter, endothermic reactions will feel colder”*1. *Photosynthesis is and endothermic reaction, how might you explain this?*

*“Photosynthesis absorbs light energy from the sun, endothermic reactions absorb energy”* | *Knowledge organiser (provided on Teams and in class)*[*https://www.youtube.com/watch?v=eJXL0IrbtqE*](https://www.youtube.com/watch?v=eJXL0IrbtqE)[*https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zb7wwnb*](https://www.bbc.co.uk/bitesize/topics/zypsgk7/articles/zb7wwnb) |
| ***02 Rearranging Atoms*** | *Students will know that there are energy changes when bonds are broken and made. Energy is absorbed to break bonds.****Bond-breaking****is an****endothermic****process. Energy is released when new bonds form.****Bond-making****is an****exothermic****process.* | *Students will already know that a chemical change is the making of new substances and most reactions are irreversible. Students will know the definitions and examples of exothermic and endothermic reactions* |  | *Reactants- substances that undergo a chemical reaction**Product- substances that are made in a chemical reaction* | *Retrieval questions**Simple exam questions**End of topic test* *Summative assessment* *Cold call questions:*1. *How might this diagram link to an endothermic process? (students see diagram of breaking wood)*

*“Energy is needed to break the wood, just like energy is needed to break bonds”* | *Knowledge organiser (provided on Teams and in class)*[*https://www.youtube.com/watch?v=0l8x1lDbbRU*](https://www.youtube.com/watch?v=0l8x1lDbbRU) |
| ***03 Overall Energy Changes******04 Catalysts***  | *Students will be able to recognise that the overall energy change of a chemical reaction depends on the relative amount of energy needed to separate and combine atoms during the reaction.* *Students will know that chemical reactions have an activation energy and that this is the minimum energy required for a chemical reaction to occur.**Students will know that some reactions have catalysts. Catalysts are substances that speed up the rate of a reaction without being used up in the process. (HAP) Students will know that catalysts do this by providing an alternative pathway of lower activation energy.* | *Students will need to know that energy is transferred when bonds are made or when they are broken.* *Students will know that chemical reactions require energy to break and make bonds.* | *Analyse: Compare different energy levels**Students will be able to conduct a practical activity to show the difference of the rate of a reaction with and without a catalyst*  | *Energy change- the amount of energy given or absorbed during a reaction**Activation energy- energy required to start a reaction**Catalysts- speed up the rate of a reaction by lower the activation energy* *Alternative- available as another possibility or choice* | *Retrieval questions**Simple exam questions**End of topic test* *Summative assessment 1**Cold call questions:*1. *How might the overall energy change value help to distinguish between an exo and endothermic reaction?*

*“Positive energy changes represent an endothermic reaction because energy is entering the system”**“Negative energy changes represent an exothermic reaction because energy is being lost from the system”**Retrieval questions**Simple exam questions**End of topic test* *Cold call questions:*1. *How might catalysts influence the temperature change in an exothermic reaction?*

*“The catalyst makes the reaction happen quicker therefor the temperature would increase faster”* | *Knowledge organiser (provided on Teams and in class)*[*https://www.youtube.com/watch?v=qvbYxahlfNc*](https://www.youtube.com/watch?v=qvbYxahlfNc)[*https://edu.rsc.org/experiments/catalysis-of-a-sodium-thiosulfate-and-ironiii-nitrate-reaction/442.article*](https://edu.rsc.org/experiments/catalysis-of-a-sodium-thiosulfate-and-ironiii-nitrate-reaction/442.article) |