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# Chemical Energy

1	I can explain how collisions are random and must be successful for a reaction to occur .
2	I can state that during changes of state, there are energy changes
3	I can state that energy may be released or absorbed during chemical reactions, and I can describe how the temperature of the surroundings changes during a chemical reaction
4	I can describe changes of states with reference to energy changes
5	I can explain changes of state with reference to the energy levels of particles and whether a chemical reaction is exothermic or endothermic
6	I can explain that during chemical reactions, energy may be absorbed or released during the making and breaking of bonds

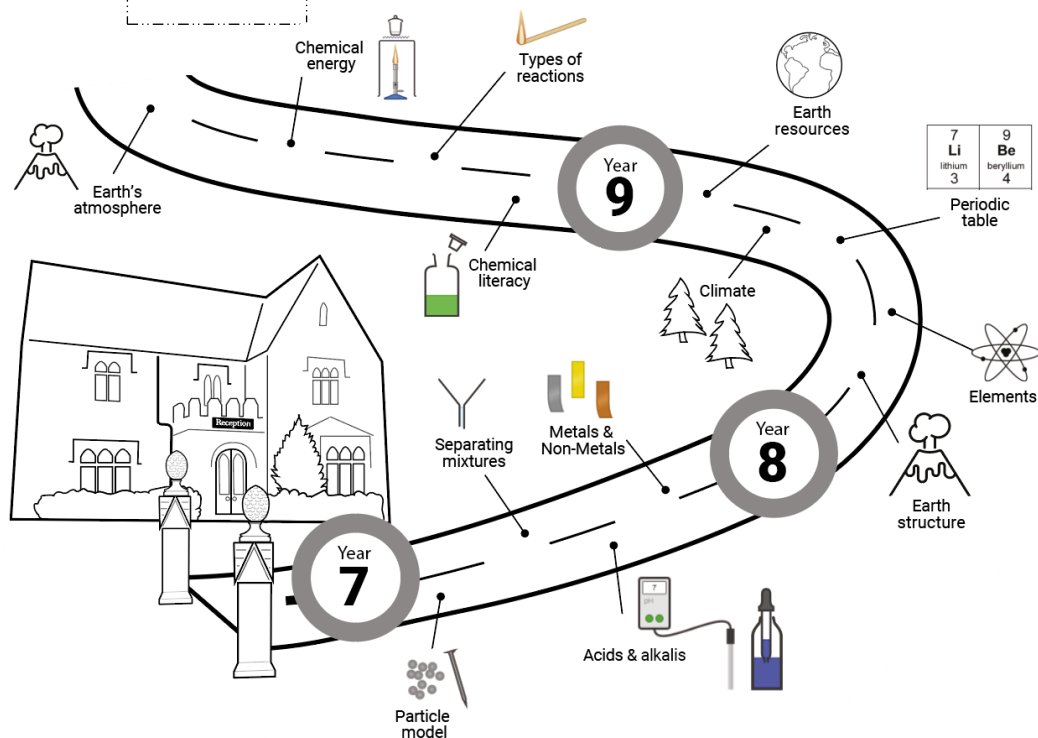
catalyst	Substances that speed up chemical reactions but are unchanged at the end.
chemical bond	Force that holds atoms together in molecules.
combustion	A chemical reaction in which a substance reacts quickly with oxygen and gives out light and heat. Also called burning.
conservation of mass	In a chemical reaction, the total mass of reactants is equal to the total mass of products. This is conservation of mass. Mass is conserved in chemical reactions and in physical changes.
decomposition	A chemical reaction in which a compound breaks down to form more than one product.
endothermic reaction	An endothermic reaction takes in energy, usually as heat. In other words, it transfers energy from the surroundings.
exothermic reaction	An exothermic reaction gives out energy, usually as heat or light. In other words, it transfers energy to the surroundings.

Prior knowledge from KS2: At KS2 you will have covered an understanding of materials by exploring and comparing the properties. You should also explored changes that are difficult to reverse, for example burning, rusting and other reactions.

Why?  
Chemical reactions are useful in everyday use such as hand warmers, ice packs for sports injury

Future learning:  
At GCSE you learn in more detail about exothermic and endothermic reactions, including energy profiles and how to calculate changes in energy.

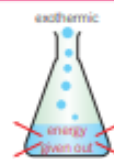
Careers:  
Physio  
Firefighter



## Exothermic and endothermic reactions

**Exothermic** reactions involve a transfer of energy from the reactants to the surroundings

- As energy is transferred to the surroundings this will show an increase in temperature
- Examples of exothermic reactions include combustion, freezing, and condensing



**Endothermic** reactions involve a transfer of energy from the surroundings to the reactants

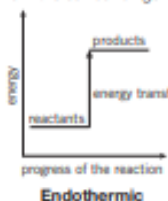
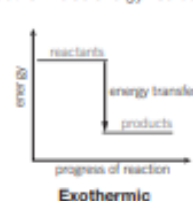
- As energy is taken into the reactants a decrease in temperature will be shown
- Examples of endothermic reactions include thermal decomposition, melting, and boiling



## Energy level diagrams

**Energy level diagrams** show the values of energy between the reactants and the products in a reaction

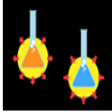
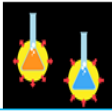

- If the energy is greater in the reactants than the products then the reaction is exothermic as energy has been given out to the surroundings
- If the energy is lower in the reactants than the products then the reaction is endothermic as energy has been taken in from the surroundings



## Bond energies

- Energy must be used to break **chemical bonds**, meaning that this reaction is endothermic
- Energy is given out when chemical bonds are made, meaning that this reaction is exothermic
- To see if a reaction is endothermic or exothermic, you must find the difference in the energy needed to break and to make the bonds in the reaction
- If the energy needed to break the bonds is less than the energy given out when making the bonds, the reaction is exothermic
- If the energy needed to break the bonds is more than the energy released when making the bonds, the reaction is endothermic

Complete some of the tasks below to reach a total of \_\_\_\_\_ points over this unit of work – Highlight the box once you have completed it.

Topic	1 Point	2 Points	4 Points	6 Points	10 Points
Endothermic reaction 	Write down a way of remembering what an endothermic reaction is. (poem, analogy etc)	Create a poster with different <u>real life</u> examples of endothermic reactions	Write a paragraph explaining what happens in an endothermic reaction in terms of bond breaking and making. Write it as though you are explaining to someone who knows nothing about chemistry	An endothermic reaction occurs between ethanoic acid and sodium carbonate. Will adding more ethanoic acid make the reaction more endothermic? State yes or no and justify your answer	Research what an energy profile diagram looks like for an endothermic reaction. Sketch it and explain how it shows an endothermic reaction
Exothermic reaction 	Write down a way of remembering what an exothermic reaction is. (poem, analogy etc)	Create a poster with different <u>real life</u> examples of endothermic reactions	Write a paragraph explaining what happens in an exothermic reaction in terms of bond breaking and making. Write it as though you are explaining to someone who knows nothing about chemistry	Draw a graph of an exothermic reaction. Explain how it shows an exothermic reaction (temperature, energy, transfer)	Research what an energy profile diagram looks like for an exothermic reaction. Sketch it and explain how it shows an endothermic reaction
Bond energies 	Draw two chemical reactions. Use spheres to represent atoms and lines to represent bonds. Make sure it is clear what type of atom it is by using different colours	Write a poem about bond energies, endothermic and exothermic reactions	Write a paragraph explaining what bond energies are and how they are used to determine if, overall, a reaction is endothermic or exothermic.	Draw a bond energy diagram for an <u>exo</u> /endothermic reaction and label it. Explain how it shows this type of reaction.	Visit the RSC website and research an experiment to do with bond energies. Write down what it is, the equipment needed, brief method and variables.