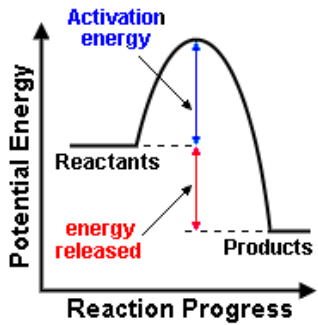
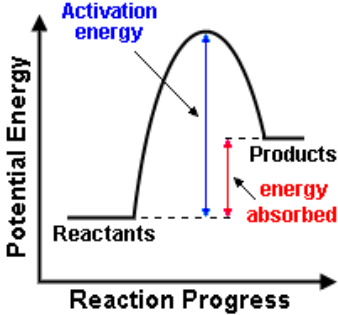


## Topic 5

1. What is the law of conservation of energy?	Energy cannot be created or destroyed, it is transferred.
2. What is an exothermic reaction in terms of energy and temperature.	Energy is transferred to the surroundings, the amount of energy in the reaction decreases. The temperature increases.
3. What is an endothermic reaction in terms of energy and temperature.	Energy is transferred from the surroundings, the amount of energy in the reaction increases. The temperature decreases.
4. Give examples of common exothermic reactions.	Combustion, oxidation and neutralisation.
5. Give some uses of exothermic reactions.	Self-heating cans and hand warmers.
6. Give examples of common endothermic reactions.	Thermal decomposition and the reaction between citric acid + sodium hydrogencarbonate.
7. Give a use of endothermic reactions.	Sports injury packs.
8. What is activation energy?	The energy needed to start a reaction
9. Draw the energy profile for an exothermic reaction showing activation energy and overall energy change.	 <p style="text-align: center;"><b>Exothermic reaction</b></p>
10. Draw the energy profile for an endothermic reaction showing activation energy and overall energy change.	 <p style="text-align: center;"><b>Endothermic reaction</b></p>
11. In terms of energy what happens during bond breaking?	Energy is taken in to break the bonds. It is endothermic
12. In terms of energy what happens during bond making?	Energy is released when bonds are made. It is exothermic
13. Describe the energy change in exothermic reactions in terms of bond breaking and making.	The energy released when bonds are created is more than the energy required for bond breaking. Overall energy change $\Delta H = -$ (negative)

## Topic 5

14. Describe the energy change in endothermic reactions in terms of bond breaking and making.	The energy taken in when bonds are broken is more than the energy released during bond making. Overall energy change $\Delta H = +$ (positive)
15. What are the units of bond energy?	kJ/mol
<b>16. How can a simple cell be made?</b>	<b>By connecting 2 different metals in an electrolyte.</b>
<b>17. How is voltage related to the reactivity of metals?</b>	<b>The greater the difference in reactivity between the two metals used, the higher the voltage produced.</b>
<b>18. When a rechargeable battery is recharged, what is happening in terms of the chemical reaction?</b>	<b>The chemical reaction is reversed by the external electrical current supplied.</b>
<b>19. Give the advantages and disadvantages of hydrogen fuel cells.</b>	<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Do not need to be electrically recharged.</li> <li>• No pollutants are produced</li> <li>• Can be a range of sizes for different uses.</li> </ul> <p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Hydrogen is highly flammable</li> <li>• Hydrogen is sometimes made by non-renewable resources.</li> <li>• Hydrogen is difficult to store.</li> </ul>
<b>20. What is the overall equation for the reaction which takes place in a Hydrogen fuel cell?</b>	$2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
<b>21. What is the half equation for the reaction at the negative electrode in a hydrogen fuel cell?</b>	$2\text{H}_2(\text{g}) + 4\text{OH}^-(\text{aq}) \rightarrow 4\text{H}_2\text{O}(\text{l}) + 4\text{e}^-$
<b>22. What is the half equation for the reaction at the positive electrode in a hydrogen fuel cell?</b>	$\text{O}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}) + 4\text{e}^- \rightarrow 4\text{OH}^-(\text{aq})$