

Energy changes

Reading – pages 61-63

Knowledge

1. What is activation energy?
2. In terms of chemical bonds, which part of a reaction is endothermic?
3. In terms of bonds, which part of a reaction is exothermic?
4. In an experiment to measure the energy change during a neutralisation reaction, why might a polystyrene cup be used rather than a beaker?
5. What else could be done to cut down on energy transfers?
6. Give two examples of types of reactions that are exothermic
7. Give two examples of types of reactions that are endothermic

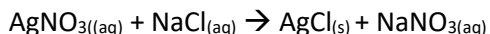
Application

1. If a reaction is exothermic overall, what does this mean in terms of energy and bonds?

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2. A student was measuring the temperature change during a precipitation reaction.



The student mixed the solutions in a beaker and used a thermometer to record the temperature of the solutions before and after mixing and then calculated the temperature change. She repeated the experiment twice. Her results are shown below:

Attempt	1	2	3	Average
Temperature increase (°C)	7.5	7.3	9.5	

- a) Calculate the average temperature change.

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- b) Is this reaction exothermic or endothermic? Explain how you know

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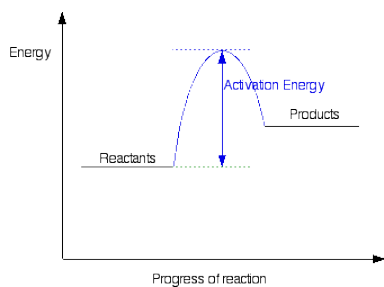
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- c) How would the student tell this is a precipitation reaction?

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3. Describe the reaction shown below in terms of energy used in bond breaking and energy released in bond making



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4. Describe how you would use the equipment below to test the hypothesis 'The higher the concentration of acid, the more exothermic the reaction'

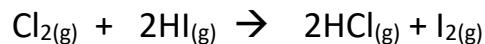
Include independent, dependent and control variables. Include sensible suggestions for volumes.

Thermometer, polystyrene cup, measuring cylinders, plastic lid, HCl, Magnesium ribbon

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Extend (higher tier only)

5. Chlorine reacts with hydrogen iodide to produce hydrogen chloride and iodine. The equation for the reaction is:



Bond	Average Bond Energy / kJ mol <sup>-1</sup>
I-I	+151
H-I	+298
H-Cl	+432
Cl-Cl	+242

a) Calculate the overall energy change during the reaction. Give the unit.