

## Temperature changes in exothermic and endothermic reactions: teacher notes

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**Introduce students to chemical energetics with these activities**

Use these notes alongside the *Education in Chemistry* article '[How to teach chemical energetics](#)'.

### Videos

Show footage of Apollo 11 launch as example of a dramatic exothermic reaction. The footage also includes the view from the lunar lander as it lifted-off from the moon.

[https://images.nasa.gov/details-Apollo\\_11\\_Intro\\_720p.html](https://images.nasa.gov/details-Apollo_11_Intro_720p.html)

Ask students how the Apollo 11 lunar module could have launched back off the moon without igniting a conventional fuel. To answer the question, show footage from Periodic Table of Videos, as well as to show how other reactions can also be exothermic.

<https://www.youtube.com/watch?v=JLCrZGgKD-k>

### Class practical

Introduce students to chemical energetics by measuring temperature changes in a range of chemical reactions with a class practical such as '[Exothermic or endothermic?](#)'. Students carry out two experiments and record temperature measurements for an exothermic and endothermic reaction. Ask students to record their temperature measurements from their experiment in the tables provided in the worksheet, inputting details of the reactants, products and temperatures on the diagrams.

Note that in addition to the steps in the 'Exothermic or endothermic?' practical, students are also asked to measure the temperature of the surrounding air. This will provide data to show that, despite the transfer of energy to the surroundings, the temperature of the air does not change (appreciably) as the energy is widely dissipated. Also note that the instructions do not explicitly mention lids, but it would be a good idea to source lids for the polystyrene cups.

The length of time required for carrying out the actual reactions is around 30 minutes, but this will depend on the nature of the class and how the practical is organised.

### Worksheet

Once students have filled in their measurements in part 1 of the worksheet, they should decide if each reaction is exothermic or endothermic based on the temperature changes.

You can then talk through the diagrams in parts 2 and 3, and support students in describing the 'chemical story' of the reaction. Then read through the 'energy story' paragraphs and ask students to circle the words to make the energy story correct. This should support students in linking observation of temperature change with the energy transfers taking place.

### Consolidation

As consolidation, you can demonstrate the experiment to the students – but making a deliberate mistake by not putting the lid on. Ask students to comment on how this might affect the temperature measurements and explain why in terms of transfer of energy. (For an exothermic reaction, no lid would allow energy to transfer rapidly to the surrounding air resulting in a smaller increase in temperature.)