



Champion  
the Researchers

## BIOFUELS

Catalina researches ways of modelling energy systems, and how we can make energy use more sustainable. Biofuels – fuels derived from biological materials such as plants – may provide a sustainable alternative to fossil fuels such as coal.

### PUPILS TEST EACH BIOFUEL BY MEASURING HOW MUCH IS REQUIRED TO RAISE THE TEMPERATURE OF WATER TO A GIVEN VALUE

#### Equipment

A selection of different biofuels, such as sunflower oil, vegetable oil and olive oil; spirit burners; copper/metal can; thermometer; water; tripod and gauze; heat-proof mat; scales

#### Method

Pour about 100 cm<sup>3</sup> water (room temperature) into the copper can.

Fill a spirit burner with the first fuel. Weigh the burner and fuel and place under the tripod and gauze, on the heat-proof mat. Place the can on the gauze. Light the burner.

Using the thermometer, check the temperature of the water. Extinguish the burner when it reaches 70 °C.

Re-weigh the burner and fuel. Make a note of the difference between the weights before and after burning – this is the amount of fuel used.

Repeat the experiment for the other two biofuels.

The amount of fuel used to raise the water temperature to 40 °C gives an indication of how efficient it is (less fuel, more efficient). Rank the fuels in order of efficiency.

#### Extensions

This is a very simple comparative test. To take this further, you could calculate the energy transferred from each biofuel to the water, using the specific heat capacity of water and the equation:  $E = mc\Delta T$

where  $E$  = energy transfer (J),  $m$  = mass of water (kg),  $c$  = specific heat capacity of water (4181 J/kg°C),  $\Delta T$  = difference in initial and final water temperature (°C).

#### The research link

The [Biofuel Research Journal](#) is a source of articles researchers have written about biofuels. It is an example of an open access journal, which means the reader can access the articles free of charge. Most journals, including many prestigious ones, are not free. Whether all journals should be open access is a hotly debated topic.

#### Additional guidance notes

Take care when lighting and extinguishing the burners – the glass casing will be hot.



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