

Lesson 8: Alternative sources of energy

Testing Ethanol as a Fuel

Wikipedia reference http://en.wikipedia.org/wiki/Ethanol_fuel

You are going to test how good ethanol is as a fuel by using it to heat water in a beaker. You will compare it to other fuels as well, like paraffin.

Hazards

Ethanol and all fuels are **HIGHLY FLAMMABLE**. Please make sure that there are no bottles of ethanol near sources of ignition.

Method

Set up a beaker in a clamp stand. Pour in 100ml of water and take its temperature.

Put some ceramic wool in a tin lid. Find the mass of this. Then add some ethanol (10-15 drops will do) to the ceramic wool and quickly find the mass again. You will use these two results to calculate the mass of ethanol you have used.

Wasting no time, put the tin lid with the ethanol under the beaker and light the ethanol with a spill. Stir the water in the beaker with the thermometer.

Take note of the colour of the ethanol flame. Why is it this colour?

When the ethanol has finished burning, continue stirring the water until the temperature stops rising. Note down this reading and use it to work out the temperature rise.

Repeat this procedure for one other fuel, like paraffin.

Analysis

Use your results to work out how much energy the ethanol has produced using the following formula.

$$\text{Energy released} = \frac{100 \times 4.2 \times \text{Rise in temp of water}}{\text{Mass of ethanol burnt}}$$

Repeat the calculations for the other fuel you used.

Evaluation

- The actual amount of energy that ethanol releases per gram is 1734kJ. This should be a lot bigger than the value you got. How can you account for this?
- How would you design a better procedure for measuring the energy change?
- How do you think this affects car designers when they are looking at designing engines?

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The report

Do some research on uses of ethanol as fuels (a really excellent place to start is Wikipedia). Use this to write a report to the AA (or some other automobile association) or the Government panel on alternative fuel use, outlining the benefits and problems associated with using Ethanol as a fuel.

Structure your report well. Use the following sections and try to answer the questions posed.

Introduction

- Why am I writing this report?
- What is ethanol?

Benefits of using ethanol as a fuel

- Why is ethanol a better fuel than paraffin?
- Why other countries use ethanol as a fuel?
- What are the other advantages of ethanol?

Drawbacks of using ethanol as a fuel

- How would a change to ethanol affect farming in Britain?
- What are the dangers of ethanol (are they any worse than other fuels?)
- What are the alternatives to ethanol?

Conclusion

- What are your recommendations?