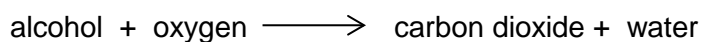


Determination of the amount of energy released by a fuel

Introduction

Fuels react with oxygen when they burn, releasing energy. You will burn four different alcohols and compare the energy they give off.



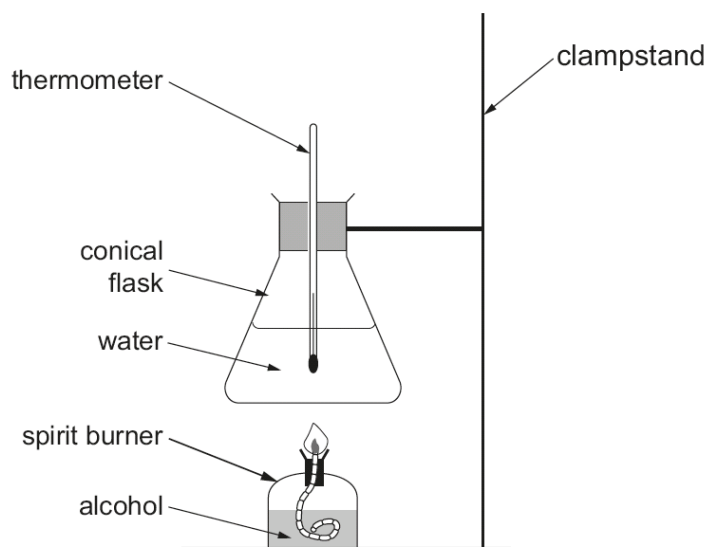
Apparatus

clamp stand, clamp and boss
 250cm³ conical flask
 100cm³ measuring cylinder
 thermometer

Access to:

electronic balance ± 0.01 g
 4 \times spirit burners containing methanol, ethanol, propanol, butanol

Diagram of Apparatus



Method

1. Measure 100 cm³ of water into the conical flask.
2. Clamp the flask at a suitable height so the spirit burner can be placed below it (as shown in the diagram - make sure that the thermometer does not touch the bottom of the flask).
3. Record the temperature of the water.
4. Record the mass of the spirit burner (including the lid and alcohol).
5. Place the spirit burner under the conical flask and light it.
6. Allow the burner to heat the water until the temperature rises by about 40 °C. Record the temperature of the water.
7. Extinguish the flame carefully and record the mass of the burner.
8. Repeat steps 1-7 with each of the other alcohols.

Analysis

1. Calculate the temperature rise for each fuel.
2. Calculate the mass of each alcohol burnt.
3. Calculate the energy released for each alcohol using the following equation.

$$\text{Energy released from alcohol per gram (J)} = \frac{\text{mass of water (g)} \times \text{temperature increase (}^{\circ}\text{C)} \times 4.2}{\text{mass of alcohol (g)}}$$