Chem CP8 Combustion of alcohols

Your teacher may watch to see if you can:

- keep careful control of control variables.

Aim

To investigate the temperature rise produced in a known mass of water by the combustion of the alcohols ethanol, propanol, butanol and pentanol.

Method

Apparatus

- 100 cm^3 measuring cylinder
- 250 cm^3 conical flask
- stand boss head and clamp
- heat-resistant mat
- eye protection
- thermometer
- insulation/draught shield
- electronic balance
- spirit burners with caps containing: ethanol, propanol, butanol and pentanol

⚠ Safety

Wear eye protection at all times.

All alcohols are flammable: handle with care and keep the tops on burners when not in use.

A Measure the mass of an alcohol burner and cap. Record the mass and the name of the alcohol.

B Place the alcohol burner in the centre of a heat-resistant mat.

C Use a measuring cylinder to add 100 cm^3 of cold water to a conical flask.

D Measure and record the initial temperature of the water and carefully clamp the flask above the alcohol burner.

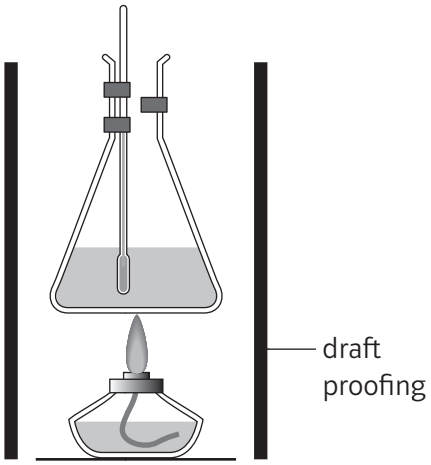
E Surround the apparatus with a draught screen/insulation.

F Remove the cap from the burner, then light the wick of the burner and allow the water to heat up by around 40 °C.

G Replace the cap on the burner and measure and record the final temperature of the water.

H Measure the mass of the alcohol burner and cap again and record the mass.

I Wash out the flask with cold water and repeat steps **A**–**H** using fresh cold water and a different alcohol.



Recording your results

1 Record all your measurements in a suitable table.

Considering your results/conclusions

2 For each alcohol calculate:

- **a** the change in mass of the burner and lid
- **b** the change in temperature of the water.
- **c** Use your answers to **a** and **b** to calculate the mass of each alcohol burned to produce a 1 °C rise in temperature.

3 **a** Describe any trends that can be seen in your results.

b Explain why these alcohols show such a regular trend in these values. (*Hint:* think about molecular structures.)

Evaluation

4 State four possible sources of error in this experiment and explain which is the main source of error.