

## Comparing Foods for Energy

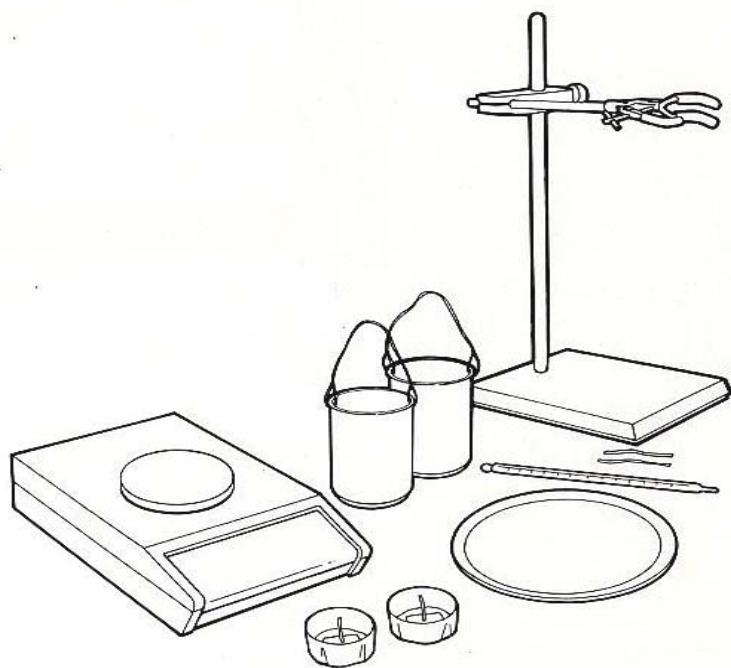
### Introduction

Many foods show on the packet an amount of energy as **kilocalories** (kcal) per 100g. In theory this is the rise in temperature of a kilogram of water caused by 100g of the food reacting completely with oxygen.

In practice it is difficult to burn food completely and measure the rise in temperature which takes place. With simple apparatus the results are inaccurate. It is, however, possible to compare temperature changes produced by different foods if the conditions for burning are exactly the same each time.

1 kilocalorie = 4.18 kilojoules (kj)

### You will need



### Equipment

Small cups (for oil and fat samples)  
Wicks  
Cans (light meal)  
Balance (readability of at least 0.1 g)  
Thermometer (0-100°C)  
Metal dish or saucer  
Clamp stand  
Spill or taper  
Eye protection

### Materials

Samples of fats and oils

### Safety



Care should be taken with lighted oil. Flames can be extinguished by covering with a damp cloth. Cups should not be moved when wicks are burning.



Wear eye protection.

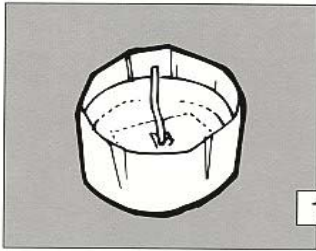


Do not consume food in a laboratory, or any food used for experiments, because it may be contaminated.



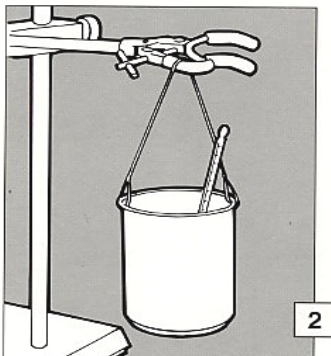
Some people are allergic to peanuts and peanut products eg peanut butter and peanut oil (ground nut oil).

## Method



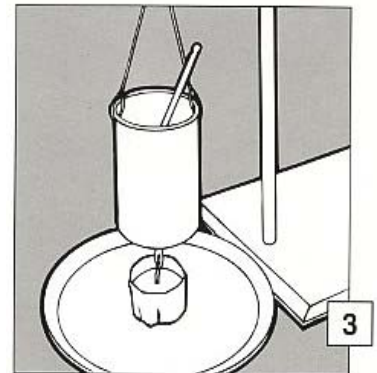
1. Warm the cup or dish and half fill it with fat or oil. Set the wick in the centre and weigh the cup and its contents.

2. Pour an exact amount (e.g. 100cm<sup>3</sup>) of water into the can and, together with the thermometer, set it up shown in the diagram.



3. Note the temperature of the water and light the wick. Put the cup under the can as shown.

Let it burn long enough to raise the temperature by about 50°C. Extinguish the flame and note the final temperature of the water and re-weigh the cup with its content.



4. Calculate the difference between the first and final temperatures (**t**) of the water and between the first and final weights of the cup of oil (**m**). A calorie is the energy which raises 1g of water 1°C. so the energy per gram of oil raising the temperature of the volume of water (**w**) can be calculated as:

$$\text{Energy} = \frac{\mathbf{w} \times \mathbf{t}}{\mathbf{m}} \text{ calories (1000cal = 1 kcal)}$$

5. Repeat steps 1-4 exactly but using different fats or oils. Compare the calories per gram in each case.

1 kilocalorie (kcal) = 4.18 kilojoules (kj)