**Year 8 Physical Science**

**The energy content of food**

**Aim:** To find out the energy content of different food samples.



**Equipment**

* 3 food samples
* 3 test tubes and test tube rack
* Thermometer
* Retort stand, boss head and clamp
* Bench mat
* Tongs or skewer
* Matches
* Electronic balance
* Measuring cylinder

### **Method**

1. Measure 10ml of water into the test-tube.
2. Clamp the test-tube at an angle in the retort stand over a heat resistant mat.
3. Take the temperature of the water and record it in the table.
4. Weigh a piece of food and record the mass.
5. Fix the food on the end of the tongs/skewer.
6. Ignite the food using a match. Hold the food below the test-tube and above a heat resistant mat. Rotate the food so that it stays ignited. If the flame goes out, quickly relight it.
7. When the food stops burning, insert the thermometer and record the temperature.
8. Carefully remove the hot test tube with a paper towel and place it in the rack.
9. Repeat the experiment using the different foods.
10. Determine how much energy was absorbed by the water by multiplying the temperature rise by 42. It takes 42J of heat energy to raise the temperature of 10ml of water by 1°C.

**Results**

|  |  |  |  |
| --- | --- | --- | --- |
| Food Type | cracker | chip | m/mallow |
| Mass (g) |  |  |  |
| Water temperature before (°C) |  |  |  |
| Water temperature after (°C) |  |  |  |
| Temperature rise (°C) |  |  |  |
| Energy absorbed (J) = temperature rise x 42 |  |  |  |

\* If no temperature rise is seen, the experiment could be repeated with a test tube stopper.

**Questions**:

1. What is the potential energy type in food?

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1. What energy types are released in this experiment?

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1. Draw an energy flow diagram for this experiment.
2. The amount of energy absorbed by the water is less than the amount of energy released by the food. Explain why.

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1. How is the energy transformation in the experiment different to the energy transformation that would occur in your body if you had digested these foods?

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1. If we consider the useful energy output to be the energy absorbed by the water, calculated at step 10, and we use the marshmallow food packaging to calculate the energy input of your marshmallow, we can calculate the energy efficiency.

Useful energy **output** (energy absorbed for marshmallow from table) \_\_\_\_\_\_\_\_J

To calculate useful energy **input** of the marshmallow:

* Use energy per 100g from packaging ­­­­­­­­­­­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_kJ
* To convert to Joules **x 1000** \_\_\_\_\_\_\_\_J/100g,
* To convert to J/g **÷ 100**\_\_\_\_\_\_\_\_J/g
* To calculate useful energy input **x J/g by the mass** of your marshmallow ­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_J
* Use the values in the grey boxes to calculate the energy efficiency



