

# Experiment: Energy Released from Combustion Reactions

## Objective

To observe and measure the energy released from the combustion of various fuels and determine the efficiency of each.

## Materials

- 1 thermometer
- 3 test tubes
- Cheezel
- Potato chips
- Small strips of paper
- Water
- Bunsen burner
- Electronic mass balance
- Food holder
- Small measuring cylinder
- Retort stand
- Bosshead and clamp

## Method

1. Pour 10mL of water into a test tube.
2. Attach test tube to bosshead and clamp.
3. Measure and record the starting temperature of the water using a thermometer.
4. Measure the mass of the cheezel.
5. Place cheezel on food holder.
6. Ignite the cheezel using a Bunsen burner and let it burn below the test tube so that the flame heats the water.  
Re-light the fuel with the Bunsen burner if it goes out too early.
7. Once the cheezel has completely burned, measure and record the final temperature of the water.
8. Repeat Steps 1 to 7 using a new test tube, new water and a different fuel.

## Calculations and Analysis

To calculate the energy absorbed by the water, multiply the temperature change by 42. This is because it takes about 42 joules of energy to heat 10mL of water by 1°C.

A useful measurement for deciding which fuel to use in combustion is **energy density**. This is the amount of energy that a fuel can produce for a set mass. A higher energy density means that the same mass of fuel can produce a higher amount of energy. A high energy density is useful for transportation because you can get more energy without increasing the mass of the car/plane/rocket. **To calculate the approximate energy density of the fuel, divide the energy absorbed by the mass of the fuel.**

## Table of Observations

Fuel	Mass of Fuel (g)	Starting Temp. (°C)	Final Temp. (°C)	Temperature Change (°C)	Energy Absorbed (J)	Energy Density (J/g)
Cheezel						
Potato Chips						
Paper						

## Questions

1. Which fuel released the most energy during combustion? Support your answer with the observed data.
2. Do you think all of the energy from combustion was absorbed by the water? Why / why not?
3. List two ways to improve this experiment and explain why they would be an improvement.
4. Based on your results, which fuel would you consider the most efficient for heating water? Why?