

Mechanical equivalent of heat



Apparatus

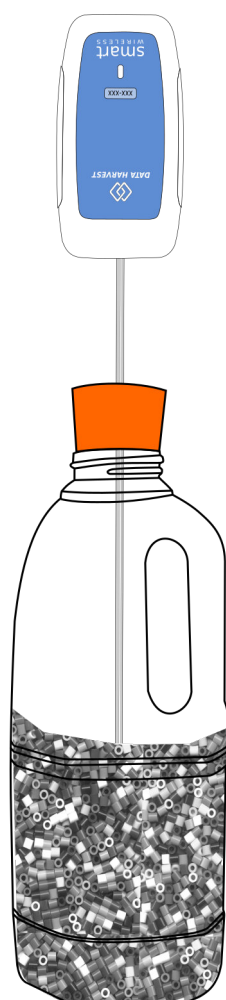
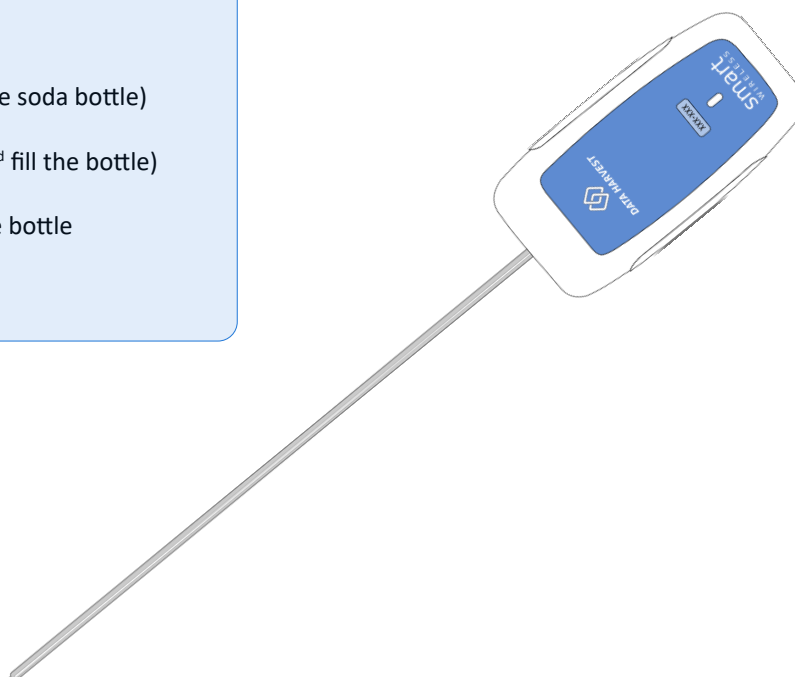
Smart wireless Temperature (housed)

Plastic bottle (2 pint milk bottle or 1 litre soda bottle)

Plastic beads or small screws (min. 1/3rd fill the bottle)

Bung with hole to fit the opening of the bottle

Masking tape (or similar)



Method

1. Set up the apparatus as shown in the diagram, use a small piece of tape to help hold the bung in place.
2. The beads should fill the bottle to 1/3rd to 1/2th
3. Check the end of the temperature sensor is in the mass of beads.
4. Open the software and connect the sensor to your Bluetooth enabled device.
5. Use graph and use set up to give an intersample time of 1s .
6. Start the recording and let the temperature in the bottle record for a few seconds, then shake the bottle up and down vigorously to make sure the beads are moving up and down the entire volume in the bottle. Use the handle (if present) to stop heat from your hands entering the bottle.
7. After about a minute, stop the recording. You should see an increase in temperature. It will not look large and the scale of the y axis will need altering (autoscale or manual)
8. Let the temperature in the bottle cool down, and repeat perhaps changing the shaking pattern.

Extensions

Change the format of the shaker, short and fat or long and skinny.

Does the type of material the container is made from make a difference?

Change the beads for glass, small screws etc.

Results and session data.

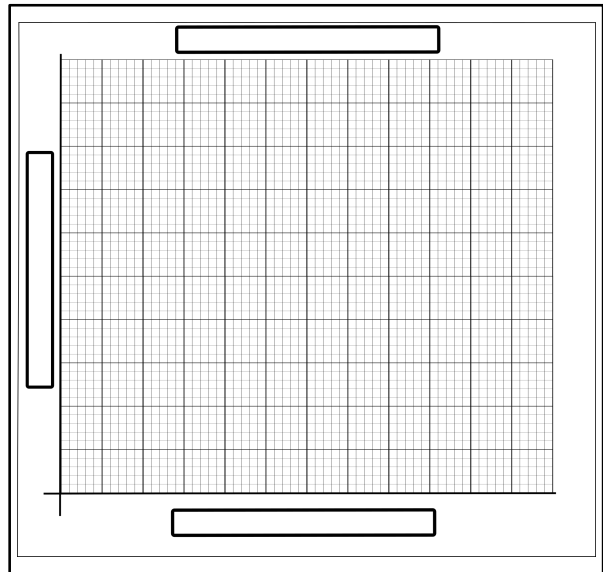
Starting
temperature.....°C

Start time.....s

End temperature.....°C

End time.....s

Temperature
increase.....°C



Sketch of the graph. Label axis.

Questions

1. Suggest a mechanism for how the heat was generated.
2. If you kept shaking the beads would the temperature keep rising or reach a level? Explain your choice.
3. Who was the scientist who studied heat and gave his name to the unit of energy?
4. What is kinetic energy?
5. What is potential energy?
6. How are Kinetic energy and Potential energy linked?