

1. A thermo-couple

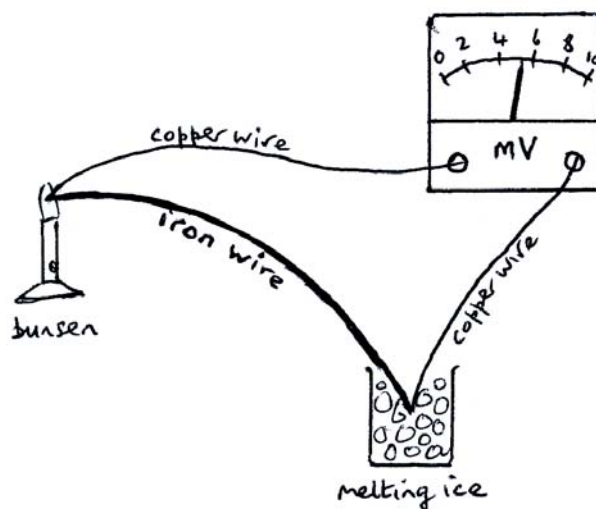
A thermocouple is a circuit containing 2 different metals.
In the circuit shown, there are 2 junctions
where the copper wires meet the iron wire.

If one junction is kept cold,
while the other junction is hot,
then a small voltage is produced.
This voltage is shown on the voltmeter (in mV).

The higher the temperature of the hot junction,
the bigger the voltage. So the voltmeter scale is
a thermometer, and it can be marked in $^{\circ}\text{C}$.

This thermometer can be used at both low and
high temperatures from -250°C to $+1500^{\circ}\text{C}$.

Because the hot junction is very small, this
thermometer can be used for measuring
temperatures that change rapidly.



A thermocouple thermometer

There are several other kinds of thermometer:

2. You have seen a **liquid-in-glass thermometer** (pages 26–27).
It can use **mercury** (for temperatures between -39°C and $+360^{\circ}\text{C}$),
or **alcohol** (for temperatures between -115°C and $+80^{\circ}\text{C}$).

3. A nurse's clinical thermometer is often a **thermistor thermometer** (photo on page 27).
A battery passes a current round a circuit containing an ammeter and a thermistor.
See the circuit on page 326.

The hotter the thermometer, the lower the resistance of the thermistor,
so the more current flows through the ammeter. The ammeter can be marked in $^{\circ}\text{C}$.
A clinical thermometer usually has a range of just $36 - 42^{\circ}\text{C}$.

4. A **resistance thermometer** uses the fact that the resistance of a metal coil increases as it gets
hotter (ie. the opposite of a thermistor). See also page 260. Platinum is often used as the metal.
This thermometer can be used at both low and high temperatures, from -200°C to over $+1200^{\circ}\text{C}$.

5. A constant-volume **gas thermometer** uses the pressure of a gas to measure the temperature.
See the diagram on page 32.

It can be used for very low and high temperatures, from -270°C to $+1500^{\circ}\text{C}$.

Questions

Use the data given above to decide which thermometer(s) could be used to measure temperatures of:

- (a) 1000°C (b) 50°C (c) -250°C (d) -50°C