CIE Physics GCSE

Topic 2.2 - Thermal Properties and Temperature

Flashcards

What is thermal expansion?

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When a material is heated, the particles have more kinetic energy so move more, resulting in more space between molecules - and ultimately resulting in the material expanding.

Which state of matter experiences the most thermal expansion? (supplement)

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Gases, because the particles have most freedom to move.

Describe how temperature is measured by liquid-in-glass apparatus.

Describe how temperature is measured by liquid-in-glass apparatus.

- As temperature rises/falls, the liquid expands/contracts
- A scale is used to calibrate and convert expansion to a temperature value

Give examples of fixed points used to calibrate thermometers.

Give examples of fixed points used to calibrate thermometers.

- Melting point of water (0℃)
- Boiling point of water (100℃)

Define sensitivity (supplement)

Define sensitivity (supplement)

The change in output per unit change in input.

What is the sensitivity of a thermometer? (supplement)

What is the sensitivity of a thermometer? (supplement)

The change in length per degree change in temperature.

Describe how to increase the sensitivity of a thermometer (supplement)

Describe how to increase the sensitivity of a thermometer (supplement)

- Bigger bulb
- Narrower bore

Define range (supplement)

Define range (supplement)

The difference between the maximum and minimum values (eg. maximum and minimum temperature on a thermometer).

How can the range of a thermometer be increased? (supplement)

How can the range of a thermometer be increased? (supplement)

- Wider bore
- Longer stem

Define linearity (supplement)

Define linearity (supplement)

When a change in input causes the same (or equivalent) change in output. (eg. 1℃ produces a 1mm change).

Define specific thermal capacity (supplement)

Define specific thermal capacity (supplement)

The amount of energy needed to raise the temperature of 1kg of a substance by 1ºC.

Give the equation linking energy and specific heat capacity (supplement)

Give the equation linking energy and specific heat capacity (supplement)

$$E = mc\Delta T$$

Where…

E = energy (J)

m = mass (kg)

c = specific heat capacity (J/kgºC)

ΔT = change in temperature (ºC)

Define internal energy.

Define internal energy.

The energy stored by particles within a system.

What kinds of energy are stored as internal energy?

What kind of energy are stored as internal energy?

Kinetic and potential.

How does heating affect internal energy?

How does heating affect internal energy?

It increases internal energy. The particles gain energy and move more, increasing their kinetic energy and therefore increasing the overall internal energy.

What does an increase in internal energy result in?

What does an increase in internal energy result in?

A change of state or an increase in temperature.

Describe how to determine the specific thermal capacity of a material (supplement)

Describe how to calculate the thermal capacity of a material (supplement)

- Use an electric heater to heat a substance for a set time
- Work out energy from E=Pt (from the power of the heater)
- Measure the temperature change with a thermometer
- Calculate specific heat capacity from $E=mc\Delta T$

Define specific latent heat.

Define specific latent heat.

The amount of energy needed to change the state of 1kg of a substance without changing its temperature.

What are the 2 types of specific latent heat?

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Specific latent heat of fusion - energy to change between solid and liquid (melt/freeze)

Specific latent heat of vaporisation - energy to change between liquid and gas (boil/condense)

Give the equation for energy for a change of state (supplement)

Give the equation for energy for a change of state (supplement)

$$E = mL$$

Energy (J) = mass (kg) x specific latent heat (J/kg)

Define melting point.

Define melting point.

The temperature at which a material in solid form will become a liquid.

Define boiling point.

Define boiling point.

The temperature at which a material in liquid form will become a gas.