

Chapter – 3: Heat

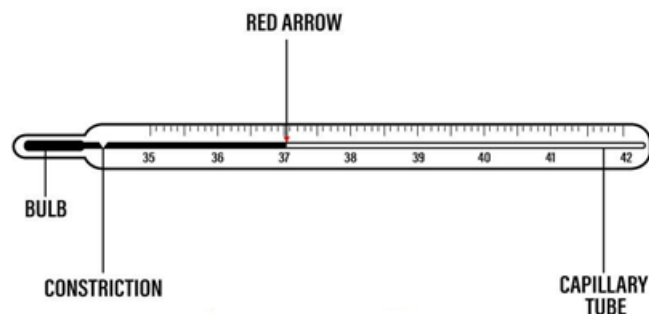
- Woollen clothes – made from animal fibres
- Cotton clothes – made from plant fibres
- In winter – cold inside – warm outside (under sun) – wear warmer clothes
- In summer – hot even inside – wear cotton clothes
- How to know – hot or cold?
- How to find – how hot or cold?

Hot and Cold

- Daily life – many objects – some cold – some hot
- Tea – hot – ice – cold
- Do not touch – too hot items
- Some hotter than others – some colder than others
- How to find? – touching them
- Is our sense of touch reliable?
- Take 3 containers – container A – hot water – container B – cold water – container C – mix water – dip hands in A and B for 2-3 minutes – dip both hands in C – both hands feel different temperature
- Touch of sense – not reliable
- How to find out hotness or coldness of object?
- Reliable measure – **temperature** – measured by **thermometer**

Measuring Temperature

- Thermometer – body temperature – **clinical thermometer**
- Hold it in hand – observe carefully – consists of long, narrow, uniform glass tube – bulb at the end
- Bulb – contain mercury – rise up with rising temperature
- Also contain a scale – Celsius scale – $^{\circ}\text{C}$
- Reads from 35°C to 42°C



- Precautions –
 - Wash before and after use – antiseptic solution
 - Ensure thermometer temperature – below 35°C
 - Keep mercury level – line of sight
 - Handle with care
- Normal human body temperature – 37°C – slightly higher or lower
- Much higher or lower temperature – thermometer may break

- Take a thermometer – place it in mouth under tongue – 2-3 minutes – read it carefully

Laboratory Thermometer

- Measure much higher or much lower temperatures
- Range – -10°C to 110°C
- Take some water – dip a thermometer – observe mercury level after stabilizing
- Mercury level changes when taken out – read while thermometer inside water
- Clinical thermometer – read after taking out – kink (small hole) near bulb
- Prevents mercury level from falling

Transfer of heat

- Frying pan – becomes hot – kept on flame – heat – flame to utensil
- Pan – removed from fire – cools down slowly – heat – pan to surrounding
- Heat – always flows – hotter to colder object
- Take a strip of metal – place piece of wax on it – place it between bricks – heat one end
- Pieces of wax – melts slowly
- Process – heat transferred – **conduction**
- Some objects – conduct easily – some do not
- Cooking pan – plastic or wooden handle
- Materials – allow conduct of heat – **conductors**
- Aluminium, copper, tin
- Materials – do not allow conduct of heat – poor conductors – **insulators**
- Water and air – poor conductors
- Water – heated – hot water rises up – cold water takes the place
- This mode of heat transfer – **convection**
- Same happens with air
- Light a candle – feel air near and over it – top air much hotter than side air
- Coastal areas –
 - Day time –
 - Land heats faster than water
 - Air over land – much hotter – rises up
 - Air over sea – cooler – takes place
 - Warm air – moves towards sea – complete cycle
 - Cool air from sea – **sea breeze**
 - Night time –
 - Exactly opposite
 - Water cools down slower than land
 - Cool air from land – move towards sea – **land breeze**
- Heat from sun – reaches us by **radiation** – no medium like air between sun and earth – no convection
- Room gets warm from heater – this process
- Hot utensil away from flame – cools down – transfers heat to the surroundings
- All hot bodies radiate heat

- Heat – falls on some object – some heat is reflected, some is absorbed, some is transmitted (passed on)
- Temperature increases due to absorption of heat

Kinds of Clothes We Wear in Summer and Winter

- Summer – we prefer – light colour clothes
- Winter – we prefer – dark colour clothes
- Dark surface – absorb more heat – comfortable in winter
- Light surface – reflect more heat – comfortable in summer

Woollen clothes keep us warm

- Wool – poor conductor
- Air – trapped inside wool fibres – prevent heat flow – body to surroundings
- 2 thin blankets – better than – 1 thick blanket – air between 2 blankets