

# Physics Topic 3: Particle model

## 1. Density

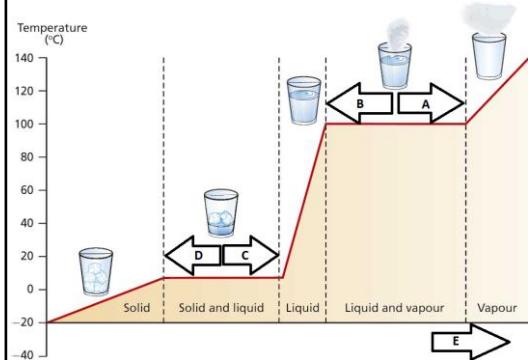
$$\rho = \frac{m}{V}$$

| Symbol | Meaning | Unit            |
|--------|---------|-----------------|
| $\rho$ | density | $\text{kg/m}^3$ |
| m      | mass    | kg              |
| V      | volume  | $\text{m}^3$    |

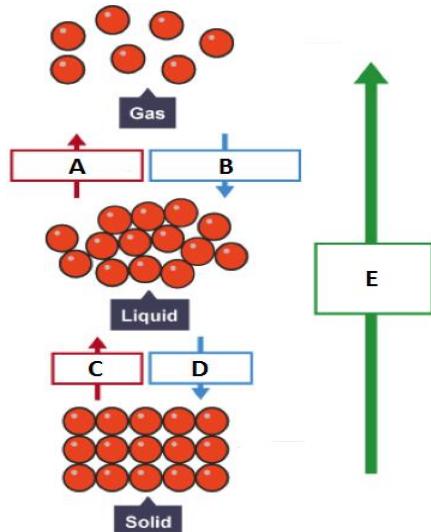
## 5. Gas properties

|                          |                                |
|--------------------------|--------------------------------|
| Diagram                  |                                |
| Arrangement of particles | Randomly arranged<br>Far apart |
| Movement of particles    | Brownian motion                |
| Energy of particles      | Very high energy               |
| Density of substance     | Very low density               |

## 2. Changes of state



- A. Evaporation/ Vaporisation
- B. Condensation
- C. Melting/ Fusion
- D. Freezing
- E. Increasing internal energy



## 3. The specific heat capacity

$$\begin{array}{lcl} \text{Energy transferred, } \Delta E & = & \text{mass, m} \times \text{Specific heat capacity, } c \times \text{Temperature change, } \Delta \theta \\ & & (\text{kilograms, kg}) \quad (\text{joule per kilogram per degree Celsius, } \text{J/kg°C}) \end{array}$$

To find the specific heat capacity of a substance the equation can be rearranged to:

$$c = \frac{\Delta E}{m \Delta \theta}$$

## 4. The specific latent heat

$$\begin{array}{lcl} \text{Energy transferred, } \Delta E & = & \text{mass, m} \times \text{Latent heat, L} \\ & & (\text{joules, J}) \quad (\text{kilogram per J/kg}) \end{array}$$

To find the specific latent heat of a substance the equation can be rearranged to:

$$L = \frac{\Delta E}{m}$$

## 6. Pressure in gases (TRIPLE ONLY)

| change            | effect               | reason   |
|-------------------|----------------------|--|
| Increase Pressure | Increase volume      | More particles so more collisions<br>Increase the force stretching the balloon until the forces balance          |
| Decrease pressure | Decrease volume      | Less particles so less collision.<br>Decrease the force causing the balloon to contract until the forces balance |
| Formula           | $pV=\text{constant}$ | If fixed mass and constant temperature   |