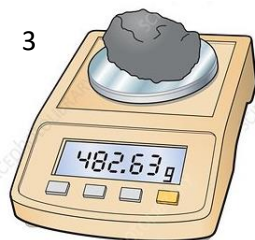
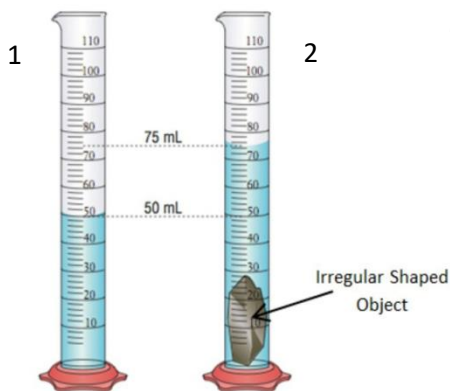


1. Key Words

Density	A measure of how compact the particles are in a substance
Internal energy	The total kinetic and potential energy of all the particles in the substance
Latent heat	The amount of energy required to change the state of a substance
Specific heat capacity	The amount of energy required to change the temperature of a 1kg by 1°C

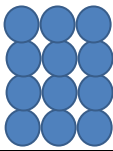

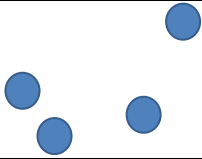
2. Calculating Density

- Record the volume of water in a half-filled measuring cylinder
- Place object into the measuring cylinder and calculate the change in volume
- Measure the mass of the object
- Calculate the density using the equation



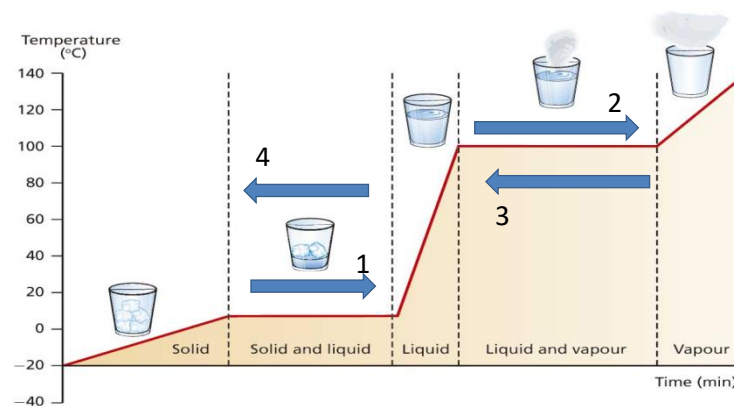
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

3. States of matter

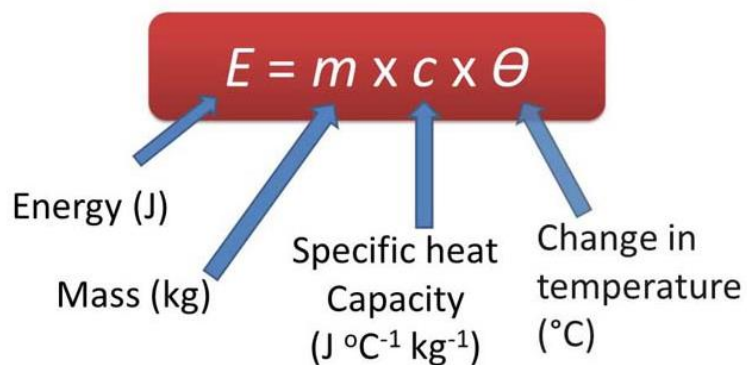
Property	Solid	Liquid	Gas
Particle diagram			
Internal energy	Low	Medium	High
Movement of particles	Vibrating around fixed points	Move over each other	Vary fast, spread out to fill space
Density	High	Medium	Low

4. Changes of State

	Process	Change of state occurring
1	Melting	From a solid to a liquid
2	Evaporation / Boiling	From a liquid to a gas
3	Condensing	From a gas to a liquid
4	Freezing	From a liquid to a solid



5. Specific Heat Capacity and Latent Heat

$$E = m \times c \times \theta$$


Energy (J)

Mass (kg)

Specific heat Capacity ($\text{J } ^\circ\text{C}^{-1} \text{ kg}^{-1}$)

Change in temperature ($^\circ\text{C}$)

Energy = mass x specific latent heat

J

kg

J/kg

$$E = mL$$

The stronger the intermolecular forces the more energy that will be needed to overcome these forces and cause a change in state.

6. Energy Changes during Changes of State

Process	Energy Changes
Melting	In a solid the particles vibrate around a fixed point. When a solid is heated, thermal energy is transferred to the particles as kinetic energy. This increase in kinetic energy increases the internal energy and allows the particles to overcome some of the intermolecular forces. This allows the particles to move and slide over each other.
Evaporation / Boiling	In a liquid the particles can move and slide over each other. When a liquid is heated, thermal energy is transferred to the particles as kinetic energy. This increase in kinetic energy increases the internal energy and allows the particles to overcome all the intermolecular forces in the substance. This means the particles can spread out to fill the space they are in.
Condensing	When a gas is cooled the internal kinetic energy is transferred to thermal energy which dissipates to the surroundings. Intermolecular forces become stronger, and the particles move closer together.
Freezing	When a liquid is cooled the internal kinetic energy is transferred to thermal energy. Intermolecular forces become stronger, and the particles begin to vibrate around a fixed point.