TOPIC 3: PARTICLE MODEL OF MATTER

States of Matter

Gases
- Most Kinetic Energy
- Particles can move freely
- Lowest Density

Liquids
- Particles can flow over each other

Solids
- Particles can only vibrate about fixed positions
- Highest Density
- Least Kinetic Energy

Density
- Measured in kg/m^3
- $\rho = m/v$
- Mass per unit volume

Changes of State
- Changes of state are physical changes
- Internal Energy
  - The total kinetic and potential energies of the particles in a system
- Mass is always conserved in changes of state
- MELTING: Solid → Liquid
- EVAPORATION: Liquid → Gas
- CONDENSATION: Gas → Liquid
- Sublimation
  - When a solid changes to a gas without becoming a liquid
- Chemical Changes
  - Cannot easily recover its original properties
- Physical Changes
  - If change is reversed the material's properties can be recovered

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Specific Heat Capacity

Temperature increases depend on material type, material mass and the energy inputted

The energy required to raise the temperature of 1kg of a substance by 1°C

Measured in J/kg°C

$\Delta E = m c \Delta \theta$

Specific Latent Heat

Latent Heat of Fusion

Changing from solid to liquid

Latent Heat of Vaporisation

Changing from liquid to vapour

Measured in J/kg

The energy required to change the state of 1kg of a substance without a change in temperature

$\Delta E = m L$

Pressure in Gases

Work Done

Doing work on a gas will transfer energy to it

Bike Pump

As pump is compressed, work is done on the gas so temperature increases

Pressure produces a force at right angles to the container it is in

Particle Motion

Molecules are in constant random motion

Temperature is determined by the kinetic energy of the substance

The higher the temperature, the higher the kinetic energy

Unit of pressure is the Pascal

If there is a fixed mass of gas held at constant temperature, pV = constant

KEY

'Higher tier only' written in green.
'Physics only' written in clouds.

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