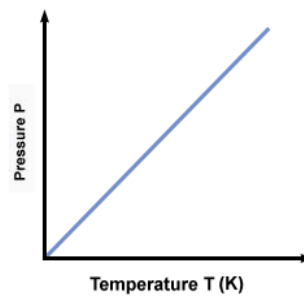
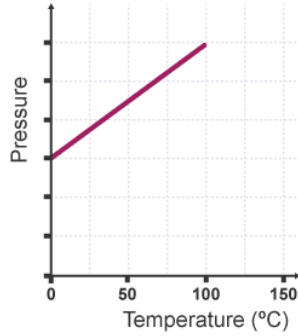
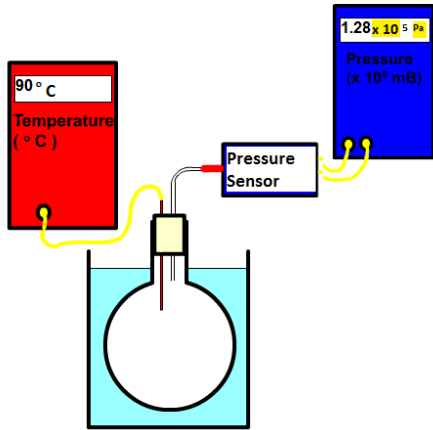


GAS LAWS SUMMARY

1. Pressure and Temperature

(**Volume constant, mass constant)



**** TEMP MUST BE IN KELVIN**

$$\frac{p_1}{T_1} = \frac{p_2}{T_2}$$

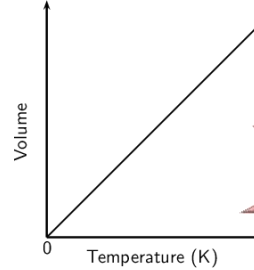
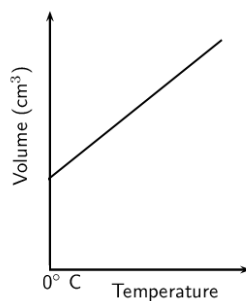
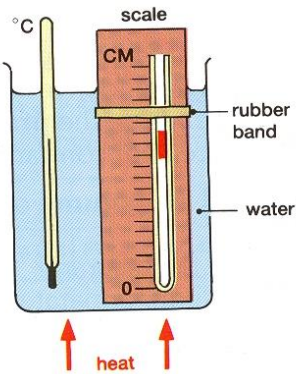
Kinetic theory

- Temp ↑ particles have greater speed, and greater Ek

- Particles collide with container walls more often and with greater Force, - since $P = F/A$, Pressure ↑

2. Volume and Temperature

(**Pressure constant, mass constant)



**** TEMP MUST BE IN KELVIN**

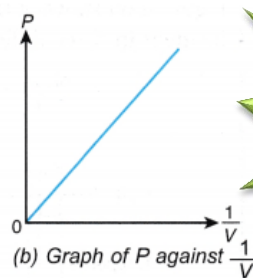
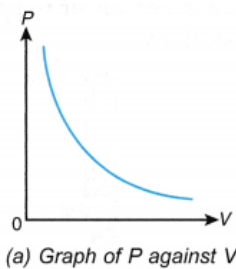
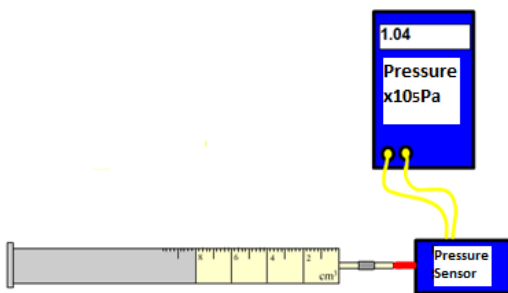
$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

Kinetic theory

- Volume ↓ particles collide with container walls more often - Overall force increases, - since $P = F/A$, Pressure ↑

3. Pressure and Volume

(**Temperature constant, mass constant)



$$p_1 V_1 = p_2 V_2$$

Kinetic theory

- Volume ↓ particles collide with container walls more often - Overall force increases - since $P = F/A$, Pressure ↑

Pressure is the force per unit area

$$p = \frac{F}{A}$$

p : (Pa or Nm⁻²) F : (N) A : (m²)

Combined Gas Equation

$$\frac{pV}{T} = \text{constant}$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

Degrees Celsius to Kelvin: + 273

Kelvin to degrees Celsius: - 273

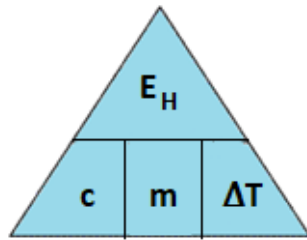
Absolute Zero: -273 °C / 0 K

There is no negatives on the kelvin scale
Temperature is a measure of the mean kinetic energy of particles

Specific heat capacity (c): Heat energy required to raise the temperature of 1kg of a substance by 1°C

$$E_H = c m \Delta T$$

E_H : Heat energy (J)
 c : specific heat capacity ($J\ kg^{-1}\ ^\circ C^{-1}$)
 m : mass (kg)
 ΔT : change in Temperature ($^\circ C$)



Specific heat capacity values are different for all materials

- values found in data sheet

$E = P t$ can be used to find heat energy supplied by appliances

Heat energy will usually be lost to the surroundings - not all will be transferred to the substance being heated

Low specific heat capacity -

not much energy to heat (heats up quickly for constant power) but loses heat quickly

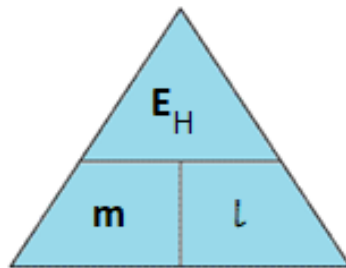
High specific heat capacity -

lots of energy to heat (heats up slowly for constant power) but loses heat slowly (retains heat better)

Specific latent heat (l): Heat energy required to change the state of 1kg of a substance at the same temperature

$$E_H = m l$$

E_H : heat energy (J)
 m : mass (kg)



l : specific latent heat of fusion / vaporisation

Specific latent heat values are different for all materials – values found in data sheet

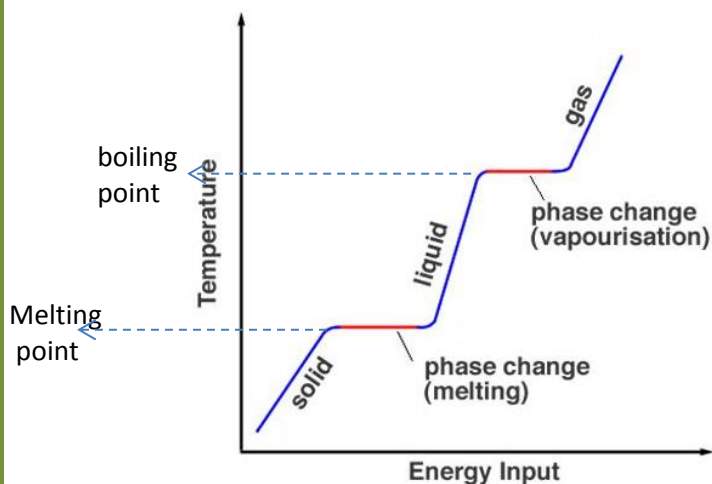
Specific Latent heat of fusion, l_f :

Solid -> Liquid

Specific Latent heat of vaporisation l_v :

Liquid -> Gas

The same material **requires different quantities of heat** to change the state of unit mass from **solid to liquid (fusion)** and to change the state of unit mass from **liquid to gas (vaporisation)**.



During change of state

– **temperature remains constant**

For change of temperature:

$$E_H = c m \Delta T$$

For change of state:

$$E_H = m l$$

"specific" = per kilogram