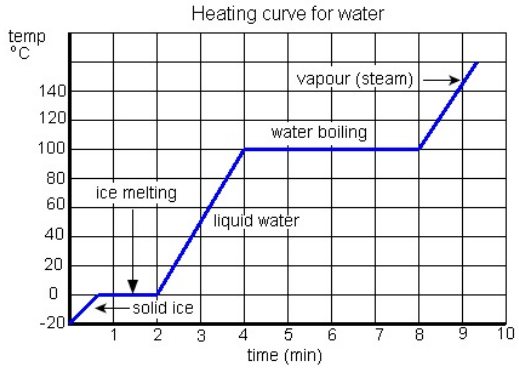
Thermal Physics

1 Differences between heat and temperature

	Heat	Temperature
Definition	Thermal energy(transferred from hot to cooler places)	A comparative measure of how hot something is
Unit	Joule	Kelvin
Measured using	Joulemeter	Thermometer

2 Graph of heating water



3 Specific heat capacity

Specific heat capacity - The energy needed to raise the temperature of 1kg of a material by 1K

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

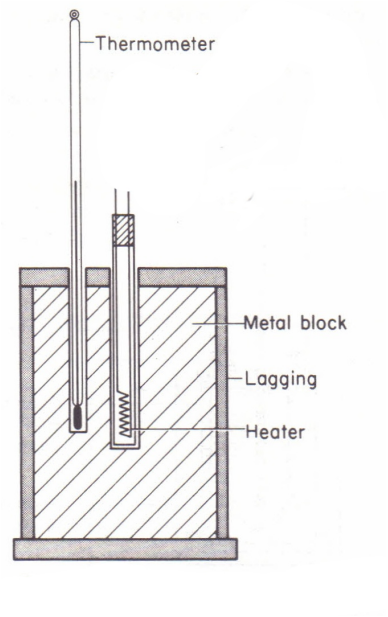
c=Specific heat capacity - $Jkg^{-1}\ °C$
m=Mass - kg
$\Delta\theta$ = Temperature change - $°C$
Q = Heat energy - J

3.1 Latent heat

Specific latent heat of fusion, L_f $Q = mL_f$
The energy needed to change 1kg of a solid to a liquid without a temperature change

Specific latent heat of vaporisation, L_v $Q = mL_v$
The energy needed to change 1kg of a liquid to a vapour without a temperature change

3.2 How to determine the specific heat capacity of a metal



1. Set up the experiment with a voltmeter and ammeter to determine the electrical power of the heater
2. Allow time for the heat to conduct through the metal (until there is a temperature rise)
3. Start a stopclock, record the V, I and temperature
4. Record V, I and T every 2 minutes for 20 minutes

4 Gas laws

4.1 Boyle's law

Boyle's law - Pressure is inversely proportional to volume
Gases - Free moving particles, no forces

$$\text{Boyle's law: } P = kV^g$$

$$\ln(P) = \ln(k) + g\ln(V)$$

This is in the form y=c+mx

4.2 Summary of gas laws

Law	Proportionality	Constant	Equation
Boyle's	$p \propto \frac{1}{v}$	Temperature, moles	$p_1 v_1 = p_2 v_2$
Charles'	$V \propto T$	Pressure, moles	$\frac{v_1}{T_1} = \frac{v_2}{T_2}$
Gay-Lussac	$p \propto T$	Volume, moles	$\frac{p_1}{T_1} = \frac{P_2}{T_2}$

4.3 Ideal Gas equation

$$pV = nRT$$

p=Pressure(Pascals)
V=Volume(m^3)
n=Number of moles
R=Universal gas constant=$8.31 JK^{-1}mol^{-1}$
T=Temperature(K)