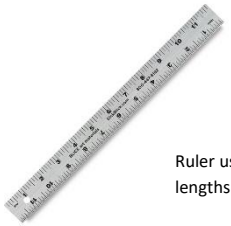
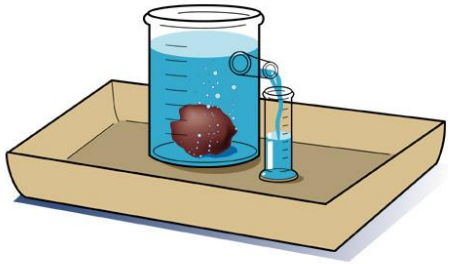
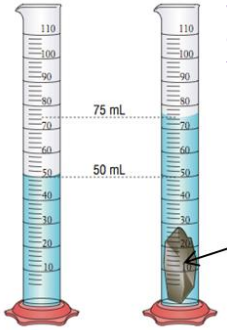
Vernier callipers used to measure small widths /lengths (to 0.05 mm)



Ruler used to measure lengths (to 1mm)

Micrometer used to measure very small widths (0.01 mm)

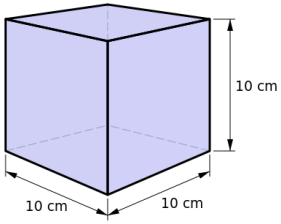




Volume of an irregular object. Used then to find density = mass/volume

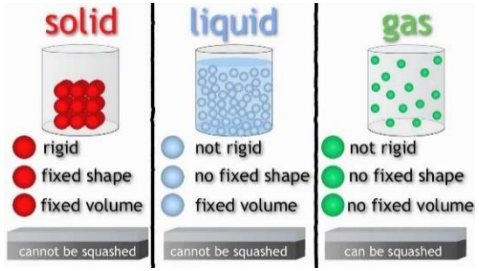
30 Quick questions: Answer these in your book

1 What is the equation for density?
2 What is density measured in?
3 What is mass measured in?
4 How would you measure the volume of a rectangular block?
5 what is the volume of this shape?



6 How would you find the volume of an irregularly shaped object like a toy car?
7 Would a 250ml beaker or a 10ml measuring cylinder be better for finding the volume of a ring?
8 How would you describe the arrangement of the particles in a solid?
9 What state are particles in if they can move freely and randomly?
10 Which of the following liquids has the greatest density: Petrol, crude oil, treacle, water?
11 How does a physical change differ from a chemical change?
12 What is sublimation?
13 What changes of state are represented by melting, boiling and freezing?
14 The energy stored inside a system by the particles is called what?
15 The internal energy of a system is made up of two different types of energy. What are they?
16 If particles move more quickly, what type of energy has increased?
17 If particles move further apart, what type of energy has increased?
18 How could you increase the kinetic energy of molecules in a gas?
19 What happens to the pressure in a fixed volume of gas if the temperature is reduced?
20 Why is it really dangerous to put deodorant cans on to fires?
21 The temperature of a liquid rises as it is heated. There is a point where energy is still being put in but the temperature does not go up. What is happening during this time.
22 Why is the fruit filling in a pie hotter than the crust?
23 When is it more pleasant to swim in the sea, at the start of the day or at the end? Why?
24 What does $\Delta\theta$ mean in the specific heat capacity equation?
25 What does the mathematical symbol delta, Δ mean?
26 The latent heat is the energy needed to change the state of a substance. What letter is used to latent heat?
27 E = mL is the equation for latent heat. Rearranged this means that L = $\frac{E}{m}$. What are the units for L?
28 There are two types of specific latent heat, fusion and vaporisation. Which one is used to find the energy needed to turn 1 kg of liquid into 1kg of gas?
29 A steep downward cooling curve would suggest what about the object being tested?
30 The average kinetic energy of the molecules in a gas is related to what property of the gas?

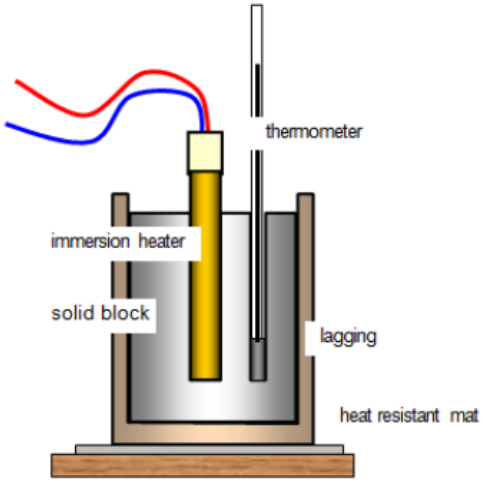
Module 3 Particle Model Knowledge Organiser



Name:

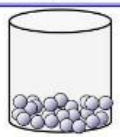
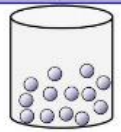
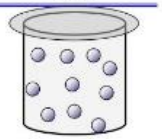
KEY WORDS/IDEAS TO REMEMBER

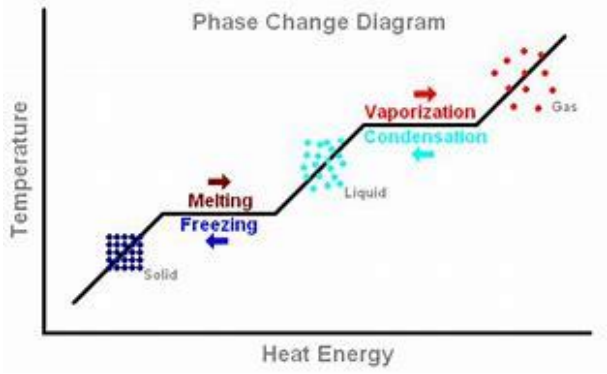
States of matter
Specific heat capacity
Specific latent heat of vaporisation
Specific latent heat of fusion
Internal energy
Temperature
Pressure
Density
Displacement
Micrometer
Vernier calipers



Specific heat capacity [$\Delta E = mc\Delta\theta$] was introduced in the Energy module 1. It is important to know the difference between this and the specific latent heat that is introduced in this module.

Properties of Solids, Liquids, and Gases

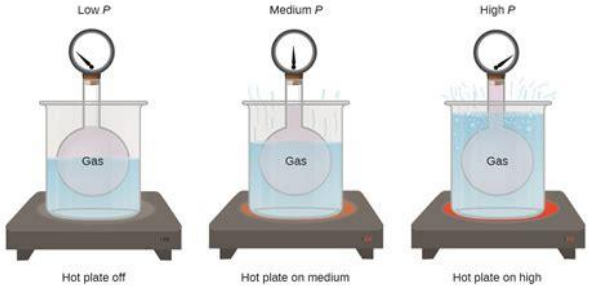
Property	Solid	Liquid	Gas
			
Shape	Has definite shape	Takes the shape of the container	Takes the shape of its container
Volume	Has a definite volume High densities	Has a definite volume High densities	Fills the volume of the container Low densities
Bonding	Ionic, Metallic, Covalent	Covalent	Covalent
Arrangement of Particles	Fixed, very close Crystalline or amorphous	Random, close	Random, far apart, Collisions
nteractions **Between** articles	Very strong forces: (i.e. Melting point, malleability, ductility, conductivity…)	Strong forces: (i.e. Boiling point, Surface Tension, Viscosity, Vapor pressure…)	Essentially none



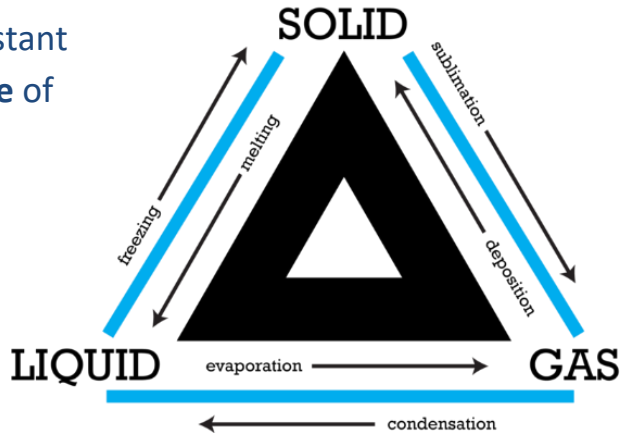
The flat parts of the graph show where the state (or phase) is changing. The energy needed to change the state of 1kg is called the specific latent heat,L; $\Delta E=mL$. To change from 1kg of liquid to 1kg of gas, the specific latent heat of vaporisation is needed. To change from 1kg of solid to 1kg of liquid, the latent heat of fusion is needed. The temperature does not change when the state changes (hence the flat part).

Note: in England we spell vaporisation with an 's' not a 'z'.

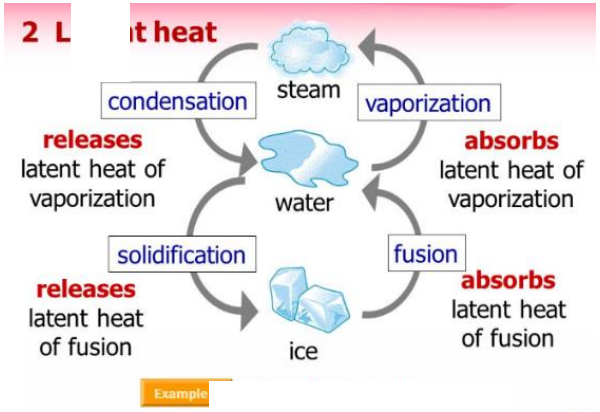
The molecules in a gas are in constant **random** motion. The **temperature** of the gas is related to the **average kinetic energy** of the molecules.



If the temperature of the gas in a fixed volume increases, the pressure increases. The number of molecules stays the same!



The internal energy is the total kinetic energy **and** potential energy of all the particles that make up a system. Phase (state) changes occur when particles are moving apart (or closer together) but not moving faster (or slower). This means that the potential energy goes up (or down) so the internal energy goes up (or down) but the temperature stays the same.



These changes are 'physical' because they are reversible.