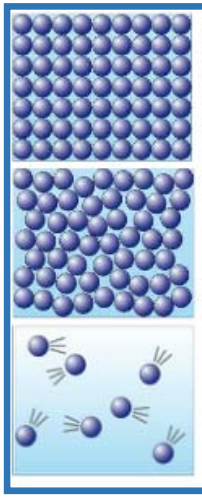
Physics Crib Sheet: Topic 3



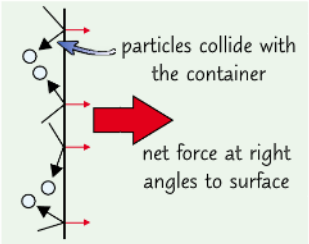
SOLIDS
- Particles in fixed, regular arrangement
- Strong forces of attraction
- Particles vibrate in a fixed position

LIQUIDS
- Particles close together, but can move past each other
- Irregular arrangement
- Weaker forces of attraction
- Random movement

GASES
- No forces of attraction between particles
- Random movement
- More energy than solids/liquids

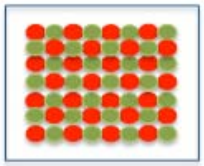
GASES

- Particles collide with the sides of the container – creating **pressure**
- Increasing the temperature gives particles more kinetic energy
- So they hit the sides of the container with more force



- **So increasing the temperature of a gas increases its pressure**

DENSITY



High Density
Particles tightly packed – e.g. solids

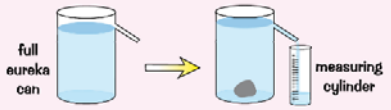
Low Density
Particles loosely packed – e.g. gases
Could be **compressed** to become more dense

$$\text{density } \rho = \frac{\text{mass } m}{\text{volume } v}$$

Density = kg/m³
Mass = kg
Volume = m³

To find the density of a solid object

1) Use a balance to measure its mass (see p.232).
2) If it's a regular solid, start by measuring its length, width and height with an appropriate piece of equipment (e.g. a ruler). Then calculate its volume using the relevant formula for that shape.
3) For an irregular solid, you can find its volume by submerging it in a eureka can filled with water. The water displaced by the object will be transferred to the measuring cylinder:



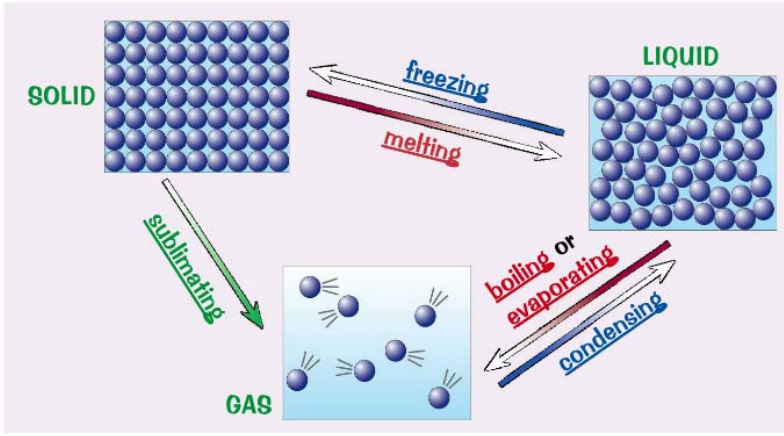
4) Record the volume of water in the measuring cylinder. This is the volume of the object.
5) Plug the object's mass and volume into the formula above to find its density.

To find the density of a liquid

1) Place a measuring cylinder on a balance and zero the balance.
2) Pour 10 ml of the liquid into the measuring cylinder (see p.232) and record the liquid's mass.
3) Pour another 10 ml into the measuring cylinder, repeating the process until the cylinder is full and recording the total volume and mass each time.
4) For each measurement, use the formula to find the density. (Remember that 1 ml = 1 cm³.)
5) Finally, take an average of your calculated densities. This will give you a value for the density of the liquid.

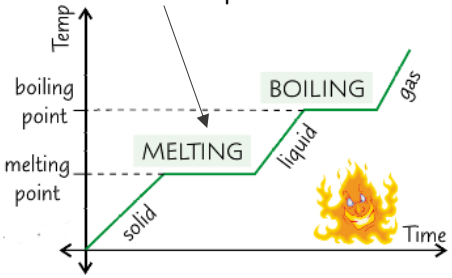
The volume of a cube is equal to length × width × height. Make sure you know the formulas for basic shapes.

CHANGES OF STATE



Internal energy
Total energy stored by particles in a system

Energy being used for breaking bonds between particles, so that it can change state – called **LATENT HEAT**. This energy doesn't raise the temperature



Specific latent heat of fusion = energy needed to change 1kg of a solid into a liquid without changing its temperature

Energy = mass x specific latent heat
J kg J/kg

$$E = mL$$