The particulate nature of matter

1) The three states of matter are solid, liquid and gas.
● solids- particles have a regular arrangement and are close together, least energy – particles are just vibrating
● liquids- particles have a random arrangement and are close together, particles have more energy than those in a solid, but less than those in a gas
● gases- particles have a random arrangement and are spread apart, particles have the most energy (thus motion is more random and frequent)
2) changes of state
= a physical change
- Evaporation = happens at the surface, molecules have enough energy to evaporate – i.e. go from liquid to gas
-Boiling = happens throughout the liquid, liquid to gas
-Freezing = liquid to solid
-Melting = solid to liquid
-Condensation = gas to liquid
-Sublimation = solid to gas
● Melting and freezing take place at the melting point
● Boiling and condensing take place at the boiling point
3) Kinetic theory can help to explain melting, boiling, freezing and condensing…
-amount of energy needed to change state (from s to l, from l to g) depends on the strength of the forces between the particles of the substance.
-nature of the particles involved depends on the type of bonding and the structure of the substance.
-stronger the forces : higher the melting point and boiling point of the substance.
-more kinetic energy (from increased temperature)-> more movement-> change of state from (s) to (l) to (g)
4) gases, pressure, temperature
-higher the pressure = the more motion of a gas' particles

The particulate nature of matter (cont)

- higher the temperature = the more motion of a gas' particles
5)Brownian motion
=particles in fluids move randomly
-this is because they move around and collide with each other
- evidence: random movement of pollen grains in water
6)Diffusion
=movement of particles from an area of high concentration to an area of low concentration
-particles must be able to move(diffusion does not occur in solids)
-a smell does not travel very fast, because the particles collide with particles of air, changing direction randomly when they collide, taking much longer to travel from place to place
-molar mass and diffusion: the smaller the molecular mass, the greater the average speed of the molecules (small mr= fast diffusion)

experimental techniques: apparatus

Appropriate apparatus for measuring…
o Time: stopwatch/clock
o Temperature: thermometer
o Mass: balance
o Volume: measuring cylinder, burette, pipette

experimental techniques: Chromatography

-Used to separate mixtures, give information to help identify substances
-stationary phase and a mobile phase
-Separation depends on the distribution of substances between the
phases
-to carry it out: place substances on line (in pencil) near bottom of paper, place in solvent and observe how far the substances travel up the paper

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