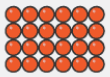
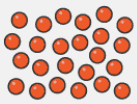
Chemistry Notes

Edexcel IGCSE

Chapter 1a – States of Matter

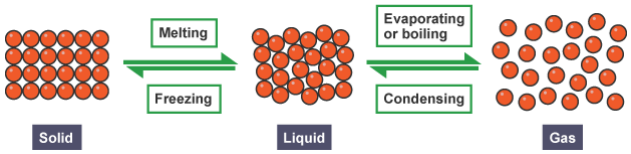
1a States of matter

1.1 Understand the three states of matter in terms of the arrangement, movement and energy of the particles

	Solid	Liquid	Gas
Arrangement of particles	Close together Regular pattern	Close together Random arrangement	Far apart Random arrangement
Movement of particles	Vibrate on the spot	Move around each other	Move quickly in all directions
Diagram			

- Kinetic energy: Solid < Liquid < Gas
- Solids have a fixed shape, cannot flow or be compressed – particles are packed, cannot move
- Liquids take the shape of container but cannot be compressed – particles are packed but can slide over one another
- Gases completely fill container, can be compressed – particles can move in all directions, space to move into

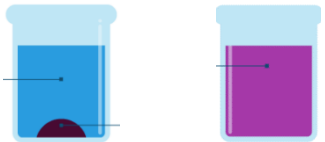
1.2 Understand the interconversions between the three states of matter in terms of:
- The names of the interconversions
- How they are achieved
- The changes in arrangement, movement and energy of the particles



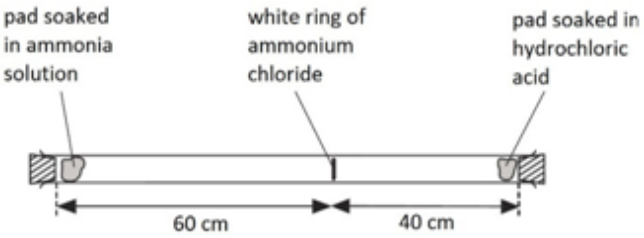
- To go right, must supply heat energy or sometimes decreasing pressure (stove cans)
- To go left, must remove heat energy (cool) or sometimes increase pressure (cooking stoves)
- Solid to gas = Sublimation, Gas to solid = Deposition

1.3 Understand how the results of experiments involving the dilution of colored solutions and diffusion of gases can be explained

- Eg experiment with Potassium permanganate (KMnO4) crystal and Ammonia/Hydrogen chloride gas diffusion
- Dilution of colored solutions:
  - When crystal of KMnO4 is dropped, one area of high concentration is created
  - Molecules diffuse from area of high concentration to low concentration = spreads out
  - Larger space between each KMnO4 molecule = diluted color = less purple



- Diffusion of gases:
  - Two solutions (ammonia and HCl) are placed at opposite ends of a test tube
  - Ammonia lighter = diffuses faster than HCl, forming a ring partway through the test tube when they react (ammonium chloride)
  - Works because solution at each end evaporates and gas particles travel to area of low concentration (opposite end of tube) – they will meet



1.4 Know what is meant by the terms:

- ***Solvent –*** A substance, mostly a liquid in which other substances can be dissolved in (eg water)
- ***Solute –*** A substance which is dissolved in the solvent (eg salts and sugars)
- ***Solution*** – A liquid mixture in which the solute and the solvent are mixed (solute distributed evenly)
- ***Saturated solution*** – A solution in which no more solute can dissolve in. Happens bc solvent has specific solubility at some temp and pressure. Additional substance added will be solid precipitate or let off as gas

1.5C Know what is meant by the term solubility in the units g per 100g of solvent

- Solubility is the ability of a solute to dissolve in the solvent. Measured by maximum amt of solute that can dissolve in 100g of solvent (equiv 100ml of water) – making it saturated
- Units = g/100g of solvent

1.6C – Understand how to plot and interpret solubility curves

- Temperature on the X-axis, solubility on the y-axis
- Note that the curve is very different for each solute. Eg Potassium Nitrate increases w/ temperature, but most gases decrease – eg carbon dioxide in fizzy drinks
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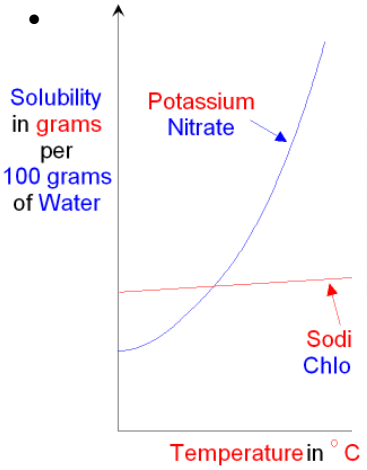

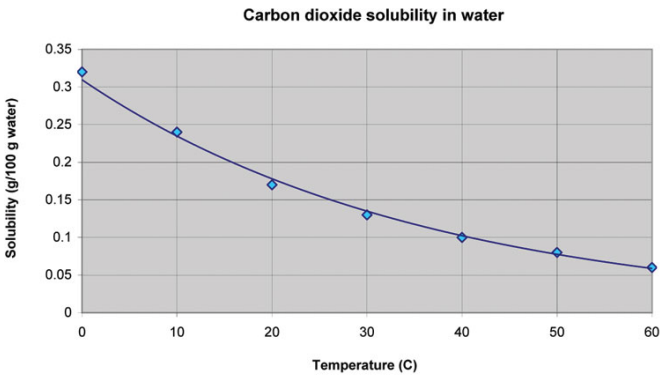

1.7C – Practical: Investigate the solubility of a solid in water at a specific temperature

- Set water bath to specific temperature and measure time taken for solid to dissolve in the water – or add excess and measure how much can dissolve
- As temp increases, dissolves faster bc more soluble