ASPIRE
INTERNATIONAL SCHOOL

Science Department

2023/2024

Year 7 -Term 3

Revision Pack of Unit 2 (Stage 8)

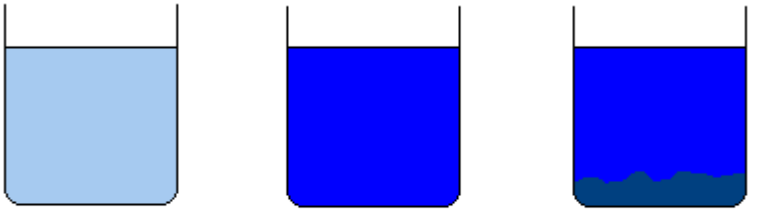
Name: …….

Class: ……

2.1 Dissolving

Definitions:

- **Solute:** a substance that is dissolved
- **Solvent:** a liquid in which other substances will dissolve, for example, water or alcohol.
- **Solution:** a mixture in which particles of a substance (solute) are mixed with particles of a liquid so that the substance can no longer be seen.
- **Soluble:** a substance (solute) that will dissolve**.**
- **Insoluble:** a substance (solute) that will not dissolve**.**
- **Solubility:** It is the **ability** of the solute to dissolve in a given solution
- **Rate of solubility:** the speed of dissolving of the solute in a solvent.
- **Saturated solution:** the solution that cannot dissolve more solute.
- **concentrated (solution):** a solution in which a large amount of solute is dissolved
- **dilute (solution):** a solution in which a small amount of solute is dissolved



Notes:

- **The mass of solute + the mass of solvent = the mass of solution.**
- To compare the solubility of different solutes you must measure how much of each solute will dissolve in a known amount of the solvent.
- **The greater** the solubility, **the more** the solute dissolved in a solution.
- As the temperature increases, the solubility increases.

Question:

- **Most solutes will dissolve more quickly and easily in hot water than in cold water. Explain**

  As the temperature increases, the more energy the particles have, the more they vibrate and move. That's why You can dissolve a greater mass of the solute in hot water than in the same volume of cold water.

- **200 g of sugar dissolves in 100 g of water at 20^0C. how much will dissolve in 200 g of water at 20^0C?**

  200 g of water is twice as much as 100 g, so twice as much sugar will dissolve 204 X 2 = 408 g

2.2 Solubility

Factors affect the rate of solubility:

1- Temperature
2- Stirring
3- Size of crystals
4- Nature of solute

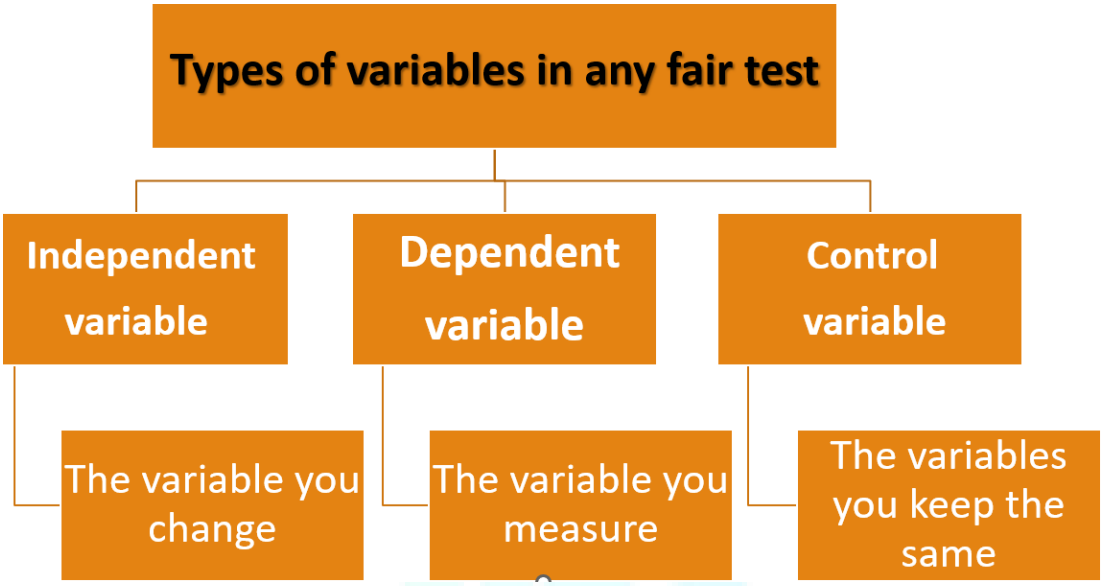
Heat and stirring allow particles to **gain more energy**, so they **vibrate faster**, **increasing the collision between the solvent and solute particles** and the solubility rate accordingly.

Difference between melting and dissolving:

	Melting	Dissolving
Include	1 substance	2 substances
Definition	Change in state (from a solid to liquid) due to heating	Mixing of the particles of two different substances due to adding a new substance
Example	Heating butter	Mixing sugar and water

- **Different substances have different rates of solubility.**
- **Some materials are not soluble in water but they can dissolve in other solvents, such as:**
  - **Nail polish dissolves in acetone and doesn't dissolve in water**
  - **Oil paint dissolves in methanol and doesn't dissolve in water**

2.3 Planning a solubility investigation



Questions:

- **Why do we have a control variable? / Why do we use the same (time/amount/volume/….) of ……..**
  - To make it a fair test.

- **How can we make sure that we are making a fair test?**
  - Keep all variables the same except the independent variable.

- **Why do we need to repeat the test?**
  - To make sure our results are reliable.

- **What do we need to do to make sure our results are reliable and accurate?**
  - Repeat the test.

- **What is an anomalous (anonymous) result?**
  - It's a result that doesn't fit the pattern.

- **What should you do about it?**
  - Ignore it and repeat the investigation.

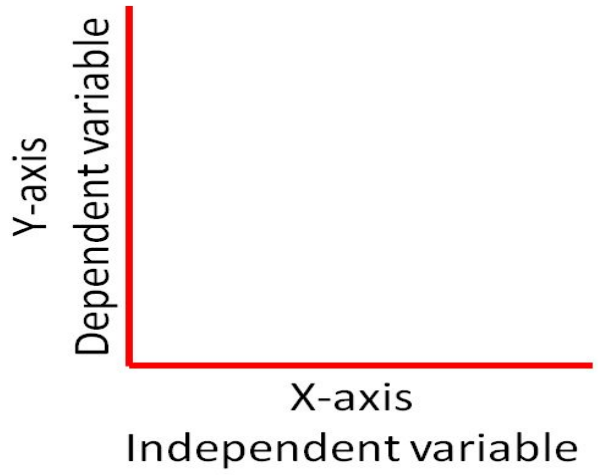
- **Should you include the anomalous 'wrong' result when working out the mean?**
  No, ignore it and calculate the mean.

Notes:

- **When recording your results in a table the independent variable is on the first column while the dependent variable is on the second column and all units must be included Check the example below:**

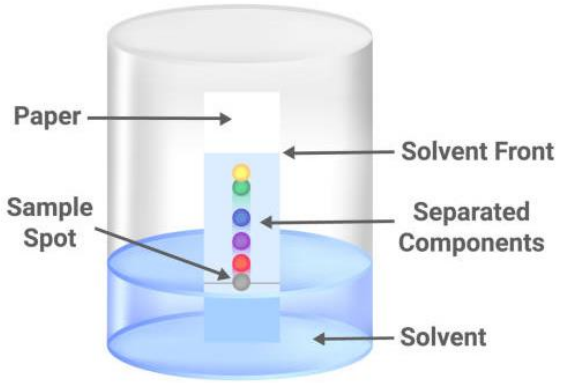
Temperature in °C	Time for mark to disappear in s			
	Attempt 1	Attempt 2	Attempt 3	Mean

- **Drawing a graph:**



2.4 Paper chromatography

Paper chromatography is a technique used to separate the coloured inks.
The resulting image on the paper is called a **chromatogram**.



Chromatography helps to:

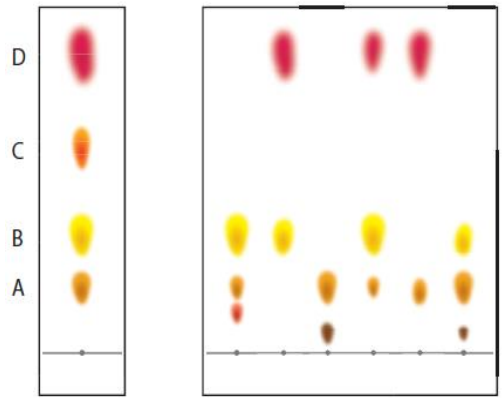
1- Identify the colours found in each dye
2- Differentiate between the solubility of each component

- The coloured inks separate because the water dissolves them.
- Water is the solvent. As the water moves up the paper, it carries the ink particles with it. The different kinds of ink particles are carried at different distances before they are left behind on the paper. This is because the ink particles have different solubility.

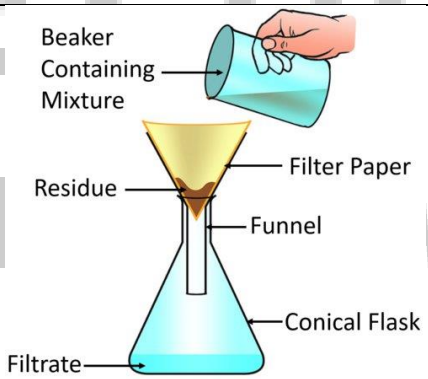
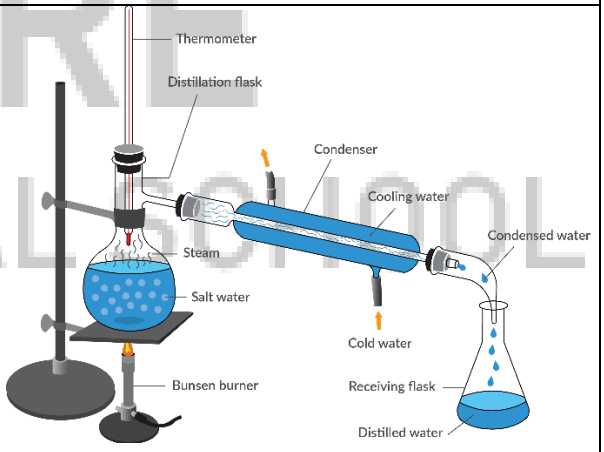
The more soluble the ink, the further its particles are carried.

- **Permanent markers** are not soluble in water but they are soluble in other solvents like alcohol
- Scientists use chromatography to study the dyes used in food. Some food dyes contain only one substance; they are a pure substance. Other dyes contain a mixture of substances.
- We need to know if any substances could be a health risk; for example, they could be toxic or cause allergic reactions.
- **The solvent front** is the highest level the solvent reaches in the paper.
- **The starting line has to be drawn with a pencil because it will not dissolve, so you can show where the spot of dye was to be placed and not interfere with the results.**
- Don't let the ink spot go under the water so that the ink does not dissolve into the water in the beaker.
- Remove the strip of paper before the water level reaches the end of the strip **so that the different colours in the ink can be seen separated** and the ink does not run off the end of the paper.

- Public health scientists may also use chromatography to check that the colourings used in products such as hair dye or the ink in pens are not harmful.
- To do this they compare chromatograms taken from a solution of food, hair dye or ink and those of the colourings that are permitted.
- The diagrams below show a chromatogram from a hair dye called Sunny Red and a chromatogram showing all the permitted dyes.
- Note that colour C is not a permitted colour and may cause any harm to the hair or skin.



Other separation techniques:

Magnetic attraction	Sieving	Filtration	Distillation
			
Separate magnetic from non-magnetic materials	Separate two solids of different sizes of grains	Insoluble solid from a liquid	soluble solid from a liquid **or** two liquids of different boiling points