

Subject: Chemistry
Year: KS3 – Year 7
Topic: C1 The Particulate Nature of Matter

Lesson Sequence

1. Matter and its Properties
2. The Particle Model
3. Particle Behaviour
4. Changing State
5. Gases
6. Water
7. Mixtures
8. Filtering
9. Evaporation
10. Chromatography
11. Distillation

Key Assessments

Assessment: Melting Ice Cube

EA Exam 2

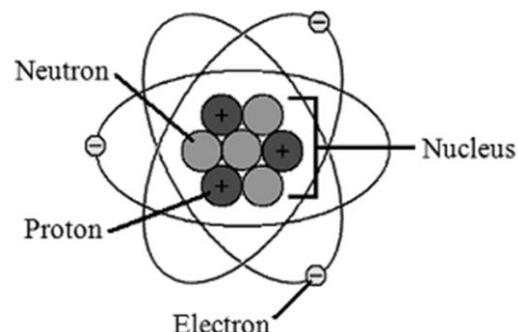
Core Texts

Smart Science Text Book

Key Words

Chromatogram	The picture or pattern of coloured results produced by a chromatography experiment.	Element	Substances made of only one type of atom.
Chromatography	Process in which different coloured chemicals are separated from a mixture based on their solubility.	Evaporating basin	Scientific equipment made of ceramic, used to encourage evaporation of a liquid.
Contract	When a substance reduces in volume.	Expand	To increase in volume.
Density	How much mass or matter there is in a given volume.	Filter paper	Used to separate a mixture based on the size of the molecules/substance. Large molecules/substances are held back by the paper smaller molecules/substances may pass through.
Diffusion	Particles (in a liquid or gas) moving from an area of high concentration to a lower concentration.	Funnel	Scientific equipment used to hold filter paper.
Dissolve	Combining a solute with a solvent to make a solution.	Gas	One of the three states of matter - particles have low density.
Distillation	Used to separate mixtures based on the boiling points of the chemicals. Chemicals are evaporated and condensed.	Insoluble	When a solute will not dissolve in a given solvent.

Structure of an Atom



Changing State: When a substance moves from one state to another. Caused by the heating or cooling of a substance or a change in pressure.

Heating/Decrease Pressure

Melting: Solid → Liquid

Boiling: Liquid → Gas

Sublimation: Solid → Gas

Cooling/Increase Pressure

Freezing: Liquid → Solid

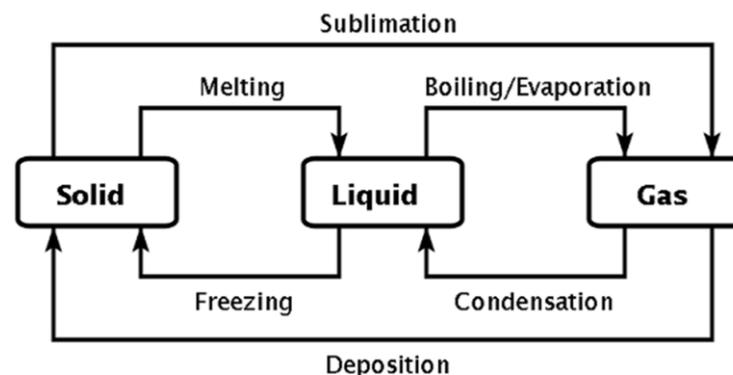
Condensation: Gas → Liquid

Deposition: Gas → Solid

Particle Behaviour

solid	liquid	gas
● rigid	● not rigid	● not rigid
● fixed shape	● no fixed shape	● no fixed shape
● fixed volume	● fixed volume	● no fixed volume
cannot be squashed	cannot be squashed	can be squashed

State Changes

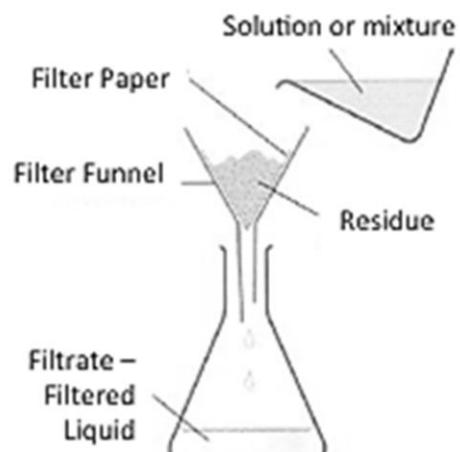


Key Words

Liquid	One of the three states of matter.	R_f Factor	A measure of how easily a substance dissolves in a solvent. Calculated by 'Distance moved by spot' / 'Distance moved from start'.
Matter	A general name for the 'stuff' all substances are made up of.	Solid	Substances in a state with a fixed shape and volume.
Melt	When a solid is heated to become a liquid (reaches its melting point).	Solubility	Ability to dissolve in a liquid/solvent.
Mixture	Different substances combined physically but not chemically, can be separated.	Soluble	Will dissolve.
Particles	Small pieces (such as atoms or molecules) that make up a substance.	Solute	A solid that dissolves in a liquid to form a solution.
Particle Theory	Description of how particles behave in solids, liquids and gases.	Solvent	The liquid in which a solid is dissolved to form a solution.
Pressure	Measure of the 'concentration of a force' in an area (Pressure = Force/Area).	State	The particular state that a substance is in at that time, solid, liquid or gaseous.
Pure	A substance containing the atoms or molecules of only one substance.	Vibrate	A regular back and forth movement.
Random	No pattern, unpredictable.		

Filtration Method

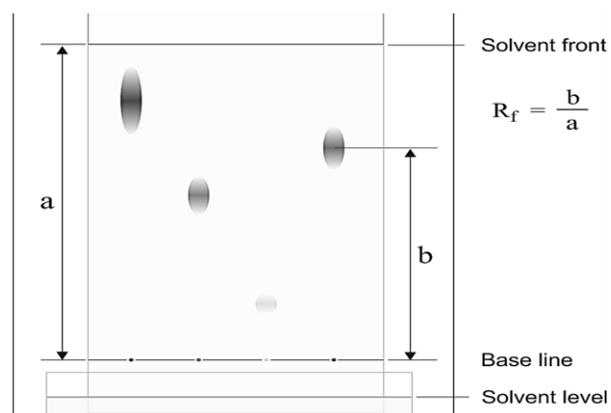
1. Fold round filter paper into quarters, and open to form a triangular shape.
2. Place filter paper into a filter funnel.
3. Pour suspension or solution into filter paper.
4. Tiny pores in the filter paper will allow liquids and small particles through, but undissolved solids or large particles will be too large to pass through the holes in the paper.
5. Solids left behind are called the residue.
6. Liquid that passes through the filter is called the filtrate.



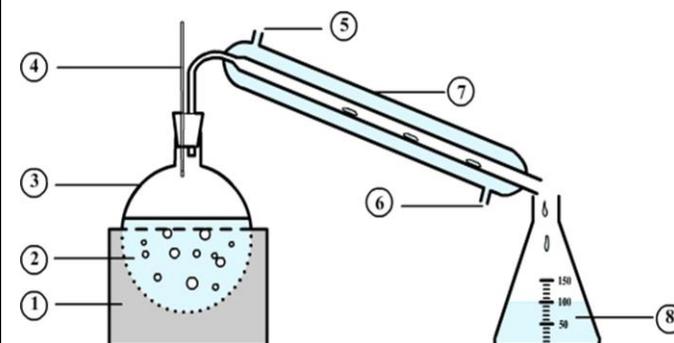
Chromatography Method

1. Draw a straight line in pencil 1 cm from the bottom of the chromatography paper.
2. Place a dot of ink on the pencil line.
3. Dip the paper in a solvent (usually water).
4. Hold paper in place until solvent has absorbed to the top of paper.
5. Remove paper from solvent and leave to dry.
6. Substances move at different speeds based on how well they dissolve in a given solvent.
7. Measure the distance the solvent travelled and the distance each spot moved in cm. Use this to calculate each spots R_f value.

Chromatogram and Calculating R_f Value



Distillation Method



1. Water and ethanol mixture is heated.
2. Ethanol has a lower boiling point (70°C) than water (100 °C), so begins to boil and evaporate (turn into a gas) first. Different substances boil at different temperatures.
3. Ethanol evaporates first.
4. The thermometer shows the boiling point of pure ethanol.
5. & 6. Cool tap water enters the condenser (7) at point 6, warm water leaves at point 5.
7. As gas vapour passes through the tube surrounded by the condenser (7), heat is lost to the cool water and the gas condenses to a liquid.
8. Pure liquid ethanol is collected in a beaker at the end of the condenser tube.