IGCSE Chemistry 2017

IGCSE Biology 2017

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Monday, July 10, 2017

1.1: Understand the Three States of Matter in Terms of Arrangement, Movement and Energy of the Particles

THREE STATES OF MATTERS:

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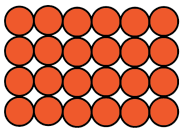
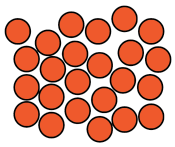
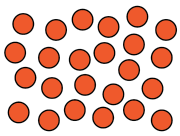
	SOLID	LIQUID	GAS
DIAGRAM			
ARRANGEMENT	Close together in regular arrangement	Close together in free arrangement	Far apart in random arrangement
MOVEMENT	Vibrate on the spot	Moves around each other	Moves quickly in all directions
ENERGY	Small amount of kinetic energy	Moderate amount of kinetic energy	Large amount of kinetic energy

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Labels: 1 : Principles of Chemistry, a) States of Matter

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

INTERCONVERSIONS BETWEEN STATES OF MATTER:

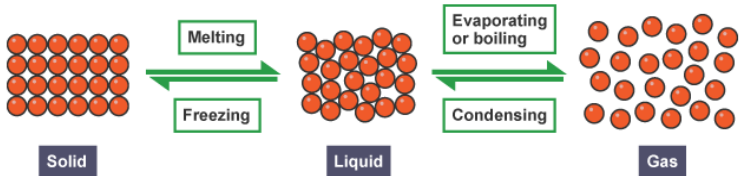

Diagram showing the interconversions between the states of matter

Labels

- 1 : Principles of Chemistry (60)
- 2 : Inorganic Chemistry (50)
- 3 : Physical Chemistry (29)
- 4 : Organic Chemistry (50)

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EXPLANATION:

CHANGE	EXPLANATION
SOLID → LIQUID **MELTING**	• ***Heat the Solid until it Melts*** • Particles gain kinetic energy and vibrates faster, allowing particles to overcome forces of attraction that hold them together in the solid • Regular pattern is broken down and particles can now slide past one another
LIQUID → SOLID **FREEZING**	• ***Cool the Liquid until it Freezes*** • Particles lose kinetic energy, allowing forces of attraction between the particles to hold them together • Particles arrange themselves into a regular pattern and are no longer able to slide past one another
LIQUID → GAS **EVAPORATING**	• ***Heat the Liquid until it Boils*** • Particles gain kinetic energy and move further apart, causing the forces of attraction between them to be completely broken and escape from liquid
GAS → LIQUID **CONDENSING**	• ***Cool the Gas until it Condenses*** • Particles lose kinetic energy and vibrates faster, allowing forces of attraction to bring particles closer together • Particles eventually clump together to form a liquid
SOLID → GAS **SUBLIMATION**	• ***Heat the Solid until it Sublimes*** • Particles gain kinetic energy and vibrates faster, causing forces of attraction between particles to be completely broken and escape from solid

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1.3: Understand How the Results of Experiments Involving the Dilution of Coloured Solutions and Diffusion of Gases can be Explained

DILUTION OF COLOURED SOLUTIONS

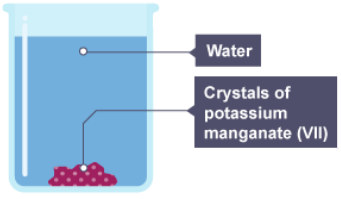

Diagram Showing a Crystal of Potassium Manganate (VII) Dissolving in Water

METHOD:

- Fill beaker with water
- Add a Crystal of Potassium Manganate (VII) and record observations

RESULTS:

- When Potassium Manganate (VII) Crystals are Dissolved in Water, a Purple Solution Forms
- This occurs as both Water and Potassium Manganate (VII) Particles are moving Freely and sliding over each other, allowing them to mix to form a solution with a weaker colour than the original Crystal (original dye)
- As Potassium Manganate (VII) particles are less concentrated, the final colour will be weaker

DIFFUSION OF GASES

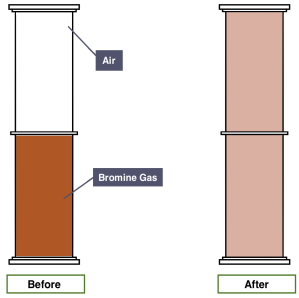

Diagram showing the Diffusion of Bromine Gas with Air

METHOD:

- Place a jar of air on top of a jar of Bromine
- Allow time for diffusion to take place and record observations

RESULTS:

- Overtime, Bromine Gas will diffuse upwards into the jar of air
- This occurs as large gaps between Air and Bromine particles allows them to move randomly and collide with each other, mixing together to form a gas with lighter shade of brown
- As Bromine particles are less concentrated, the final colour will be weaker

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1.4: Know What is Meant by the Terms: Solvent, Solute, Solution, Saturated Solution

DEFINITION:

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TERM	DEFINITION
SOLVENT	Substance that dissolves a solute E.g, In salt and water solution, water is the solvent
SOLUTE	Substance that dissolves in a solvent E.g, In salt and water solution, salt is the solute
SOLUTION	Mixture formed by a solvent and solute
SATURATED SOLUTION	Solution where no more solute can dissolve (any more solute that is added will settle at the bottom)

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1.5C: Know What is Meant by the Term Solubility in the Units g Per 100g of Solvent

SOLUBILITY: How much of a substance will dissolve in a given volume of a solvent (shown in the units of g per 100g of solvent)

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- If a substance is soluble, it will dissolve in a given amount of solvent (liquid)
- Solubility increases as temperature and pressure increases

EXAMPLES OF SOLUBILITY OF SUBSTANCES IN WATER AT 20°C:

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SOLUTE	SOLUBILITY
SODIUM CHLORIDE	36
COPPER (II) SULPHATE	32
LEAD (II) IODIDE	0.07
LEAD (II) NITRATE	54

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1.6C: Understand How to Plot and Interpret Solubility Curves

SOLUBILITY: How much of a substance will dissolve in a given volume of a solvent (shown in the units of g per 100g of solvent)

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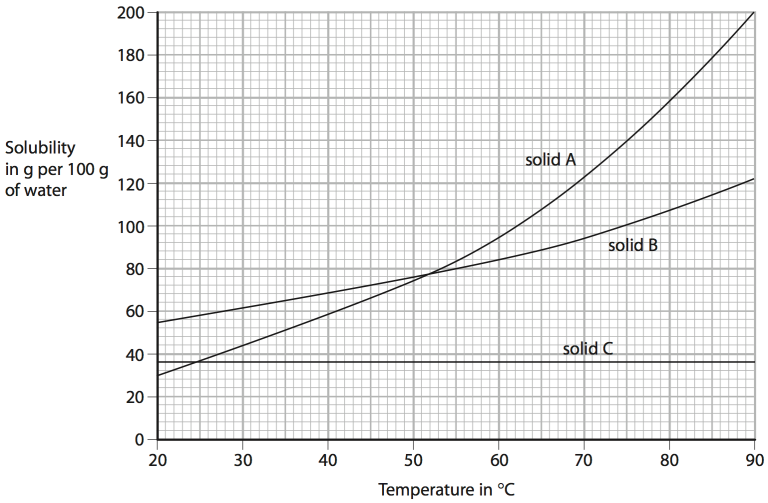
- If a substance is soluble, it will dissolve in a given amount of solvent (liquid)
- Solubility increases as temperature and pressure increases

EXAMPLE OF INTERPRETING SOLUBILITY CURVES:



SOLID	EXPLANATION
A	As temperature increases, solubility of Solid A increases the most
B	As temperature increases, solubility of Solid B increases but at a slower rate than Solid A
C	Temperature does not affect the solubility of Solid C

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1.7C: Practical: Investigate the Solubility of a Solid in Water at a Specific Temperature

SOLUBILITY: How much of a substance will dissolve in a given volume of a solvent (shown in the units of g per 100g of solvent)

INVESTIGATING SOLUBILITY OF SOLIDS AT SPECIFIC TEMPERATURES

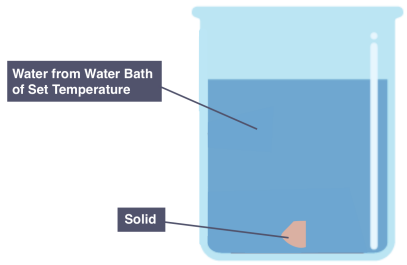

Diagram showing a Solid in Set Temperature of Water to Measure Solubility

METHOD:

- Set water bath to specific temperature
- Use water from water bath and add into Beaker
- Add solid into the beaker and measure time taken for Solid to dissolve

RESULT:

- As temperature of Water increases, time taken for Solid to dissolve will decrease (more soluble)
- This occurs as increase in temperature increases the kinetic energy of particles, overcoming the intermolecular forces of attraction between solid particles
- This causes particles to break apart, increasing solubility of Solid as a result

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1.8: Understand How to Classify a Substance as an Element, Compound or Mixture

CLASSIFICATIONS:

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CLASS	DEFINITION
ELEMENT	Substance made up of Atoms that all contain the same number of Protons (one type of Atom) and cannot be split into anything simpler ***Example***: Hydrogen, Oxygen, Carbon
COMPOUND	Substance made up of two or more Elements chemically combined together ***Example:*** Copper (II) Sulphate, Calcium Carbonate
MIXTURE	Combination of two or more substances (Elements and / or Compounds) that are not chemically joined together ***Example:*** Sand and Water, Oil and Water

Example:

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	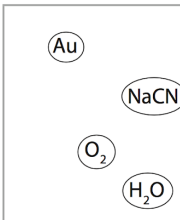	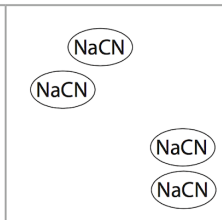	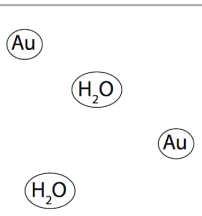
Compound, element or mixture	**Mixture**	**Compound**	**Mixture**

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Labels: 1 : Principles of Chemistry, b) Elements, Compounds and Mixtures

1.9: Understand that a Pure Substance has a Fixed Melting and Boiling Point, but that a Mixture may Melt or Boil Over a Range of Temperatures

PURE SUBSTANCE: Contains only one substance with no other substances mixed together

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- As all molecules of the same substance have the same melting and boiling point, pure substance has fixed melting and boiling point

MIXTURE: Combination of two or more substances (Elements and / or Compounds) that are not chemically joined together

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- As mixture contains different substances that have different melting and boiling point, they will have range of melting and boiling point

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1.10: Describe these Experimental Techniques for the Separation of Mixtures: Simple Distillation, Fractional Distillation, Filtration, Crystallization, Paper Chromatography

SIMPLE DISTILLATION

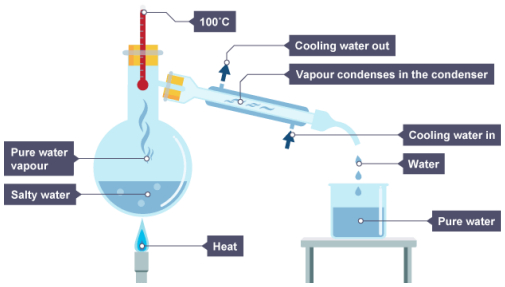

Diagram showing the Simple Distillation of a Mixture of Salt and Water

USE: To separate a liquid from a solution (E.g Water from a Solution of Salt Water)

EXPLANATION:

- Solution is heated and Water vapors will rise and evaporate
- Water vapors pass through condenser where it cools and condenses, turning into a liquid that is collected in a beaker
- After all Water is evaporated from solution, solute will be left behind

FRACTIONAL DISTILLATION

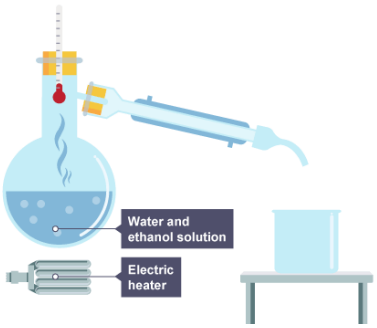

Diagram showing the Fractional Distillation of a Mixture of Ethanol and Water

USE: To separate two or more liquids that are miscible with one another (E.g Ethanol and Water from a Mixture of the Two)

EXPLANATION:

- Solution is heated to temperature of substance with the lowest boiling point and vapors of this substance will rise and evaporate
- Vapors pass through condenser where it cools and condenses, turning into a liquid that is collected in a beaker
- After all of substance is evaporated and collected, mixture of substance will be left behind

FILTRATION

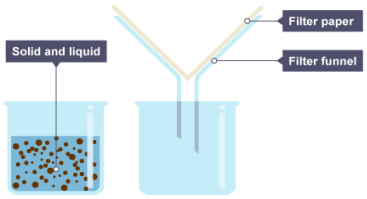

Diagram showing the Filtration of a Mixture of Sand and Water

USE: To separate an undissolved solid from a mixture of the solid and a liquid / solution (E.g Sand from a mixture of Sand and Water)

EXPLANATION:

- Filter paper is placed in a filter funnel, which is placed above another beaker
- Mixture of insoluble solid and liquid is poured into filter funnel, which only allows small liquid particles to pass through as filtrate
- Solid particles are too large to pass through as filtrate so will stay behind as residue

CRYSTALLIZATION

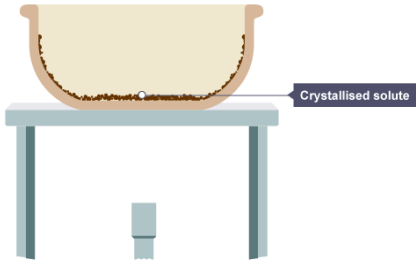

Diagram showing the Process of Crystallization

USE: To separate a dissolved solid from a solution (when the solid is more soluble in hot solvent than in cold) (E.g Copper (II) Sulphate from a Solution of Copper (II) Sulphate in Water)

EXPLANATION:

- Solution is heated, allowing solvent to evaporate and leave saturated solution
- Saturated solution is left to cool, and solids will come out of solution to grow into Crystals
- Crystals are collected and allowed to dry

PAPER CHROMATOGRAPHY

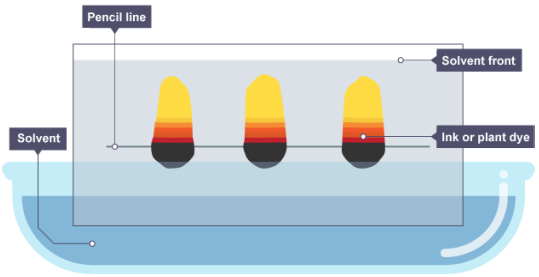

Diagram showing the Paper Chromatography of Ink and Plant Dye

USE: To separate substances that have different solubilities in a given solvent (E.g Different coloured inks mixed to form black ink)

EXPLANATION:

- Pencil line is drawn on chromatography paper and concentrated spot of ink/dye is placed on it
- Paper is lowered into bucket of solvent, allowing solvent to travel up the paper taking particles of coloured substance with it
- Different substances have different solubilities so will travel at different rates, causing substance to be spread along vertical length of paper
- This will show the different components of the ink/dye

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