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| **Subject Science - Year 7 Medium Term Plan/SOW** | | | | | | **The Academy of St Francis of Assisi** | |
| **Unit: 5** | **Title: 5 Matter - Particle model** | | | | | **Number of lessons in sequence** | **10 lessons** |
| **Overarching Curricular Goals (Aims)** | | **In this unit students will:**  Relate the features of the particle model to the properties of materials in different states. | | **Links to National Curriculum**  **Links to & building upon prior learning Including KS2 if Yr7** | **KS2links**  **KS3 links**  Acids and alkalis students will learn about the particles in acids and alkalis. Making salts students will learn how to make a solution of a salt and separate the salt from its solution. Periodic Table students will learn about classifying substances. Movement of substances and Gas exchange students will learn about the movement of substances in biological systems. Heating and cooling students will learn about energy transfer between particles. | | |
| **Outcomes/**  **Success Criteria** | | **Know**   * Know the properties of solids, liquids and gases. * Know the differences in the arrangement and movement of particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). * Know that heating (gains energy) or cooling (loses energy) a substances will bring about a change in temperature or change of state. * Know that a substance is a solid below its melting point, a liquid above it, and a gas above its boiling point.   **Apply**   * Explain unfamiliar observations about gas pressure in terms of particles. * Explain the properties of solids, liquids and gases based on the arrangement and movement of their particles. * Explain changes in states in terms of changes to the energy of particles. * Draw before and after diagrams of particles to explain observations about changes of state, gas pressure and diffusion.   **Extend**   * Argue for how to classify substances which behave unusually as solids, liquids or gases. * Evaluate observations that provide evidence for the existence of particles. * Make predictions about what will happen during unfamiliar physical processes, in terms of particles and their energy. | |
| **2/3 tier vocabulary.** | | **Differentiation/Scaffolding/Support.** | **Stretch and challenge opportunities in class, enrichment and home learning.** | **Opportunities for wider reading/Listening/watching.** | | | |
| **Keywords**  **Particle**: A very tiny object such as an atom or molecule, too small to be seen with a microscope.  **Particle model**: A way to think about how substances behave in terms of small, moving particles.  **Diffusion**: The process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer.  **Gas pressure**: Caused by collisions of particles with the walls of a container.  **Density:** How much matter there is in a particular volume, or how close the particles are.  **Evaporate**: Change from liquid to gas at the surface of a liquid, at any temperature.  **Boil**: Change from liquid to a gas of all the liquid when the temperature reaches boiling point.  **Condense:** Change of state from gas to liquid when the temperature drops to the boiling point.  **Melt:** Change from solid to liquid when the temperature rises to the melting point.  **Freeze:** Change from liquid to a solid when the temperature drops to the melting point.  **Sublime:** Change from a solid directly into a gas. | | **Knowledge Support:**   * Key facts. * Knowledge organisers.   **Reading support**:   * Explicit vocabulary delivery * Glossary of terms * Visualizer to support whole class reading. * Keyword discussion and annotation.   **Skills support:**   * Support sheets * Practical guidance sheets. * Practical scaffolding. * Demonstrations and discussions. * Writing frames. | Stretch and challenge embedded into every lesson (see PowerPoints)  **Home learning / enrichment**  **Scholarship:** |  | | | |

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| **Unit Title** | **Sequence of learning Lesson title, theme, big question.** | **Key concepts/outcomes/knowledge and skills.** | **Assessment/ including specific content/ knowledge/skills tested.**  **Green=assess/Blue=improve** | **HWK. Add**  **Hyperlink**  **To be in books clearly marked** | **Furthering Cultural Capital.**  **&**  **Opportunities for reading** | **Recall of prior or future topics –** | **Lesson resources including or hyperlink to supporting websites/resources/books/texts & individual lessons.**  **5xT+L essentials to be included in individual lessons,** |
| **5 Matter**  **5.1 Particle model** | 5.1.1  The particle model  material, particle, mixture, substance, property, particle model, density  If people were the same size as gold particles, the world's population would fit into a ball less than a thousandth of a millimetre across. | **Know**  - State that materials are made up of particles.  - State that the properties of substances can be described in terms of particles in motion.  - State what toy building bricks are representing when they are used to model substances.  **Apply**  - Explain, in terms of particles, why different substances have different properties.  - Explain properties, such as density, based on the arrangement and mass of particles.  - Use models to investigate the relationship between the properties of a material and the arrangement of its particles.  **Extend**  - Evaluate particle models that explain the properties of substances.  - Use data about particles to predict and explain differences in properties such as density.  - Design and explain a new representation for the particle model. | 1. State what materials are made up of? 2. State what is meant by a substance. 3. List three factors that give a substance its properties. 4. State why gold has a higher density than aluminium. 5. Choose the correct bold words. 6. There are **hundreds/millions** of materials. 7. Materials are made up of **practicals/particles**. 8. A substance has the **same/different** properties all the way through. 9. In a substance, all the particles are the **same/different**. 10. The particles of different substances are the **same/ different**. 11. The properties of a substance describe its **behaviour/particles.**   **(6 marks)**   1. Which has the greater density, water or mercury? Show how you decided. Data: relative mass of water particle = 18; relative mass of mercury particle = 201.   **(2 marks)**   1. Compare the density values of gold in the solid and liquid states. Suggest and explain in detail a reason for the difference in values. (see student book for values)   **(4 marks)** | Density  <https://classroom.thenational.academy/lessons/density-c8uk4c> |  |  | **PPT 5.1.1**  The particle model  Introducing the particle model  Considering models  Matter check sheet  Matter knowledge organiser |
| **5 Matter**  **5.1 Particle model** | 5.1.2  States of matter  solid, liquid, gas, states of matter | **Know**  - Describe the properties of a substance in its three states.  - State that the properties of substances can be described in terms of the arrangement and movement of its particles.  - Make relevant observations in order to decide is a substance is in its solid, liquid or gas state.  **Apply**  - Compare the properties of a substance in its three states.  - Explain the properties of solids, liquids, and gases based on the arrangement and movement of their particles.  - Use observations to decide if a substance is in its solid, liquid or gas state.  **Extend**  - Argue for how to classify substances which behave unusually as solids, liquids, or gases.  - Justify whether a given property of a substance in a given state can be explained by the arrangement, or by the movement, of its particles.  - Evaluate a representation of the particle model. | 1. Name the three states of matter.   **(1 mark)**   1. Identify three differences between a substance in the solid and liquid states.   **(3 marks)**   1. State why you cannot compress a liquid.   **(1 mark)**   1. Each sentence has one or more mistakes. Write corrected versions of the sentences. 2. There are two states of matter. 3. You can compress a substance in the solid state because the particles touch each other. 4. In the liquid and gas states, a substance flows because the particles cannot move from place to place. 5. You cannot compress a gas because the particles are spread out.   **(4marks)**   1. Describe the properties of water in its three states. Use the particle model to explain each of these properties.   **(6 marks)**   1. Is toothpaste a solid, liquid, or gas? Write a few sentences to justify your answer. 2. **marks)** 3. Daisy says that a cake is both solid and gas. Do you agree or disagree with Daisy? Use the particle model to justify your answer.   **(3 marks)** | **Particle Theory**  **Video: Optional**  [**https://classroom.thenational.academy/lessons/particle-theory-68rkec**](https://classroom.thenational.academy/lessons/particle-theory-68rkec) |  |  | **PPT 5.1.2**  **States of matter**  **Question-led**  **lesson**: States of matter  **Interactive**: Solid, liquid, or gas?  **Practical**:  Properties of solids, liquids, and gases  **Skill sheet**:  Recording results  **Homework 1 - Particle Theory**  **Particle theory exit quiz** |
| **5 Matter**  **5.1 Particle model** | Changes of state  Melt  change of state  freeze  melting point | **Know**  - Describe how the properties of a substance change as it melts or freezes.  - Recognise an energy transfer during a change of state.  - Describe the observations as stearic acid cools in terms of states of matter.  **Apply**  - Draw annotated before and after diagrams of particles, and use words, to explain observations about melting and freezing.  - Explain melting and freezing in terms of changes to the energy of particles.  - Use cooling data to identify the melting point of stearic acid.  **Extend**  - Explain why there is a period of constant temperature during melting and freezing based on the arrangement and movement of particles, and energy transfers.  - Explain in detail the differences between melting and freezing.  - Suggest reasons for the different melting points of different substances based on the arrangement, movement, and energy of their particles. | 1. Name the two states involved in freezing.   **(1 mark)**   1. Describe how particle movement changes when a substance melts.   **(1 mark).**   1. List the substances in order of increasing melting point.  * **Gallium 30 oC** * **Gold 1063 oC** * **Oxygen -218 oC** * **Water 0 oC**  1. Copy the sentences below and select the correct word. 2. The change of state from solid to liquid is **freezing/melting**. 3. As a substance melts, its particles vibrate **slower/faster**. The particles start moving **around/upwards**. 4. The substance is now in **the liquid/ solid** state. 5. The melting point of a substance is the **speed/ temperature** it melts at.   **(5 marks)**   1. A substance has a melting point of - 7 °c. Tom says the substance is liquid at 20 °C. Ben says it could be liquid or gas. Explain who is correct. Use evidence to support your answer.   **(3 marks)**   1. Use the particle model and ideas about energy transfer to explain in detail the difference between melting and freezing.   **(6 marks)**   1. A few substances change directly from the solid to the gas state. Predict what happens to the movement, arrangement and energy of the particles when this change of state occurs.   **(3 marks)** | <https://classroom.thenational.academy/lessons/change-of-state-6hj66r> | **Challenge and stretch**  At Mount Everest Base Camp (5364 m above sea level), water boils at 82 °C. Explain why the boiling point of a substance of water decreases as the height above the Earth's surface increases. |  | **PPT 5.1.3**  **Melting and freezing**  **Interactive**: What happens as water freezes?  **Practical**:  Observing the  cooling of stearic acid  **Skill sheet**:  Choosing scales  **Skill sheet**:  Recording results  **Skill sheet**:  Drawing graphs  **WebQuest**: Safer roads  Changes of state exit quiz |
| **5 Matter**  **5.1 Particle model** | 5.1.4  Boiling  boil  boiling point | **Know**  - Describe how the properties of a substance change as it boils.  - Recognise an energy transfer during a change of state.  - Draw straightforward conclusions from boiling point data presented in tables and graphs.  **Apply**  - Draw annotated before and after diagrams of particles, and use words, to explain observations about boiling.  - Explain why different substances boil at different temperatures in terms of changes to the energy of particles.  - Select data and information about boiling points and use them to contribute to conclusions.  **Extend**  - Explain why there is a period of constant temperature during boiling based on the arrangement and movement of particles, and energy transfers.  - Suggest reasons for the different boiling points of different substances based on the arrangement, movement, and energy transfers of their particles.  - Assess the strength of evidence from boiling point data, deciding whether it is sufficient to support a conclusion. | 1. A Draw a diagram to show the particles inside a bubble in boiling water.   **(1 mark)**   1. Name the substance in the bubbles in boiling water   **(1 mark)**   1. State what is meant by the term boiling point.   **(1 mark)**   1. Predict the state of silver at 1000 °C.   **(1 mark)**   1. **Copy the sentences below choosing the correct bold words.** 2. When a substance boils, it changes state from **liquid/gas** to **liquid/gas**. 3. Bubbles form at the **top of/all the way through the liquid**. 4. A certain substance boils at **any/a certain temperature**.   **(4 marks)**   1. Use the data to predict the state of copper at 2000 °C. Data for copper:   melting point= 1083 °C  boiling point = 2595 °C  **(1 mark)**   1. Draw diagrams to explain why different substances boil at different temperatures. Use the data to compare two substances using your labelled diagrams. Identify the strengths and weaknesses of your labelled diagrams.   **(6 marks)** |  |  |  | **PPT 5.1.4**  **Boiling**  **Interactive**: What happens when water boils?  **Activity**: Heating water  **Skill sheet**:  Choosing scales  **Skill sheet**:  Drawing graphs |
| **5 Matter**  **5.1 Particle model** | 5.1.5  More changes of state  evaporate (evaporation) condense (condensation)  sublime (sublimation) | **Know**  - State the names of changes of state involving gases.  - Describe one difference between evaporation and boiling.  - Write a fair test enquiry question on evaporation, and plan the method and how to control the variables.  **Apply**  - Draw annotated before and after diagrams of particles, and use words, to explain observations about evaporating, condensing and subliming.  - Explain differences between evaporation, sublimation and boiling based on the arrangement and movement of particles.  - Explain why it is important to control variables to provide evidence for a conclusion in an evaporation investigation.  **Extend**  - Make predictions about what will happen during an unfamiliar physical process – deposition – in terms of particles and their energy.  - Compare evaporation, boiling and sublimation based on the arrangement, movement, and energy transfers of particles.  - Justify the procedure and evaluate the results in an evaporation investigation. | 1. State two differences between evaporation and boiling.   **(1 mark)**   1. Identify two ways that a hairdryer speeds up evaporation.   **(1 mark)**   1. Identify the state formed when a substance condenses.   **(1 mark)**   1. Name the change of state that occurs when a substance in the solid-state changes into a gas.   **(1 mark)**   1. Write five correct sentences from the sentence starters and enders below.   **Sentence starters**   * In boiling ... * In condensing... * In evaporating...   **Sentence enders**   * ... particles leave the surface of the liquid. * ... substances change from the liquid to the gas state. * ... particles leave from all parts of the liquid. * ... substances change from the gas to the liquid state.   **(5 marks)**   1. Describe the changes in the arrangement and movement of the particles when a substance condenses. Draw before and after particle diagrams to illustrate your answer.   **(4 marks)**   1. Deposition is the change of state from gas to solid. Predict how the arrangement and movement of the particles changes during deposition. Draw particle diagrams to illustrate your answer. Then predict how energy is transferred during deposition.   **(6 marks)** |  | **Evaluating evaporation**  **Eva is investigating evaporation. She puts a small. damp tissue in a cold place. She puts a big, wet towel above a heater. The tissue dries first. Eva concludes that cold conditions speed up evaporation. Evaluate Eva's investigation: How could she improve it? Does the evidence support the conclusion?** |  | **PPT 5.1.5**  **More changes of state**  **Practical**:  Who can make the biggest crystals?  **Interactive**:  Identifying  evaporation,  condensation,  and sublimation |
| **5 Matter**  **5.1 Particle model** | 5.1.6  Diffusion  diffusion | **Know**  - Describe examples of diffusion.  - State that observations about diffusion can be explained in terms of particles in motion.  - Write a fair test enquiry question on diffusion, identify the independent and dependent variables, and plan the method and how to control the variables.  **Apply**  - Describe evidence for diffusion.  - Draw annotated before and after diagrams of particles, and use words, to explain diffusion.  - Explain why it is important to control variables to provide evidence for a conclusion in a diffusion investigation.  **Extend**  - Evaluate observations that provide evidence for the existence of particles.  - Draw annotated before and after diagrams of particles, and use words, to predict the relative speed of diffusion when the value of a given independent variable is changed.  - Justify the procedure and evaluate the results in a diffusion investigation. | 1) Draw two linked diagrams showing particles before and after diffusion.  **(2 marks)**  2) List three factors that affect the speed of diffusion.  **(3 marks)**  3) Copy and complete the sentences below.  Particles in liquids and gases move \_\_\_\_\_\_\_\_ all the time. They \_\_\_\_\_\_\_ out from a region where there are \_\_\_\_\_\_\_\_ particles to one where there are fewer. This is called \_\_\_\_\_\_\_\_\_\_  **(4 marks)**  4) Describe two pieces of evidence for diffusion.  **(2 marks)**  5) The air contains particles of argon, nitrogen, and other substances. Use the data below to predict which type of particle diffuses faster. Give a reason for your choice.  Relative masses of particles: nitrogen = 28 and argon = 40  **(2 marks)**  6) Your English teacher says that particles do not exist. Identify some strong evidence for the existence of particles. Use words and pictures to describe this evidence and explain why it shows that particles exist.  **(6 marks)** | <https://classroom.thenational.academy/lessons/diffusion-c9j64c> |  |  | **PPT 5.1.6**  **Diffusion**  **Practical**: What affects the rate of diffusion?  **Skill sheet**:  Choosing scales  **Skill sheet**:  Recording results  **Skill sheet**:  Drawing graphs  **Interactive**:  Describing diffusion |
| **5 Matter**  **5.1 Particle model** | 5.1.7  Gas pressure  gas pressure | **Know**  - Describe examples of gas pressure.  - Use words to explain gas pressure simply.  - Collect and interpret simple primary data to provide evidence for gas pressure.  **Apply**  - Draw annotated particle diagrams, and use words, to explain gas pressure.  - Explain unfamiliar observations about gas pressure in terms of particles.  - Collect, analyse and draw a conclusion from primary data providing evidence for gas pressure.  **Extend**  - Draw annotated before and after particle diagrams, and use words, to explain what happens to gas pressure as conditions are changed.  - Predict what will happen to gas pressure as conditions are changed in terms of particles and their energy.  - Evaluate the extent to which a conclusion made from primary data about gas pressure is justified by the evidence collected. | 1) State what is meant by gas pressure.  **(1 mark)**  2) Explain why adding more air increases the pressure inside a container.  **(1 mark)**  3) Explain why a plastic bottle collapses in the freezer.  **(1 mark)**  4) Copy the true sentences below. Write corrected versions of the false sentences.   1. Gas particles collide with the walls of their container. 2. Colliding gas particles exert pressure on the inside of the container. 3. The more particles in a container, the lower the pressure. 4. The higher the temperature, the lower the pressure.   **(4 marks)**  5) Jack was camping. He put a can of baked beans on his camp fire. without opening the lid. The can exploded. Use the particle model to explain why. Draw particle diagrams to illustrate your answer.  **(3 marks)**  6) Plan a talk that you could give to another class to explain what happens to an inflated balloon when you put it in a warm room and when you put it in a fridge. Illustrate your talk with particle diagrams.  **(6 marks)** | <https://classroom.thenational.academy/lessons/atmospheric-pressure-6ww36c> | **Racing car tyres can reach a temperature of 100oC. Explain why Racing-car Technicians pump tyres to a lower pressure than need in the race.** |  | **PPT 5.1.7**  **Gas pressure**  **Interactive**: What are gases like?  **Practical**: What affects gas pressure? |
|  | 5.1.8  Inside particles | **Know**  - State definitions of atoms, elements, molecules and compounds  - Name one element and one compound.  **Apply**  - Represent atoms, molecules and elements using models.  - Use diagrams to represent atoms and molecules of elements and compounds.  **Extend**  - Compare atoms, molecules and elements using models.  - Use diagrams to compare molecules of an element and a compound. | 1) State what an element is.  **(1 mark)**  2) State what a molecule is.  **(1 mark)**  3) State what a compound is.  **(1 mark)**  4) State what an atom is.  **(1 marks)**  5) A molecule of the element nitrogen consists of two nitrogen atoms. Draw a diagram to represent a nitrogen molecule. Use one blue sphere to represent each nitrogen atoms.  **(2 marks)**  6) A molecule of the compound sulfur dioxide consists of one sulfur atom joined to two oxygen atoms. Draw a diagram to represent a sulfur dioxide molecule. Use a yellow sphere to represent a sulfur atom and red spheres to represent oxygen atoms.  **(2 marks)**  7) Compare an oxygen particle to a water particle. In your answer. Include descriptions of how they are similar and how they are different.  **(2 marks)** | [**https://classroom.thenational.academy/lessons/robert-brown-71hp2r**](https://classroom.thenational.academy/lessons/robert-brown-71hp2r) |  |  | **PPT 5.1.8**  **Inside particles**  **Activity:** Atoms and molecules  **Interactive:**  Defining key words |
|  | 5.2.1  Pure substances and mixtures  pure substance  mixture | **Know**  - State what a mixture is and give examples of mixtures.  - State that a mixture can be separated as a result of the different melting points of its components.  - With help, choose a simple technique to separate the substances in a mixture.  **Apply**  - Explain what a mixture is using the particle model.  - Explain how to use melting temperatures to distinguish mixtures from pure substances.  - Devise suitable techniques to separate mixtures, based on their properties.  **Extend**  - Use particle models to compare mixtures and pure substances.  - Comment on the purity of a substance by interpreting temperature change data.  - Justify the suitability of separation techniques in terms of the properties of constituent substances. | 1) State what is meant by a mixture.  State four examples of mixtures.  **(1 marks)**  2) Describe how to find out if a sample of a substance is pure.  **(1 marks)**  3) Copy the sentences that are true. Write corrected versions of the sentences that are false.   1. A mixture is made up of different substances that are joined together. 2. You cannot change the amounts of substances in a mixture. 3. A pure substance has no other substances mixed with it.   **(3 marks)**  4) Tim heats a sample of a solid.  He plots the temperature every minute. Use the graph to decide whether the sample is a pure substance or a mixture of substances. Explain your decision.    5) Write a paragraph to compare mixtures and pure substances.  **(6 marks)** |  |  |  |  |
|  | 5.2.2  Solutions  dissolve  solvent  solute  solution | **Know**  - When provided with key words, describe solutions using key words.  - Describe observations when a substance dissolves.  - Use observations or data to draw a conclusion to distinguish a solution from a pure liquid.  **Apply**  - Explain how substances dissolve using the particle model.  - Draw annotated before and after particle diagrams to represent dissolving.  - Use data to draw a conclusion about the mass of solute dissolved in a solution.  **Extend**  - Explain the relationship between solutes, solvents, and solutions.  - Justify whether a given particle diagram represents a solution or a pure substance.  - Explain the applications of solution chemistry to different contexts. | 1) State what a solution is.  **(1 mark)**  2) Identify the solute in coffee solution.  **(1 mark)**  3) Describe the arrangement of particles in a solution.  **(1 mark)**  4) Choosing the correct bold words.   1. When salt dissolves in water a **solvent/solute/solution** forms. 2. Salt is the **solvent/solute/solution** and water is the **solvent/solute/ solution**. 3. In the solution **water/ salt** particles surround the **water/ salt** particles. 4. When any substance dissolves the solute mixes **partly/ completely** with the solvent.   **(6 marks)**  5) Laura has three beakers. Each  contains 200 cm3 of a colourless liquid. Suggest how Laura could find out which beakers contain pure water. and which contain solutions. Explain your answer.  **(3 marks)** |  |  |  |  |
|  | 5.2.3  Solubility | **Know**  - Use key words about dissolving.  - Interpret solubility data shown on a bar chart.  - Write a fair test enquiry question on solubility, and plan the method and how to control the variables.  **Apply**  - Explain observations about dissolving.  - Use the solubility curve of a solute to describe and explain simply observations about solutions.  - Explain why it is important to control variables to provide evidence for a conclusion in a solubility investigation.  **Extend**  - Suggest a reason for the effect of temperature on solubility for a given solute.  - Analyse and interpret solubility curves.  - Justify the procedure and evaluate the results in a solubility investigation. | 1) State the meaning of the term saturated solution.  **(1 mark)**  2) Write four sentences from the  sentence starters and enders below.  **(1 mark)**  3) **Sentence starters**   * A saturated solution ... * An insoluble substance ... * Solubility ...   **Sentence enders**  ... is a solution that contains the greatest mass of solid that can  dissolve.  ...contains undissolved solid.  … is the mass of substance that dissolves in 100 g of water.  … does not dissolve.  **(4 marks)**  4) Plot the values in the table on  a graph, and draw the line or curve  of best fit. Describe the relationship  shown by completing this sentence:  As temperature increases. the  solubility ....   |  |  | | --- | --- | | Temp oC | Solubility of zinc bromide g/100g of water | | 20 | 446 | | 40 | 590 | | 60 | 616 | | 80 | 647 | | 100 | 669 |   5) A student adds 20 g of  potassium chloride to 100 g of water  and stirs. Choose data from the  graph to predict and explain  what he would see.  **(3 marks)**  6) Another student adds 200 g of  Cerium (III) sulfate to 100 g of  water and stirs. Choose data from  the graph opposite to predict and  explain what she would see.  ***(3 marks)*** |  |  |  |  |
|  | 5.2.4  Filtration | **Know**  - State that mixtures may be separated due to differences in their physical properties.  - State that the method chosen to separate a mixture depends on which physical properties of the individual substances are different.  - With support, use the correct techniques to filter a mixture.  **Apply**  - Identify a physical property that must be different in order for given separation technique to work.  - Choose the most suitable technique(s) to separate a mixture of substances.  - Use annotated before and after particle diagrams, and words, to explain how filtration works.  **Extend**  - Explain why a stated physical property must be different in order for a given separation technique to work.  - Justify a chosen technique for separating a mixture of substances.  - Design a model to explain filtering, and identify advantages and disadvantages of the model. | 1) State two types of mixture that can be separated by filtration.  2) Martha filters a mixture of glitter and water. Name the filtrate and the residue.  3) List three uses of filtration.  4) State the difference in properties that allows you to separate sand and salt by the method described above.  5) Use the words below to finish labelling the diagram.   * Liquid * Filtrate * Insoluble * Residue     **(2 marks)**  6) Naomi adds 100 g of different compounds to separate beakers of water. and stirs to dissolve. Each beaker contains 100 g of water. She filters each mixture. and measures the mass of undissolved solid that remains. use the data to work out the most and least soluble substances. Show your working.    **(4 marks)**  7) Design a model you could make to explain filtering. Draw labelled diagrams to show your ideas. Identify the advantages and disadvantages of the model.  **(6 marks)** |  |  |  |  |
|  | 5.2.5  Evaporation and distillation | **Know**  - State that mixtures may be separated owing to differences in their physical properties.  - State that the method chosen to separate a mixture depends on which physical properties of the individual substances are different  - Label distillation apparatus and describe what happens in distillation.  **Apply**  - Identify the physical property that must be different in order to separate a mixture by evaporation or distillation.  - Draw annotated before and after particle diagrams, and use words, to explain how evaporation and distillation work.  - Use the particle model to explain observations made during the distillation of inky water.  **Extend**  - Compare evaporation and distillation.  - Justify whether evaporation or distillation would be suitable for obtaining given substances from solution.  - Suggest a combination of methods to separate a complex mixture and justify the choices made. | 1) Describe how to use evaporation to separate salt from seawater.  **(1 mark)**  2) State three uses of evaporation.  **(1 mark)**  3) State the difference in properties that allows you to separate water and salt by the method described above.  4) Copy the sentences below,  choosing the correct bold words.  You can use **similarities/ differences** in **physical/chemical** properties to separate mixtures. The method chosen to separate a certain mixture depends on which **particles/properties** are different.  **(3 marks)**  5) State whether you would use evaporation or distillation to obtain the substances below from their mixtures. Give a reason for each decision.   1. copper chloride crystal from a solution of copper chloride 2. propanone the solvent in 3. nail-varnish remover 4. ethanol from a mixture of ethanol and water. The boiling point of ethanol is 78 °C and the boiling point of water is 100 °C 5. solid potassium chloride from potassium chloride solution   **(5 marks)** |  |  |  |  |
|  | 5.2.6  Chromatography | **Know**  - Describe what happens to a mixture when it undergoes chromatography.  - Describe what a chromatogram looks like.  - Use evidence from chromatography to identify unknown substances in mixtures, and to identify the pen or plant a sample is from.  **Apply**  - Explain how chromatography separates mixtures.  - Identify one physical property which must be different, and one physical property which must be the same, in order to separate a mixture by chromatography.  - Use evidence from chromatography to explain how to identify unknown substances in mixtures, and to identify the pen or plant a sample is from.  **Extend**  - Justify the use of chromatography in different scenarios.  - Consider how chromatography can be used to monitor the progress of reactions.  - Suggest possible issues to consider when using chromatography to identify unknown substances. | 1) State what chromatography does.  **(1 mark)**  2) State what a chromatogram is.  **(1 mark)**  3) Copy and complete the sentences below. Chromatography separates substances in \_\_\_\_\_\_\_\_\_\_\_ it works if all the substances in the mixture are soluble in the same \_\_\_\_\_\_\_\_\_\_ the picture made by chromatography is called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **(3 marks)**  4) Explain why, in chromatography, some substances travel further up the paper than others.  **(3 marks)**  5) Look at the chromatogram below. It was obtained from the leaves of some plants. Write down which plant the unknown sample is from. Explain your choice. How confident can you be that your answer is correct? Why?  **(4 marks)**    6) A teacher has found a rude note in his classroom. There are three students who might have written it. Write instructions for how he can use chromatography to find out which student wrote the note. Point out possible problems with the method or in using the results.  **(6 marks)** |  |  |  |  |
|  |  |  |  | <https://classroom.thenational.academy/lessons/matter-revision-part-1-6xjkje>  <https://classroom.thenational.academy/lessons/matter-revision-part-2-60uket> |  |  |  |
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