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**Knowledge Rich Curriculum Plan**

SCIENCE- Designing Materials



| **Lesson/Learning Sequence** | **Intended Knowledge:**  *Students will know that…* | **Prior Knowledge:**  *In order to know this, students need to already know that…* | **Working Scientifically** | **Tiered Vocabulary and Reading Activity** | **Assessment** | **Support** |
| --- | --- | --- | --- | --- | --- | --- |
| **1 – Polymers** | *Students will know that longer molecules have higher melting points. Students will know that a polymer is a molecule with a long chain of repeating units. Students will know that longer polymer chains have higher melting points. Students will know that intermolecular forces are forces that act between molecules. Students will know how to represent polymers using diagrams.* | *Students need to already know that melting point is the temperature the substance goes from solid to liquid.* | *Communicate: Students will be able to construct an explanation about what a polymer is.* | ***Polymer:***  *A molecule with a long chain of repeating units*  ***Molecule***  *A group of atoms bonded together*  ***Monomer***  *A molecule that can be bonded to similar molecules to form a polymer* | *Retrieval questions*  *Simple exam questions*  *End of topic assessment*  *Summative assessment 3* | *Knowledge organiser (provided on Teams and in class)*  [*https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2*](https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2) |
| **2 – Branched and unbranched polymers** | *Students will know that unbranched polymers are polymers in a straight line. Students will know that branched polymers are polymers that repeat in different directions. Students will know how to differentiate between unbranched and branched polymers. Students will know that branched polymers tend to have lower melting points than branched polymers.* | *Students will need to know what a polymer is and the definition of melting point.* | *Analyse: Students will be able to analyse patterns.* | ***Bonds:***  *A lasting attraction between atoms or ions that allows structures to form*  ***Density:***  *The number of particles present within a certain volume*  ***Branched:***  *Having parts that extend from the main section*  ***Linear:***  *Arranged in a straight line* | *Retrieval questions*  *Simple exam questions*  *End of topic assessment*  *Summative assessment 3* | *Knowledge organiser (provided on Teams and in class)*  [*https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2*](https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2) |
| **3- Polymer Properties** | *Students will be able to define viscosity to be how thick a liquid is. The higher the viscosity the more viscous the substance. Students will be able to define flammability to be how easily something sets of fire. Students will be able to recognise the symbol. Students will learn that different chain lengths have different properties. Long chained molecules have a lot of intermolecular bonds so they have; a dark, high melting points, high boiling points, low flammability, high viscosity, low volatility. Short chain molecules have weak intermolecular forces. There properties are; light colour, low melting point, low boiling point, high flammability, low viscosity, burns very well in oxygen.* | *Students will need to be able to state the difference between a long and short chain polymer.* | *Enquire: Students will be able to hypothesise the properties of different polymers based on the chain length.* | ***Viscosity:***  *A measure of a fluid’s resistance to flow*  ***Volatility:***  *The tendency of a substance to change state to a gas.*  ***Colourless:***  *Without colour* | *Retrieval questions*  *Simple exam questions*  *End of topic assessment*  *Summative assessment 3* | *Knowledge organiser (provided on Teams and in class)*  [*https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2*](https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2) |
| **4- Making polymers** | *Students will know some applications of polymers and develop practical skills to investigate the uses.*  *Students will learn that nappies contain millions of super absorbent polymer beads which can absorb a considerable volume of water. There is also a water resistant outer layer made of a polymer to prevent the wetness transferring to clothes.*  *Students will investigate and observe the how the beads work by adding measured volumes of water to the beads.*  *Students will use a CLEAPSS student safety sheet to complete a risk assessment before making slime.*  *Students will also use borax to make slime which is a polymerisation reaction again following a method and using equipment to measure and then make observations. Students will learn about further uses of polymers such as carrier bags and consider problems with polymers and why recycling is important.* | *Students should already know that a measuring cylinder is used to measure small volumes of liquid, a spatula is used to transfer powders in science, a test tube is used to hold the chemicals during an experiment and these can be put into a test tube rack.*  *Students should know that nappies absorb large quantities of urine. Students may also know that the problem with nappies is they are nonbiodegradable which poses an issue in terms of pollution and landfill.* | *Using apparatus*  *Making observations*  *Using students safety sheets to carry out a risk assessment*  *Following a method*  *Reading:*  *Polymers in Nappies* | ***Disposable:***  *Something designed to be used only once*  ***Acquisition:***  *The act of gaining something*  ***Composed:***  *Made up of*  ***Absorbs:***  *To take up or receive a substance*  ***Transferring:***  *Moving from one place to another*  *(Non)* ***Biodegradable:***  *Will not naturally break down and decay*  ***Synthetic:***  *Man-made* |  | [*https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2*](https://www.bbc.co.uk/bitesize/guides/ztxnsbk/revision/2) |