



Medium Term Planning - Topic: polymers

<p>Curriculum Intent</p>	<p>In addition to working further on objectives from Year __, pupils will be taught, following National Curriculum guidelines, the following this topic:</p> <p>Additional polymerization:</p> <p>Aiming for Grade 4 LOs: • Define a monomer and a polymer. • State some uses of poly(ethene) and poly(propene). • Write a word equation for the formation of poly(ethene) and poly(propene).</p> <p>Aiming for Grade 6 LOs: • Describe how monomers become polymers. • Draw the monomer for an addition polymer when the structure of the polymer is given. • Draw an addition polymer structure when the structure of the monomer is given.</p> <p>Aiming for Grade 8 LOs: • Explain why monomers for addition polymers must be unsaturated. • Explain the process of addition polymerisation in detail, including using balanced symbol equations and the concept of atom economy. • Explain how the repeating unit of a polymer relates to the monomer</p> <p>Condensation polymerization:</p> <p>Aiming for Grade 6 LOs: • Describe condensation polymerisation. • Draw a simplified structure of the monomers for a condensation polymer when the structure of the polymer is given. • Draw a simplified structure of a condensation polymer when the structure of the monomers are</p> <p>Aiming for Grade 8 LOs: • Predict the products of condensation polymerisation. • Explain the process of condensation polymerisation in detail, including using equations. • Compare and contrast in detail, giving appropriate examples, the two methods of polymerisation. given.</p> <p>Natural polymers:</p> <p>Aiming for Grade 8 LOs: • Predict the products of condensation polymerisation. • Explain the process of condensation polymerisation in detail, including using equations. • Compare and contrast in detail, giving appropriate examples, the two methods of polymerisation.</p> <p>Aiming for Grade 6 LOs: • Identify the monomer from the structural formula of a polymer. • Describe the structure of an amino acid.</p> <p>Aiming for Grade 8 LOs: • Predict the products of condensation polymerisation using natural monomers. • Explain in detail the process of condensation polymerisation with natural monomers, including using equations. • Explain how amino acids react together in an acid–base reaction.</p> <p>DNA:</p> <p>Aiming for Grade 4 LOs: • State that DNA is an example of a natural polymer. • State what DNA stands for. • Name the type of monomers used to make DNA.</p> <p>Aiming for Grade 6 LOs: • Describe the main structure of DNA. • Describe the importance of DNA for living systems. • Sketch the shape of a DNA strand.</p> <p>Aiming for Grade 8 LOs: • Explain the shape of the DNA polymer. • Explain how nucleotides form DNA. • Explain the purpose of DNA.</p>
<p>Skills/National Curriculum Links</p>	<p>SMSC: group work from practical activities in this section. Also pupils can work in groups to produce a timeline for the development of the periodic table.</p> <p>PSHE/British Values: The history of the is important development of the atom when learning about british values and world values. Students will complete teamwork, leadership and put science into everyday situations. They will show mutual respect during classwork.</p> <p>Skills Builder:Listening (Receiving, retaining and processing info), Speaking (The oral transmission of info and ideas), Problem solving (Find a solution to a situation or challenge), Creativity (imagination and</p>
<p>Spiritual, moral, social, and cultural development</p>	

	generation of new ideas), Staying positive (The ability to use tactics and strategies to overcome setbacks), aiming high (Set clear and tangible goals), Leadership and teamwork
Numeracy	
Literacy	<p>Vocabulary Tier 2: unsaturated, saturated, monosaccharide, fructose, cellulose, condensation, intermolecular.</p> <p>Vocabulary Tier 3: additional polymerization, DNA, deoxyribonucleic acid, monomers, nucleotides, polymer</p> <p>Reading: Following a written method and read risk assessments. Students may be directed to the textbook; this could be in lesson or at home on Kerboodle.</p> <p>Writing: Describing and explaining scientific phenomenon, free response writing for describing precautions taken, use of word mat to promote sentence formation.</p> <p>Oracy: inclusion of BEST resources which are research evidence on common misunderstandings in science, effective diagnostic questioning and formative assessment, constructivist approaches to building understanding, and effective sequencing of key concepts that promote metacognitive talk and dialogue.</p>
Becoming future ready	<p>Careers/Employability: Scientist</p> <p>Chemist</p> <p>Drug development</p> <p>Teacher</p> <p>Post-doctoral researcher</p>
Adaptation	Throughout this topic, quality first teaching will provide differentiation:
QFT/SEND Provision	<p>By product: Linear assessments and differentiated practical work.</p> <p>By resource: Lessons are differentiated per class and students, worksheets are available if support and assessments are linear.</p> <p>By Intervention: by providing different levels of supervision and support</p> <p>By Progressive Questioning: exploring pupils' understanding through interactive dialogue.</p> <p>By Grouping: according to prior attainment, gender, social preference, preferred learning style.</p> <p>By Offering Optional Activities: In class or as homework, to extend learning.</p> <p>This QFT/SEND provision will be explicit within the lesson-by-lesson schemes of work.</p>
Implementation Curriculum Delivery	To be able to:
Learning Outcomes (Core Knowledge)	<p>7.3.1 Alkenes can be used to make polymers such as poly(ethene) and poly(propene) by addition polymerisation. In <u>addition polymerisation reactions, many small molecules (monomers) join together to form very large molecules (polymers).</u> In <u>addition polymers the repeating unit has the same</u> atoms as the monomer because no other molecule is formed in the reaction. Students should be able to: • <u>recognise addition polymers and monomers from diagrams</u> in the forms shown and from the presence of the functional group C=C in the monomers • <u>draw diagrams to represent the formation of a polymer from a given alkene monomer</u> • relate the repeating unit to the monomer.</p> <p>7.3.2 <u>Condensation polymerisation involves monomers with two functional groups.</u> When these types of monomers react they join together, usually <u>losing small molecules such as water</u>, and so the reactions are called condensation reactions. The simplest polymers are produced from two different monomers with two of the same functional groups on each monomer. Students should be able to explain the basic principles of condensation polymerisation by reference to the functional groups in the monomers and the repeating units in the polymers.</p> <p>7.3.3 <u>H Amino acids have two different functional groups in a molecule.</u> Amino acids react by condensation polymerisation to produce polypeptides. For example, glycine is H₂NCH₂COOH and polymerises to produce the polypeptide (-HNCH₂COO-) _n and nH₂O Different amino acids can be combined in the same chain to produce proteins. 7.3.4 Other <u>naturally occurring polymers</u> important for life include <u>proteins, starch, and cellulose</u>. Students should be able to name the types of monomers from which these naturally occurring polymers are made.</p> <p>7.3.4 <u>DNA (deoxyribonucleic acid) is a large molecule essential for life.</u> DNA encodes genetic instructions for the development and functioning of living organisms and viruses. Most DNA molecules are two polymer chains, <u>made from four different monomers</u> called nucleotides, in the form of a double helix. Students should be able to name the types of monomers from which these naturally occurring polymers are made.</p>
Current learning to be developed in the future within:	A level chemistry students will study organic chemistry as a whole section at A level. They recap the knowledge at GCSE and then extend on this in detail.
Assessment	Refer to assessment maps for formative and summative assessment opportunities.
Impact	Attainment and Progress – Refer to assessment results / data review documentation.