Map of the unit: Designer Polymers

This shows the relationship between the Storyline, the Activities and the Chemical Ideas. To aid planning, laboratory-based practical work is indicated by (P), activities involving IT skills are indicated by (IT) and those developing study skills by (S).

ACTIVITIES	CHEMICAL STORYLINE	CHEMICAL IDEAS
	DP1 DESIGNER POLYMERS	
DP2.1 Making nylon (P) **DP2.2** Taking nylon apart (P)	**DP2** THE INVENTION OF NYLON	***13.3*** *Carboxylic acids and their derivatives (revision)* ***13.4*** *The –OH group in alcohols, phenols and acids (revision)* **13.8** Amines and amides ***5.4*** *Forces between molecules: hydrogen bonding (revision)*
	DP3 POLYESTERS: FROM CLOTHES TO BOTTLES	**13.5** Esters
DP4 Comparing models of nylon-6,6 and Kevlar	**DP4** KEVLAR	
DP5 Bubble gum – or bubble glass?	**DP5** TAKING TEMPERATURE INTO ACCOUNT	**5.5** The structure and properties of polymers
	DP6 POLY(ETHENE) BY DESIGN	
	DP7 THROWING IT AWAY ... OR NOT	
DP8 Check your notes on **Designer Polymers** (S)	**DP8** SUMMARY	

Note Chemical Ideas shown in italics are revisited from earlier units.

DP
DESIGNER POLYMERS

Relation to other units

This is the seventh teaching unit of the course (and the first unit in A2).

The Polymer Revolution introduces ideas about polymers and polymerisation, and shows how the properties of addition polymers are related to their bonding and structure, particularly the intermolecular forces between the polymer chains. Alcohols, carboxylic acids and esters are considered in **What's in a Medicine?**

These ideas are revisited and extended in this unit in the context of condensation polymers. Students are also introduced to nitrogen-containing organic compounds.

The chemistry of amines and amides is revisited in **Engineering Proteins**, which also provides further examples of polymers, intermolecular forces and the relationship between properties, and bonding and structure. Further examples of the use of acyl chlorides in acylation reactions are met in **Colour by Design** and **What's in a Medicine?**

Concept map

The concept map which follows shows how the major chemical ideas in this teaching unit develop throughout the course.

Concept	Introduced in unit	Developed in unit(s)	Assumed in unit(s)
Polymers and polymerisation	PR	DP	EP
Intermolecular forces	DF	PR	DP, EP, AA, CD, O, MD
Relationship between properties, and bonding and structure	M	PR, DP, EP, AA, CD, O, MD	–
Condensation reactions	DP	EP	MD
Carboxylic acids	WM	DP	EP, AA, CD, MD
Acyl (acid) chlorides	DP	–	MD
Esters	WM	DP	AA, CD, MD
Acylation	DP	–	CD, MD
Alcohols	DF	PR, WM, DP, MD	CD
Amines and amides	DP	EP	CD, MD

Advance warning

The following items needed for activities in this unit may not already be in your school, and might take a little time to obtain.

Activity	Item(s)	Essential/Optional	Typical quantity per experiment
DP2.2	Nylon-6,6 granules	Essential	2 g
	Heating mantle	Optional (but recommended)	1
DP5	Bubble gum, eg Hubba Bubba	Essential	1 piece