Map of the unit: Aspects of Agriculture

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
	AA1 WHAT DO WE WANT FROM AGRICULTURE?	
AA2.1 How does temperature affect the rate of a reaction? (P) **AA2.2** Making models of silicates and clays **AA2.3** Structure and properties (P) **AA2.4** Investigating ion exchange (P) **AA2.5** The pH, buffering capacity and lime requirement of soil (optional extension) (P)	**AA2** THE WORLD AT YOUR FEET	***10.2*** *The effect of temperature on rate (revision)* ***10.3*** *The effect of concentration on rate (revision)* ***5.2*** *Molecules and networks (revision)* **5.6** Bonding, structure and properties: a summary **7.5** Ion exchange **3.2** The size of ions
AA3.1 What is the nitrogen content of soil? (optional extension) (P) **AA3.2** The nitrogen balance in UK agriculture **AA3.3** Revising for end of course exams (S)	**AA3** KEEPING SOIL FERTILE	***9.1*** *Oxidation and reduction (revision)* **11.3** The p block: nitrogen and Group 5 **7.3** Equilibria and partial pressures ***10.4*** *What is a catalyst? (revision)* ***10.5*** *How do catalysts work? (revision)*
AA4.1 Dilemma over malaria (IT) **AA4.2** Partition equilibrium (P) **AA4.3** What makes an active pyrethroid?	**AA4** COMPETITION FOR FOOD	***3.5*** *Geometric isomerism (revision)* ***3.6*** *Optional isomerism (revision)* **7.4** Partition equilibrium ***13.5*** *Esters (revision)*
AA5 Check your notes on **Aspects of Agriculture** (S)	**AA5** SUMMARY	

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

AA

ASPECTS OF AGRICULTURE

Relation to other units

It is suggested that this unit should be taught towards the end of the course, but *before* **Colour by Design**, **The Oceans** and **Medicines by Design**. If units are being taught in parallel (see page 2), then a split into **Aspects of Agriculture** followed by **The Oceans**, and **Colour by Design** followed by **Medicines by Design** would work well.

Aspects of Agriculture develops ideas about chemical equilibrium met previously in **The Atmosphere** and **Engineering Proteins**. Students also meet ion exchange and partition equilibria. The study of inorganic chemistry is extended to include p-block elements in Group 5, particularly the redox chemistry of nitrogen. The link between the properties of a substance and its structure and bonding is summarised, bringing together ideas met in several earlier units. This unit completes the study of rates of reactions, building on ideas met in **The Atmosphere** and **Engineering Proteins**.

A study of the Haber Process introduces students to the idea of 'optimum' conditions for an industrial process. This is developed further in **Visiting the Chemical Industry**.

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)
Relationship between properties, and bonding and structure	M	PR, DP, EP, AA, CD, O, MD	–
The Perodic Table	EL	M, SS, AA	all others
Nitrogen and Group 5	AA	–	–
Redox	M	SS	AA
Giant covalent (network) structures	M	AA	–
Ionic substances	M	AA, O	all others
Hydration of ions	M	AA, O	–
Size of ions	AA	O	–
Buffering action	AA	O	–
Intermolecular forces	DF	PR	DP, EP, AA, CD, O, MD
Chemical equilibrium	A	EP, AA, O	SS
Rates of reactions	A	EP, AA	–
Catalysis	DF	A, EP, SS, AA	several
Isomerism	DF	PR, EP	SS, AA, 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
AA2.3	Samples of sand, quartz, talc, mica, clay and unexpanded vermiculite	Essential	small samples only
AA2.4	Strong cation exchange resin (in hydrogen form)	Essential	5 g
	Strong anion exchange resin	Essential	5 g
AA2.5	Samples of soil or soil-based compost (also AA3.1)	Optional	50 g
AA3.1	Boric acid	Optional	0.1 g
	Devarda's alloy	Optional	0.5 g