Map of the unit: What's in a Medicine?

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
WM1	The origins and development of the modern pharmaceutical industry (IT)	WM1	THE DEVELOPMENT OF MODERN IDEAS ABOUT MEDICINES		
WM2	Extraction of salicylic acid (P)	WM2	MEDICINES FROM NATURE		
WM3	Investigating the chemistry of the –OH group in various environments (P)	WM3	IDENTIFYING THE ACTIVE CHEMICAL IN WILLOW BARK	<i>13.2</i> 13.3 13.4	Alcobols and ethers (revision) Carboxylic acids and their derivatives The –OH group in alcohols, phenols and acids
WM4	Interpretation of the mass spectrum of salicylic acid	WM4	INSTRUMENTAL ANALYSIS	6.4 2.1 6.5	Infrared spectroscopy A simple model of the atom (revision) Mass spectrometry
WM5.1 WM5.2	A preparation of aspirin (P) Using spectroscopy	WM5	THE SYNTHESIS OF SALICYLIC ACID AND ASPIRIN		
WM6	An aspirin assay (P)	WM6	DELIVERING THE PRODUCT		
		WM7	THE MIRACULOUS MEDICINE		
WM8	Which product should a pharmaceutical company develop?	WM8	DEVELOPMENT AND SAFETY TESTING OF MEDICINES		
WM9	Check your notes on What's in a Medicine? (S)	WM9	SUMMARY		

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

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S

LEVEL

WHAT'S IN A MEDICINE?

Relation to other units

This is best taught as the sixth unit of the course, but it can be taught at any time between **From Minerals to Elements** and **Designer Polymers**, providing due attention is paid to the order in which the concepts are developed.

The Elements of Life introduces students to spectroscopy and the interaction of radiation with matter – a subject which is taken further in **The Atmosphere**. The principles underlying the operation of a mass spectrometer are included in **The Elements of Life**. **Developing Fuels** includes early ideas about organic chemistry and introduces alcohols.

In this unit students learn how mass spectrometry can be used to show the structure of an organic compound and meet infrared spectroscopy as another analytical technique. They study the chemistry of alcohols and phenols in detail and are introduced to the chemistry of carboxylic acids and their derivatives.

The work on carboxylic acids and esters is developed in more detail in **Designer Polymers**, and the study of organic chemistry continues in **Engineering Proteins** and **Colour by Design**. Aspects of pharmaceutical chemistry are further considered in **Medicines by Design** which also draws together the whole of the organic chemistry in the course.

Nuclear magnetic resonance spectroscopy is studied in **Engineering Proteins** and ultraviolet and visible spectroscopy in **Colour by Design**. The use of spectroscopic techniques for the structure determination of organic compounds is brought together in **Medicines by Design**.

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)
Interaction of radiation with matter	EL	A, WM, EP, CD	SS, MD
Mass spectrometry	EL	WM	MD
Infrared spectroscopy	WM	—	CD, MD
Alcohols	DF	PR, WM, DP, MD	CD
Elimination reactions	WM		MD
Phenols	WM	CD	MD
Carboxylic acids	WM	DP	EP, AA, CD, MD
Esters	WM	DP	CD, AA, MD
Delocalisation of electrons	PR	WM, CD	several
Chromatography	WM	CD	EP, AA, MD
Aspects of the pharmaceutical industry	WM	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
WM2	Oil of wintergreen Thin layer chromatography plates (silica coated) Ultraviolet light source (for viewing t.l.c plates, sensitised ~260 nm)	Essential Essential Optional	2 cm ³ 1 per activity
WM6	Aspirin tablets	Essential	300 mg

