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
CD1 Changing colours chemically (P)	CD1 WAYS OF MAKING COLOUR	6.7 Where does colour come from? (revision)
	CD2 THE MONASTRAL BLUE STORY	
CD3 Seeing colours (P)	CD3 CHROME YELLOW	5.1 Ions in solids and solutions (revision)
 CD4.1 Using reflectance spectra to identify pigments CD4.2 What factors affect the drying potential of an oil? CD4.3 Investigating paint media CD4.4 Identifying a pigment CD4.5 Finding a perfect match 	CD4 CHEMISTRY IN THE ART GALLERY	 6.8 Ultraviolet and visible spectroscopy 13.6 Oils and fats 7.6 Chromatography 6.1 Light and electrons (revision)
CD5 Comparing hydrocarbons (P)	CD5 AT THE START OF THE RAINBOW	12.3Arenes12.4Reactions of arenes
CD6 Making azo dyes (P)	CD6 CHEMISTS DESIGN COLOURS	13.10Azo compounds6.9Chemistry of colour
CD7.1 Dyeing with a direct dye and a reactive dye (P) CD7.2 Different dyes for different fibres (P)	CD7 COLOUR FOR COTTON	
	CD8 HIGH-TECH COLOURS	
CD9 Check your notes on Colour by Design (S)	CD9 SUMMARY	

Note Chemical Ideas in italics are revisited from earlier units.

8

A2

LEVEL

COLOUR BY DESIGN

Relation to other units

This teaching unit should come near the end of the course. Many ideas met in previous units are revisited and used in a new context.

Colour by Design brings together ideas about why compounds are coloured, which have been met previously in **The Steel Story**. Spectroscopy and the interaction of radiation with matter were covered in **The Elements of Life**, **The Atmosphere**, **What's in a Medicine?** and **Engineering Proteins**. These ideas are revisited and taken further in this unit. Thin layer chromatography was met in **What's in a Medicine?** and paper chromatography in **Engineering Proteins**. Students meet gas–liquid chromatography in this unit and this is developed further in **Medicines by Design**.

The study of organic chemistry is extended to include the structure of benzene and the reactions of arenes. **Medicines by Design** draws together the whole of the organic chemistry in the course.

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
Atomic emission spectra	EL	_	SS, CD
Infrared spectroscopy	WM	_	CD, MD
Colour by absorption	SS	CD	-
Ultraviolet and visible spectroscopy	CD	_	MD
Chromatography	WM	CD	EP, AA, MD
Phenols	WM	CD	MD
Carboxylic acids	WM	DP	EP, AA, CD, MD
Esters	WM	DP	AA, CD, MD
Structure of benzene	DF	CD	PR, WM, DP, EP, MD
Reactions of arenes and related compounds	WM	DP, CD	MD
Reaction mechanisms	А	PR, CD, MD	-
Intermolecular forces	DF	PR	DP, EP, AA, CD, O, MD
Relationship between properties, and bonding and structure	М	PR, DP, EP, AA, CD, O, MD	-
Types of chemical change	М	several	CD

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
CD1	Ammonium vanadate(V) NH_4VO_3 Dry ice (can use a CO_2 generator)	Essential Optional	0.5 g (enough for 5–6 groups)
CD5	Cyclohexane Cyclohexene Methyl benzoate	Essential Essential Essential	2 cm ³ 2 cm ³ 2.5 cm ³
CD6	Phenylamine Ethyl 4-aminobenzoate (benzocaine) Methylphenol (cresol; any isomer) Naphthalen-2-ol (β-naphthol)	Essential Essential Essential Essential	1.5 cm ³ 2 g } few crystals
CD7.1	* White cotton cloth (untreated) * Durazol Red 2B * Procion Red MX-5B	Essential Essential Essential	0.2 g
CD7.2	 * White cotton, polyester and nylon, or a multifibre strip * Acid Blue 40 * Direct Red 23 * Disperse Yellow 7 	Essential Essential Essential Essential	0.4 g 0.2 g 0.1 g Enough for 10+ groups

* Current suppliers are listed on the Salters Advanced Chemistry Web Site.

A special safety note

In each activity involving practical work, specific safety hazards are identified in the *list of requirements*. Further details can be found in books on safety, which have been listed on page 11. Nevertheless, you will need to be responsible, as in all laboratory work, for routine safety procedures.

The **Colour by Design** unit involves the use of a number of toxic or harmful chemicals such as phenylamine, naphthalen-2-ol and lead chromate(VI). *These compounds should be used in small quantities only, under strict supervision.*

Students should wear gloves when using dye solutions and should not handle the solid dyes. Technicians making up the dye solutions should use a fume cupboard. Eye protection should be worn as a matter of course whenever carrying out laboratory work.

Storyline: answers to assignments



Chemistry Web Site.)

anhydride and ammonia in the reaction mixture reacted with the iron reaction vessel. This happened