WM9.2

CHECK YOUR KNOWLEDGE AND UNDERSTANDING

This activity helps you to check your knowledge and understanding of the new topics that you have covered in this module.

Introduction

The checklist below covers the key points in **Chemical Storylines WM1** to **WM9**.

The statements listed correspond to learning outcomes in the specification for the A2 examinations. Remember that you will come back to many of these ideas in later modules.

You will probably have made summary notes of the main ideas that you have met. Now is a good time to make sure that your notes cover all the points you need. If you feel that you are not yet able to meet the requirements of all the statements in the list, you should look again at the areas concerned, seek help from your teacher if necessary and develop your notes accordingly.

Most of the points are covered in **Chemical Ideas**, with supporting information in **Chemical Storylines** or the activities. However, if the main source of information is in a storyline or an activity, this is indicated.

What you do

Read and think about each of the statements in the checklist. Put a tick in the column that best represents your current ability to do what is described.

A – I am confident that I can do this
B – I need help to clarify my ideas on this
C – I am not yet able to do this

You will be sharing this information with your teacher so that you can work together to improve your understanding.

At the end of Chemical Storylines WM1 to WM9 you should be able to:	A	B	C
• describe acids in terms of the Brønsted–Lowry theory as proton donors, and bases as proton acceptors, and identify the proton donor and proton acceptor in an acid–base reaction			
• recognise and write formulae for members of the following homologous series: diols, diamines, dicarboxylic acids, phenols, acyl chlorides, acid anhydrides, esters **Activity WM9.1**			
• use systematic nomenclature to name and interpret the names of diols, carboxylic acids, dicarboxylic acids, esters, aldehydes and ketones **Activity WM9.1**			
• describe and explain the acidic nature of carboxylic acids, and their reaction with alkalis and carbonates			
• describe the reaction of alcohols with carboxylic acids in the presence of concentrated sulfuric(VI) acid or concentrated hydrochloric acid to form esters			
• describe the following properties of phenols: – acidic nature, and their reaction with alkalis but not carbonates – test with neutral iron(III) chloride solution to give a purple colouration – reaction with acyl chlorides to form esters **Activity WM3**			
• describe the following reactions involving carbonyl compounds (aldehydes and ketones): – formation of carbonyl compounds by oxidation of alcohols using acidified dichromate, with the need to distil in the case of aldehydes – oxidation of aldehydes to carboxylic acids using acidified dichromate, under reflux – reaction with hydrogen cyanide to form cyanohydrin			
• describe the mechanism of the nucleophilic addition reaction between a carbonyl compound and hydrogen cyanide, using 'curly arrows' and bond polarities **Activity WM2.2**			
• understand that more effective medicines can be obtained by modifying the structure of existing medicines **Chemical Storylines WM6**			
• discuss given examples and understand that combinatorial chemistry is used to make a large number of related compounds together, so that their potential effectiveness as medicines can be assessed by large-scale screening **Activity WM5.2**			

continued

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• understand that most reactions used in chemical synthesis can be classified as: rearrangement, addition, substitution or elimination and be able to classify a given reaction using these terms • understand that a condensation reaction is addition followed by elimination • recall the meaning of the concept 'atom economy' • recall and understand that rearrangement and addition reactions have a higher atom economy than substitution and condensation reactions, which have a higher atom economy than elimination reactions • discuss the importance of 'atom economy' and reaction type in working towards the development of environmentally friendly industrial processes in the production of polymers and medicines **Activity WM5.3**			
• understand that testing a medicine involves clinical trials which answer the following questions about a potential new drug: – Step I – Is it safe? – Step II – Does it work? **Chemical Storylines WM6** – Step III – Is it better than the standard treatment? **Activity WM8**			
• describe the technique of thin-layer chromatography (t.l.c.), including location of spots using iodine or ultraviolet radiation • interpret t.l.c. results in terms of the number of spots and matching spot heights (or R_f values) with known compounds • understand that chromatography can be used for the purification of an organic substance **Activity WM5.1**			
• interpret and predict mass spectra: **Activity WM4** – identify the M+ peak and explain that it indicates the M_r – explain how the molecular formula can be worked out from the high-resolution value of the M+ peak – recall that other peaks are due to positive ions from fragments – recall that the mass differences between peaks indicate the loss of groups of atoms e.g. loss of a methyl group would be indicated by a mass difference of 15 – suggest the origins of peaks: e.g. peaks at masses of 15 and 77 are usually due to the presence of the methyl and phenyl positive ions			
• use information given in the *Data Sheet* to interpret and predict infrared spectra for organic compounds, in terms of the functional group(s) present **Activity WM4** • understand that specific frequencies of infrared radiation make specific bonds vibrate more			

Synoptic statements The following statements describe the knowledge and understanding that you have covered in more detail in earlier modules, but that you have met or used again when studying **What's in a Medicine?** Check that you are confident about these learning outcomes – they may be assessed in the A2 examinations in questions that require you to *apply* your knowledge and understanding from different areas of the subject.	**A**	**B**	**C**
• draw and interpret simple electron 'dot-cross' diagrams to show how atoms bond through ionic, covalent and dative covalent bonds and be able to describe a simple model of metallic bonding **Chemical Ideas 3.1** • use the electron-pair repulsion principle to predict and explain the shapes of simple molecules (e.g. CH_4, NH_3, H_2O, SF_6) with up to six outer pairs of electrons (any combination of bonding and lone pairs) **Chemical Ideas 3.2** • recall the typical physical properties (e.g. melting point, solubility in water, ability to conduct electricity) characteristic of giant lattice (metallic, ionic, covalent network) and simple molecular structure types **Chemical Ideas 5.8**			
• recognise and write formulae for members of homologous series met in the AS course • use systematic nomenclature to name and interpret the names of organic compounds as required in the AS course • recall the reactions of halogenoalkanes (ES), alkenes (PR) and alcohols (PR) **Chemical Ideas 12.1, 12.2, 13.1, 13.2**			
• describe the techniques for heating and purifying volatile liquids: heating under reflux and distillation **Chemical Ideas – Appendix 1**			

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