O6

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 O1** to **O6**.

The statements listed correspond to learning outcomes in the specification for the A2 examinations. Remember that you may come back to some 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 O1 to O6 you should be able to:	A	B	C
• explain the factors (including intermolecular bonds and ion–dipole bonds) determining the relative solubility of a solute in aqueous and non-aqueous solvents and explain the hydration of ions **Activity O2.1**			
• for the following terms: *enthalpy change of solution, lattice enthalpy, enthalpy change of solvation (hydration) of ions*: – explain and use these terms – describe the solution of an ionic solid in terms of an enthalpy cycle involving these terms – use these enthalpy cycles to perform calculations			
• describe acids (in terms of the Brønsted–Lowry theory) as proton donors and bases as proton acceptors and explain and use the terms *conjugate acid* and *conjugate base*			
• explain and use the terms *strong acid, strong base,* writing equations for their ionisation in water **Activity O3.2**			
• explain and use the terms *weak acid* (writing equations for their ionisation in water), *acidity constant* ('dissociation constant') K_a, pK_a			
• explain and use the term *pH* and use given data to calculate the pH of: – strong acids – strong bases, using K_w (value will be given) – weak acids (including calculating any of the terms pH, K_a and concentration from any two others, being aware of the approximations made in using a simple equation)			
• for *buffer solutions* based on solutions of weak acids and their salts: – explain the meaning of the term *buffer* – explain how buffers work (including in everyday applications) – carry out buffer solution calculations			
• explain the hydrogen bonding in water and explain the unusual physical properties of water that arise from it: – anomalous boiling point among hydrides of Group 6 – specific heating capacity – enthalpy change of vaporisation – density change on melting			

continued

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• explain entropy changes in a qualitative manner, interpreting entropy as a measure of the number of ways that molecules and their associated energy quanta can be arranged			
• calculate the entropy change of a reaction given the entropies of reactants and products			
• recall the expressions: $\Delta S_{tot} = \Delta S_{sys} + \Delta S_{surr}$ and $\Delta S_{surr} = -\Delta H/T$ • be able to perform calculations using these expressions • explain the tendency for a reaction to occur in terms of the sign of ΔS_{tot}			

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 **The Oceans**. 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**
• recall the meaning of the term *ionisation enthalpy*, write equations for the successive ionisations of an element and interpret periodic and group trends in the properties of elements in terms of ionisation enthalpy **Chemical Ideas 2.5**			
• recall and explain the relationship between the position of an element in the Periodic Table and the charge on its ions **Chemical Ideas 3.1**			
• recall the names and formulae of NO_3^-, SO_4^{2-}, CO_3^{2-}, OH^-, NH_4^+, HCO_3^-; write formulae for compounds formed between these ions and other given anions and cations **Chemical Ideas 3.1**			
• discuss the global influence of the dissolving of carbon dioxide in water; discuss and explain the benefits and risks associated with various approaches to reducing atmospheric CO_2 levels including: more economical use of fuels, the use of alternative fuels (including hydrogen), capture and storage of CO_2 and increased photosynthesis **Chemical Storylines DF10**			

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