

## Map of the module: The Oceans

This shows the relationship between the Chemical Storylines, 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).

Chemical Ideas references in *italics* are covered in earlier modules and are included in synoptic learning outcomes for this module in the specifications. Emphasis in teaching and learning should be on the **new** (non-italicised) sections of Chemical Ideas. The degree to which revisited Chemical Ideas are studied will depend on the needs of individual students.

| ACTIVITIES  | CHEMICAL STORYLINE                          | CHEMICAL IDEAS   |
|---|---|--|
|   | <b>O1</b> THIRD ROCK FROM THE SUN?          |  |
| <b>O2.1</b> Why do solids dissolve? (P)                       | <b>O2</b> SALT OF THE EARTH                 | <b>2.5</b> <i>Atoms and ions*</i>  |
| <b>O2.2</b> Finding enthalpy changes of solution (P)          |   | <b>3.1</b> <i>Chemical bonding (section on naming and writing the formulae of ions and the compounds they form and how ionic changes relate to position in the Periodic Table)</i> |
| <b>O3</b> The pH scale (P)                                    | <b>O3</b> THE SMELL OF THE SEA!             | <b>5.1</b> Ions and solids in solution<br><b>4.5</b> Energy changes in solution  |
| <b>O4.1</b> Finding out more about weak acids (P)             | <b>O4</b> THE OCEANS – A SAFE CARBON STORE? | <b>8.1</b> <i>Acid–base reactions</i>  |
| <b>O4.2</b> Classifying acid solutions                        |   | <b>8.2</b> Strong and weak acids and pH (section on pH, strong acids and strong bases)   |
| <b>O4.3</b> Investigating buffer solutions (P)                |   | <b>7.1</b> <i>Chemical equilibrium</i><br><b>7.2</b> <i>Equilibria and concentration</i>   |
| <b>O5.1</b> The enthalpy change of vaporisation of water      | <b>O5</b> THE GLOBAL CENTRAL HEATING SYSTEM | <b>8.2</b> Strong and weak acids and pH (section on weak acids)  |
| <b>O5.2</b> Heat-resistant balloons (teacher demonstration)   |   | <b>8.3</b> Buffer solutions  |
| <b>O5.3</b> What crystals form when a solution is cooled? (P) |   | <b>5.4</b> <i>Bonds between molecules: hydrogen bonding</i>  |
| <b>O5.4</b> Ideas about entropy                               |   | <b>5.5</b> Hydrogen bonding and water<br><b>4.3</b> <i>Entropy and direction of change</i>   |
| <b>O6</b> Check your knowledge and understanding              | <b>O6</b> SUMMARY                           | <b>4.4</b> Energy, entropy and equilibrium   |

\* Synoptic learning outcomes also state that students should be able to interpret periodic and group trends in terms of ionisation enthalpies, recall the meaning of ionisation enthalpy and write equations for successive ionisations of an element (**Chemical Ideas 2.5**).