

## IGCSE Chemistry: Acids, Bases and Salts

### Whole unit overview

(Please note: (S) denotes material in the Supplement (Extended syllabus) only)

Learning Outcomes		Suggested Teaching Activities	Resources
8.1	Describe the characteristic properties of acids as reactions with metals, bases, carbonates and effect on litmus.	Test tube experiments linked to the Periodic Table 1 unit.  Opportunity for experiments to show exothermic nature of neutralisation, (section 6.1 Unit 1 Periodic Table 1)	<a href="http://www.shodor.org/">http://www.shodor.org/</a>  (for relevant resources for experiments)
8.1	Describe the characteristic properties of bases as reactions with acids and with ammonium salts and effect on litmus.	Test tube experiments linked to above and heating ammonium salts with hydroxides.  Illustrate by reference to examples of neutralisation e.g. indigestion tablets, treatment of bee and wasp stings, addition of sodium hydroxide to (acidic detergent in) shower gel/washing up liquid/bubble bath (could look at labels of ingredients).	
8.1	Describe neutrality and relative acidity and alkalinity in terms of pH (whole numbers only) measured using Universal Indicator paper.	Students can arrange solutions of varying pHs in terms of increasing acidity / basicity e.g. milk, vinegar, ammonia solution, 'bench' and 'household' chemicals.	

IGCSE Chemistry 0620 Scheme of Work

8.1 (S)	Define acids and bases in terms of proton transfer limited to aqueous solutions.	Can introduce the concept of pH meters (conductivity) to measure pH for advanced students.	
8.1 (S)	Describe the meaning of weak and strong acids and bases.	Link this to proton loss from acids and proton acceptance of bases for dilute mineral acids, ethanoic acid (vinegar), alkali metal hydroxides and aqueous ammonia.	<a href="http://www.science.ubc.ca/">http://www.science.ubc.ca/</a> (home page)
8.2	Classify oxides as either acidic or basic, related to metallic and non-metallic character.	Linked to Unit 1 Periodic Table 1, oxides of sodium, magnesium, carbon, sulphur and phosphorus are all good examples to use.	<a href="http://wine1.sb.fsu.edu/chm1045/notes/Periodic/Metals/Period06.htm">http://wine1.sb.fsu.edu/chm1045/notes/Periodic/Metals/Period06.htm</a>
8.2 (S)	Further classify other oxides as neutral or amphoteric.	As examples use aluminium and zinc for amphoteric oxides and nitrogen(II) oxide and carbon monoxide for neutral oxides.	
13	Describe the manufacture of lime (calcium oxide) from calcium carbonate (limestone) in terms of the chemical reactions involved.	Experiment: heat a limestone chip <u>very</u> strongly for 20 minutes and cool to form calcium oxide on the surface.  Observe reaction of calcium oxide when drops of water are added to make slaked lime (example of exothermic reaction). Test the pH.	Notes on limestone: <a href="http://www.mineralstech.com/limestone.html">http://www.mineralstech.com/limestone.html</a>  Uses of lime/slaked lime to be found in: <a href="http://www.learnthings.co.uk/">http://www.learnthings.co.uk/</a>
8.1	Describe and explain the importance of controlling acidity in soil.	Teach with section 13 below.	

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13	Name some uses of lime and slaked lime as in treating acidic soil and neutralising acidic industrial waste products.	<p>Possible issues to discuss include...</p> <ul style="list-style-type: none"> <li>the importance of lime kilns for hundreds of years in making unfertile land fertile.</li> <li>the environmental effects of large scale limestone quarrying to meet the huge demand.</li> <li>the use of calcium carbonate to remove sulphur dioxide from power station emissions.</li> </ul>	
13	Name the uses of calcium carbonate in the manufacture of iron and cement.	Discuss the importance of lime to the building industry, but that it can be attacked by acids in the rain/air.	
8.3	Describe the preparation, separation and purification of salts as examples of some of the techniques specified in syllabus section 2.2 (b) and the reactions specified in section syllabus section 8.1 (see above).	Experiments should include the preparation of salts such as copper(II) sulphate, magnesium sulphate (filtration method) and sodium or potassium salts (titration method)	Notes on salt preparation in: <a href="http://www.rjclarkson.demon.co.uk/">http://www.rjclarkson.demon.co.uk/</a>
8.3 (S)	Describe the preparation of insoluble salts by precipitation.	Extend the salt preparation to include lead(II) chloride, lead(II) iodide and barium sulphate. (CARE: Pb and Ba compounds are poisonous)	

IGCSE Chemistry 0620 Scheme of Work

8.3 (S)	Suggest a method of making a given salt from suitable starting materials, given appropriate information.	This provides an opportunity for assessed experiments.	
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