



Chemistry Scheme of Learning

Year 9 – Term 4/Unit 4

Intent – Rationale

Pupils build on their knowledge of acid base reactions covered in term 3 and focus on neutralisation, as well as the concept of strong and weak acids. They deepen their understanding of pH and we bring in the mathematical concept of concentration of hydrogen ions using a logarithmic scale. Pupils continue to develop their practical skills and carry out titrations in which they plot a pH curve in order to identify the point of neutralisation in an acid-base reaction, as well as preparing a soluble salt using an acid-base reaction (required practical 1)

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
<ul style="list-style-type: none"> <li>Year 7 Chemistry Topic 3 Acids and Alkalis. Pupils learn about the pH scale and the difference between acids and alkalis, as well as dilute and concentrated acids. Pupils observe a demo titration</li> <li>Year 8 Topic 9 Reactions of Acids. Pupils learn how to prepare a soluble salt from an insoluble substance and they prepare a sample of copper sulphate. They are also introduced to the neutralisation ionic equation and have to know what ions are produced by acids and alkalis</li> </ul>	<ul style="list-style-type: none"> <li>Topic 7 Organic Chemistry in term 1 in Year 11 GCSE Chemistry in which pupils study carboxylic acids which are weak acids</li> <li>Topic 3 Quantitative Chemistry in term 2 and 3 of Year 10. Pupils revisit these exact same practical techniques in the context of chemical calculations. For soluble salts they have to determine and explain which reagent is the limiting reagent, and for titrations they have to calculate unknown concentrations using this technique</li> <li>Topic 10 Using Resources in term 4 and 5 of Year 11. Pupils have to make a fertiliser using a titration method to exactly neutralise ammonia solution to make an ammonium salt</li> <li>Topic 3.1.2 in Term 1 Year 12 A level Chemistry for the Amount of Substance topic. Pupils revisit calculating concentrations and titrations are one of the required practical skills for their practical endorsement.</li> <li>Topic 3.1.12 in Term 3 Year 13 A level Chemistry for the Acids and Bases topic in which pupils must be able to calculate the pH of strong and weak acids and strong bases</li> </ul>
What are the links with other subjects in the curriculum?	What are the links to SMSC, British Values and Careers?
<ul style="list-style-type: none"> <li>Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work</li> </ul>	<ul style="list-style-type: none"> <li>Uses acids and bases in everyday life</li> <li>Use of titrations in different careers</li> <li>Manufacture of soluble salts in industry</li> </ul>
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?
<p>FROM THE LIBRARY</p> <p><i>Chemicals in Action: Acids and Bases</i>; Chris Oxlade-546.24</p> <p><i>Chemicals in Action</i>; Ann Fullick-540</p> <p><i>Elephants on Acid and Other Bizarre Experiments</i>; Alex Boese-500</p>	<ul style="list-style-type: none"> <li>Calculating concentrations</li> <li>Logarithms</li> <li>Standard form</li> <li>Graph plotting</li> </ul>



## Biology Scheme of Learning

### Year 9 – Term 4

#### Intent – Concepts

#### What knowledge will students gain and what skills will they develop as a consequence of this topic?

##### Know

- Know that soluble salts can be made from acids by reacting them with solid insoluble substances, such as metals, metal oxides, hydroxides or carbonates.
- Know that acids produce hydrogen ions (H<sup>+</sup>) in aqueous solutions
- Describe the use of universal indicator or a wide range indicator to measure the approximate pH of a solution
- Describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately.

##### Apply

- Describe how to make pure, dry samples of named soluble salts from information provided.
- Use the pH scale to identify acidic or alkaline solutions
- Explain that a strong acid is completely ionised in aqueous solution and I can give examples of strong acids (hydrochloric, nitric and sulfuric acids). Explain that a weak acid is only partially ionised in aqueous solution and I can give examples of weak acids (ethanoic, citric and carbonic acids).
- Know for a given concentration of aqueous solutions, the stronger an acid, the lower the pH.

##### Extend

- I know that the solid is added to the acid until no more reacts and the excess solid is filtered off to produce a solution of the salt
- Use and explain the terms dilute and concentrated (in terms of amount of substance), and weak and strong (in terms of the degree of ionisation) in relation to acids
- Describe neutrality and relative acidity in terms of the effect on hydrogen ion concentration and the numerical value of pH (whole numbers only). Write ionic equations to represent neutralisation reactions
- Know that as the pH decreases by one unit, the hydrogen ion concentration of the solution increases by a factor of 10 and use this information to calculate pH values or hydrogen ion concentration

#### What subject specific language will be used and developed in this topic?

#### What opportunities are available for assessing the progress of students?

<u>Word</u>	<u>Definition</u>
<b>Salt</b>	A compound formed when the hydrogen in an acid is replaced by a metal
<b>Neutralisation</b>	The chemical reaction of an acid with a base in which salt and water are formed. If the base is a carbonate CO <sub>2</sub> is also produced
<b>Soluble</b>	Can dissolve
<b>Filtration</b>	A method of separating mixtures which separates solids from liquids/solutions
<b>Filtrate</b>	The liquid/solution collected after removing the solid
<b>Crystallisation</b>	Forming solid crystals from a salt solution.
<b>Acids</b>	When dissolved in water the solution has a pH below 7. They are H <sup>+</sup> donors
<b>Alkalis</b>	A solution that has a pH above 7



<b>pH</b>	A number that tells you how acidic or alkaline a solution is. It tells you the concentration of H <sup>+</sup> in a solution		
<b>Titration</b>	A method for measuring the volumes of two solutions reacting together		
<b>Ionised</b>	When an ionic compound separates into separate ions in solution		
<b>Strong Acid</b>	An acid which fully ionises in a solution, producing many H <sup>+</sup>		
<b>Weak Acid</b>	An acid which partially ionises in a solution, not producing many H <sup>+</sup>		
<b>Concentration</b>	The amount of particles in a solution compared to the volume of water		



Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
<b>Preparing a soluble salt</b>	<p>Do I know that soluble salts can be made from acids by reacting them with solid insoluble substances, such as metals, metal oxides, hydroxides or carbonates?</p> <p>Can I describe how to prepare these salts?</p>	<p>Do I know that the solid is added to the acid until no more reacts and the excess solid is filtered off to produce a solution of the salt?</p> <p>Can I prepare a soluble salt from an insoluble substance?</p>	
<b>Neutralisation</b>	<p>Do I know that acids produce hydrogen ions (H<sup>+</sup>) in aqueous solutions?</p> <p>Can I describe the use of universal indicator or a wide</p>	<p>Can I write ionic equations to represent neutralisation reactions?</p>	



	<p>range indicator to measure the approximate pH of a solution?</p> <p>Can I use the pH scale to identify acidic or alkaline solutions?</p>		
<b>pH curves</b>	<p>Can I describe how to carry out titrations using strong acids and strong alkalis only (sulfuric, hydrochloric and nitric acids only) to find the reacting volumes accurately?</p>	<p>Can I successfully carry out a titration and plot a pH curve?</p> <p>Can I describe and explain the shape of the pH curve?</p>	
<b>Strong and weak acids</b>	<p>Can I explain the difference between strong and weak acids based on</p>	<p>Can I use and explain the terms dilute and concentrated (in terms of amount of substance),</p>	



	<p>whether they fully or partially ionise in solution?</p> <p>Do I know that for a given concentration of aqueous solutions, the stronger an acid, the lower the pH?</p>	<p>and weak and strong (in terms of the degree of ionisation) in relation to acids?</p> <p>Do I know that as the pH decreases by one unit, the hydrogen ion concentration of the solution increases by a factor of 10 and can I use this information to calculate pH values or hydrogen ion concentration?</p>	
<b>Revision</b>			
<b>Topic 4 Assessment 3</b>	Summative Assessment		
<b>Revision of previous topic for</b>			



Year 9 assessment			
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