Science Autumn Term 1 – Chemistry: Acids and Alkalis (C8)

Section A: Vocabulary

Tier 3 Vocabulary

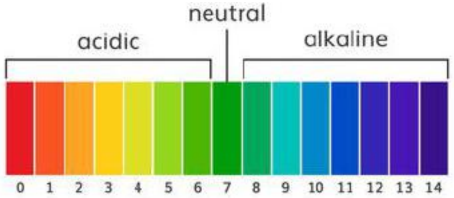
acid	A solution with a pH of less than 7 and that contains an excess of hydrogen (H^+) ions.
alkali	A solution with a pH of more than 7 and that contains an excess of hydroxide (OH^-) ions.
base	Any substance, soluble or insoluble, that neutralises an acid, forming a salt and water only.
aqueous solution	A solution with water as the solvent.
concentration	A measure of how much solute is dissolved in a solvent such as water. (Units g dm^{-3} or mol.dm^{-3})
indicator	A substance that changes colour depending on the pH of a solution.
neutral	A substance that is neither an acid nor an alkali. Neutral solutions have a pH of 7 and the same concentrations of hydrogen (H^+) and (OH^-) ions.
strong acid	An acidic solute that dissociates completely into ions when it dissolves.
weak acid	An acidic solute that does not dissociate completely into ions when it dissolves.
oxidation	A reaction in which a substance gains oxygen or in which an atom or ion loses electrons.
reduction	A reaction in which a substance loses oxygen or in which an atom or ion gains electrons.

Tier 2 Vocabulary

effervescence	Fizzing / bubbles produced during a reaction.
crystallisation	The process of forming crystals.
filter (verb)	To remove or separate a solid from a liquid by passing the mixture through a porous material.

Section B: Indicators and pH

Universal Indicator is a mixture of indicators, designed to give a range of colours that can tell us the approximate pH of a chemical. This is a measure of how strong or weak the acid/alkali is:



A digital pH meter can give a more accurate value for the pH of a solution. This is because it has a greater ***resolution*** – meaning it can record pH to a higher degree of accuracy (one or even two decimal places).

Higher Tier Only

pH	0		1		2		3		4		5		6		7
difference in concentration of H^+ ions		× 10		× 10		× 10		× 10		× 10		× 10		× 10	

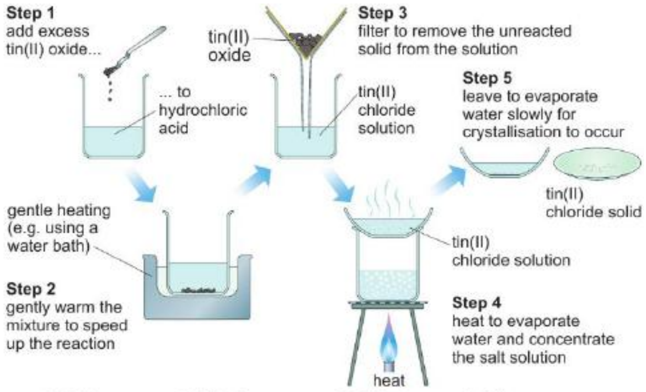
The pH of a chemical is determined by the concentration of ions dissolved in it. The table above shows how the concentration of ions change for different pH values for acids.

Other indicators do not give a range of colours – they have one colour with acids and a different colour with alkalis:

indicator	litmus	methyl orange	phenolphthalein
colour in alkaline solutions	blue	yellow	pink
colour in acidic solutions	red	red	colourless

Section C: Core Practical Tasks

Preparing Soluble Salts



$SnO(s) + 2HCl(aq) \rightarrow SnCl_2(aq) + H_2O(l)$

tin(II) oxide + hydrochloric acid → tin(II) chloride + water

Investigating Neutralisation

Method

Wear eye protection.

A Use a measuring cylinder to add 50 cm^3 of dilute hydrochloric acid to a beaker.

B Estimate and record the pH of the contents of the beaker.

- Put a piece of universal indicator paper onto a white tile.
- Dip the end of a glass rod into the liquid, then tap it onto the universal indicator paper.
- Wait 30 seconds, then match the colour to the appropriate pH on a pH colour chart.
- Rinse the glass rod with water.

C Measure out 0.3 g of calcium hydroxide powder onto a piece of paper or a 'weighing boat'.

D Add the calcium hydroxide powder to the beaker and stir. Then estimate and record the pH of the mixture.

E Repeat steps B and C seven times so that you add a total of 2.4 g of calcium hydroxide powder to the acid.

F Plot a graph with pH on the vertical axis and mass of calcium hydroxide on the horizontal axis.