Subject	Year	Term
Chemistry	13	3

Topic

5.1.3 Acids,Bases and Buffers

Content (Intent)

Prior Learning (Topic) GCSE: C6. Year 12: 1.1, 1.2, 2.1, 3.2.1 Enthalpy changes, 3.2.3 Equilibrium and 5.1.2 How Far?

Brønsted–Lowry acids and bases

(a) (i) a Brønsted–Lowry acid as a species that donates a proton and a Brønsted–Lowry base as a species that accepts a proton**(see also 2.1.4 Acids)**
(ii) use of the term conjugate acid–base pairs
(iii) monobasic, dibasic and tribasic acids

(b) the role of H+ in the reactions of acids with metals and bases (including carbonates, metal oxides and alkalis), using ionic equations **(see also 2.1.4 c, 2.1.5 e)**

(c) (i) the acid dissociation constant, Ka, for the extent of acid dissociation **(see also 2.1.4 b)**
(ii) the relationship between Ka and pKa pH and [H+(aq)]

(d) use of the expression for pH as:

$pH = -\log[H^+]$

$[H^+] = 10^{-pH}$

(e) use of the expression for the ionic product of water, Kw

(f) calculations of pH, or related quantities, for:
(i) strong monobasic acids
(ii) strong bases, using Kw

(g) calculations of pH, Ka or related quantities, for a weak monobasic acid using approximations

(h) limitations of using approximations to Ka related calculations for 'stronger' weak acids

Buffers: action, uses and calculations

(i) a buffer solution as a system that minimises pH changes on addition of small amounts of an acid or a base

(j) formation of a buffer solution from:
(i) a weak acid and a salt of the weak acid, e.g., CH_3COOH/CH_3COONa
(ii) excess of a weak acid and a strong alkali, e.g., excess $CH_3COOH/NaOH$

(k) explanation of the role of the conjugate acid–base pair in an acid buffer solution, e.g., CH_3COOH/CH_3COO^-, in the control of pH

(l) calculation of the pH of a buffer solution, from the Ka value of a weak acid and the equilibrium concentrations of the conjugate acid–base pair; calculations of related quantities

(m) explanation of the control of blood pH by the carbonic acid–hydrogen carbonate buffer system

Neutralisation

(n) pH titration curves for combinations of strong and weak acids with strong and weak bases, including:
(i) sketch and interpretation of their shapes
(ii) explanation of the choice of suitable indicators, given the pH range of the indicator
(iii) explanation of indicator colour changes in terms of equilibrium shift between the HA and A^- forms of the indicator

(o) the techniques and procedures used when measuring pH with a pH meter.

Future Learning (Topic) 5.2.3 Electrode potentials

How will knowledge and skills be taught? (Implementation)	How will your understanding be assessed & recorded (Impact)

Practical work Investigating buffer solutions PAG 11 Titration curves **Written** Presentations Worked through examples Past paper question examples and answers. Definitions given for acids and bases Explanation of how to identify conjugate acid-base pairs Explanation of how to calculate a pH. Explanation of how to calculate quantities present at equilibrium. Explanation of how a buffer works and is made. Including the blood pH buffer. Explanations of how to carry out calculations involving buffers, weak acids and strong base. Explanation of how to construct and draw a pH titration curve Explanation of how to choose an indicator and how an indicator changes colour Modelled answers with key terms.	- 1 x standard homework (Level given. Written feedback. Response expected.) -1 x end of topic test (Level given. Verbal feedback to class and individuals.) PAG 11 Titration curves

How can parents help at home?

Look at the topic specific resources on the VLE
Use appropriate websites: MachemGuy, Allery Chemistry, Chemistry World – by Royal Society of Chemistry, ChemGuide.
Take an interest! Ask your children what they have learnt and be curious about their learning.

Helpful further reading/discussion

Reading	**Vocabulary Lists**	**Careers Links**
Text book: A level chemistry for OCR by Rob Ritchie and Dave Gent. Chapter 20 and 21 p.332-346 The Science of Everyday Life by Marty Jopson Why Chemical Reactions Happen by Keeler and Wothers	Brønsted–Lowry acid Brønsted–Lowry base Proton donor Proton acceptor Conjugate acid–base pairs Monobasic, dibasic and tribasic acid Dissociation constant Strong/weak acid or base Buffer Indicator Titration curve	Medicine Veterinary science Material science Biomedical sciences Environmental science Toxicologist Pharmacist Dentist

	pH	