**22 Quantitative equilibria**

**Topic summary**

**•**  In dilute aqueous solution, [H2O] is a constant, 55.5 mol dm−3.

**•**  For a weak acid, HA, its degree of ionisation may be calculated using the formula:

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**•**  In aqueous solution, the product [H+][OH−] is a constant, the **ionic product of water**, *K*w, whose value is 1.0 × 10−14 mol2 dm−6 at room temperature.

**•**  **pH** = −log10[H+]

**•**  For a strong acid or base, [H+] or [OH−] = *c*, where *c* is the concentration of the acid or base.

**•**  For a weak acid, [H+] = √(*K*a × *c*).

**•**  A **buffer solution** is one that resists changes in pH on the addition of small quantities of acids or bases.

**•**  A buffer solution is usually a mixture of a weak acid and the salt of that weak acid. The pH of the buffer solution can be found using the formula:

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**•**  When an acid is titrated with a base, there is a rapid change in pH at the equivalence point. An appropriate **indicator** can be used to find this equivalence point.

**•**  When a solid salt M+X− is in equilibrium with its saturated solution, the product [M+][X−] is a constant, the **solubility product**, *K*sp.

**•**  If either excess M+ ions or X− ions are added, the solubility of the salt decreases; this is called the **common ion effect**.

**•**  When a substance X dissolves in two immiscible liquids A and B, the ratio:

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    is a constant; this constant is called the **partition coefficient**.