

# [A2 chemistry definitions](https://assignbuster.com/a2-chemistry-definitions/)

-1A2 CHEMISTRY MODULE 4 definitions (aqa) Rate of Reaction The rate of change of concentration with time (mathematically d[X]/dt). Units are mol. dm-3. s-1 (moles per cubic decimetre per second) Initial Rate This is the rate at the very beginning of the reaction when all the starting concentrations are known exactly. Rate Equation Rate Expression A mathematical expression which relates the rate to the concentrations of substances involved in the reaction Rate Constant, k This is the multiplying constant in the rate equation, e. g., Rate = k [A].[B]2 It has a constant numerical value as long as temperature does not change. Rate constants increase as temperature increases. Order of Reaction This is the numerical power to which the concentration of a substance is raised in the rate equation. The overall order is the sum of all the individual powers, e. g., Rate = k [A].[B]2 is 1st order with respect to A, 2nd order with respect to B and 3rd order overall Homogeneous system A chemical system where all components in the mixture are in the same phase, e. g., all liquids or all gases Heterogeneous system A chemical system where components in the mixture are in different phases. Equilibrium Constant, KC This is the ratio of the product concentrations raised to the powers of their respective stoichiometric coefficients to the reactant concentrations raised to the powers of their respective stoichiometric coefficients. Stoichiometric coefficients are the balancing numbers in the chemical equation. Concentrations must be in units of mol. dm-3 The numerical value of KC changes only with temperature. Equilibrium Constant, KP This is similar to KC, except that partial pressures are used instead of concentrations. This applies only for gases (since vapour pressures of solids and liquids are negligible compared to gases). The numerical value of KP changes only with temperature. Partial Pressure The sum of the individual partial pressures of gaseous components in a mixture of gases equals the total pressure. Each gas exerts the same pressure as it would if it occupied the whole volume by itself. If the total pressure is known, the partial pressure of a component is the total pressure multiplied by its mole fraction: pA = PT Ã— xA Mole fraction This is the number of moles of a component divided by the total number of moles in the mixture, e. g., xA = nA / ntotal BrÃ¸nsted Acid A proton (H+) donor — a strong acid is one which is completely dissociated into ions (easily donates protons) BrÃ¸nsted Base A proton acceptor Conjugate Base The “ other half" of the acid after the H+ has been donated, e. g., A- for acid HA (HA and A- are known as a conjugate acid-base pair). A strong acid has a weak conjugate base and vice versa. Conjugate Acid The species formed when a base has accepted a proton, e. g., BH+ for base B pH This is defined as pH = -log10 [H+(aq)] Ionic Product of Water, Kw Pure water dissociates slightly into H+ and OH- ions. Kw = [H+] Ã— [OH-] and has the value 1 Ã— 10-14 mol2. dm-6 at 25OC pKw pKw = -log10 Kw = 14 Acid Dissociation Constant, Ka For an acid HA(aq) Ã› H+(aq) + A-(aq) then Ka = [H+(aq)] Ã— [A-(aq)] / [HA(aq)] Units are mol. dm-3 pKa This is -log10 Ka and so Ka = 10-pKa Indicator Often a weak acid, the associated acid and its conjugate base have different colours, so respond to different pH values pKin For an indicator HIn(aq) l H+(aq) + In-(aq) then Kin = [H+(aq)] Ã— [In-(aq)] / [HIn(aq)] and pKin = -log10 Kin When [In-(aq)] = [HIn(aq)] the colour is intermediate between the two colours and at pH = pKin Effectively, pKin tells you the pH value where the indicator is at its mid colour point. Indicator range This is the pH range over which the indicator changes colour. A guide is to use pKin ± 1. The ideal choice of indicator for a titration is one which has a pKin value at the equivalence point. Equivalence point This is the point (pH) at which stoichiometric amounts (equivalent moles) of acid and alkali have reacted exactly with each other. It is the mid point of the vertical section of the pH curve and is not always 7. It is only at pH 7 for a strong acid-strong base titration. It is > 7 for a weak acid-strong base and