

Definitions and Concepts for Edexcel Chemistry A-level

Topic 16: Kinetics 2

Rate of reaction: Change in concentration (amount) of a substance per unit time. Normal units are $\text{mol dm}^{-3} \text{ s}^{-1}$.

Rate equation: Describes the relationship between the rate of chemical reaction and the concentrations/pressures of reagents. Includes the *rate constant*.

Rate constant: relates the rate of a chemical reaction at a given temperature to the product of the concentrations of reactants.

Order w.r.t. a reagent: Tells you how the reactant's concentration will affect the rate of reaction. In the rate equation, it is the appropriate power to which the concentration of the reagent is raised.

e.g. rate = k [A]²[B]; in this example, the reaction is 1st order w.r.t B, and 2nd order w.r.t A. The overall order is therefore 3. increasing the concentration of B by a factor of 2 will increase the rate the same factor. However, increasing the concentration of A by 3 will increase the rate by a factor of 3² = 9.

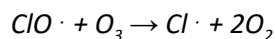
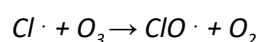
Overall order of reaction: Sum of all the individual orders of all the reactants in a chemical reaction.

Half-life: Time taken for the initial amount of reactant to decrease by half. Constant for 1st order reactions.

Rate determining step (RDS): The slowest step in a multi-step reaction. Overall rate is decided by this step - species occurring in the RDS will also occur in the rate equation.

Instantaneous rate: A rate found by drawing the tangent to the line of "concentration vs. time" graph and calculating the gradient of said tangent.

CFC's: Chlorofluorocarbons. These compounds contribute to the depletion of ozone layer. UV light can break down the C-Cl bond within a CFC and form a chlorine radical. This can then participate in the following process, hence breaking down the ozone layer:



Note that the Cl radical is regenerated. It acts as catalyst for this process.

A: the pre-exponential factor occurring in the Arrhenius equation. Measures the rate at which collisions between molecules happen without regard to their energies. Also provides a correction to the equation for the fact that a successful collision requires correct approach and orientation of the molecules.

Colorimeter: A device for measuring the absorbance.

Absorbance: Amount of light absorbed by the solution.

