

# 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]<sup>2</sup>[B]; in this example, the reaction is 1<sup>st</sup> order w.r.t B, and 2<sup>nd</sup> 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 3<sup>2</sup> = 9.*

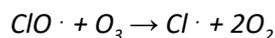
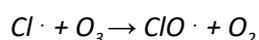
**Overall order of reaction:** Sum of all the individual orders of all the reactants in a chemical reaction.

**Half-life:** Time taken for the initial amount of reactant to decrease by half. Constant for 1<sup>st</sup> 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.

