How Fast?

The key areas of study in this topic are:

- Rate equations, rate constants, orders of reaction and the rate-determining step

By the end of this topic I should be able to:	Start	End
Define and use the following terms: *rate of reaction* *order* *overall order* *rate constant* *half-life* *rate-determining step*		
Deduce: • orders from experimental data • a rate equation from orders of the form: rate = $k[A]^m[B]^n$, where m and n are 0, 1 or 2		
Calculate the rate constant, k, and related quantities, from a rate equation and determine its units		
Deduce the order (0 or 1) with respect to a reactant from the shape of a concentration–time graph		
Calculate reaction rates from the measurement of gradients of a concentration–time graph		
Measure the constant half-life, $t_{½}$, from a concentration–time graph of a first order reaction		
Determine the rate constant, k, from the constant half-life, t1/2, for a first order reaction using the relationship: $k = \ln 2 / t_{½}$		
From a rate–concentration graph: • deduce the order (0, 1 or 2) with respect to a reactant from the shape of the graph • determine the rate constant for a first order reaction from the gradient		
Understand the techniques and procedures used to investigate reaction rates by the initial rates method and by continuous monitoring, including use of colorimetry		
For a multi-step reaction, predict: • a rate equation that is consistent with the rate-determining step • possible steps in a reaction mechanism from the rate equation and the balanced equation for the overall reaction		
Explain qualitatively the effect of temperature change on the rate of a reaction and hence the rate constant		
Understand the exponential relationship between the rate constant, k and temperature, T given by the Arrhenius equation, $k = Ae^{-Ea/RT}$		
Determine Ea and A graphically using: $\ln k = -Ea/RT + \ln A$ derived from the Arrhenius equation.		

In all topic areas you should be able to demonstrate and apply your knowledge and understanding.