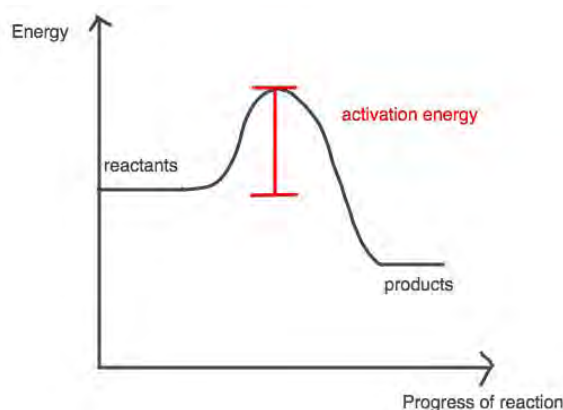


Definitions and Concepts for Edexcel Chemistry A-level

Topic 9: Kinetics 1

Activation energy (E_a): Minimum amount of kinetic energy the particles need to react.



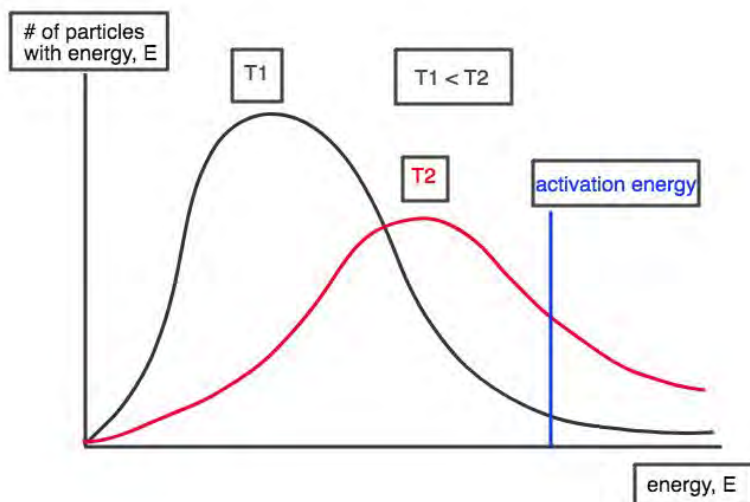
Catalyst: a substance that provides an alternative reaction route of lower activation energy and hence speeds up the reaction. It is chemically unchanged at the end of the process.

Heterogeneous catalyst: Catalyst that is in a different phase from the reactants (i.e. different physical state). Used in gas phase reactions to provide a surface for the reaction, e.g. hydrogenation of alkenes (gaseous substrates) is catalysed by a transition metal (a solid).

Homogeneous catalyst: Catalyst in the same physical state as reactants. Usually aqueous, e.g. acid-catalysed esterification.

Maxwell-Boltzmann distribution: A distribution of energy among the molecules of a gas in a closed system. The area under the graph indicates the number of particles. The situation below depicts the effect of increasing temperature on the distribution of molecular energies. At higher temperatures, the average energy increases (note how the maximum of the curve shifted between T_1 and T_2). There is also a higher proportion of molecules with energy equal to or greater than activation energy (note the area under the graph to the right of "activation energy" line). Graph starts at (0,0) - no molecules have zero energy!





Factors affecting the rate of a chemical reaction: catalyst (see above), surface area (greater surface area increases the number of successful collisions, i.e. powdered metal reacts faster with acid than a block of metal), temperature (see above), pressure/volume applied to gas phase reactions (greater the pressure/smaller the volume, the greater number of collisions), concentration (more concentrated = more successful collisions).

