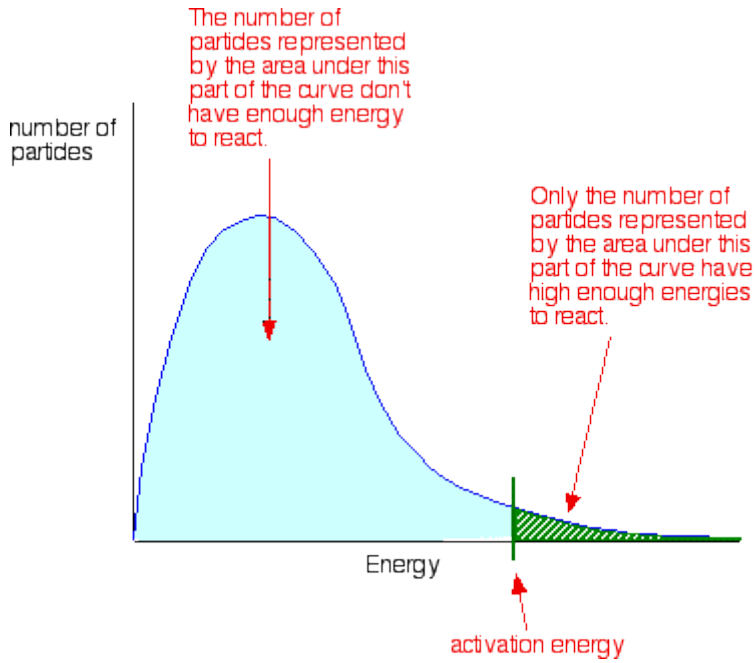
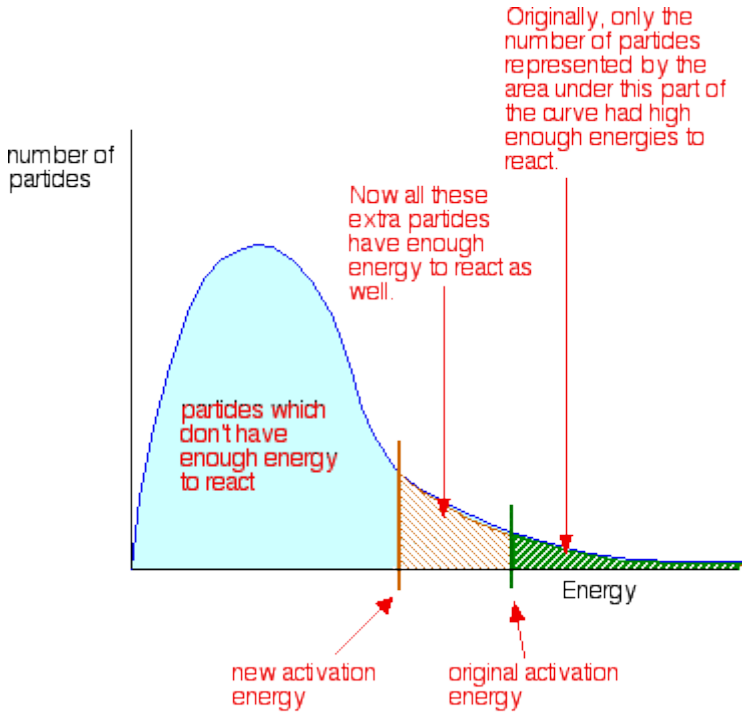
The importance of activation energy

Collisions only result in a reaction if the particles collide with a certain minimum energy called the activation energy for the reaction. The position of activation energy can be determined from a on a Maxwell-Boltzmann distribution:



Only those particles represented by the area to the right of the activation energy will react when they collide. The majority do not have enough energy, and will simply bounce apart.

To increase the rate of a reaction, the number of successful collisions must be increased. One possible way of doing this is to provide an alternative way for the reaction to happen which has a lower activation energy. In other words, to move the activation energy to the left on the graph:



Adding a catalyst has this effect on activation energy. A catalyst provides an alternative route for the reaction with a lower activation energy. This is illustrated on the following energy profile: