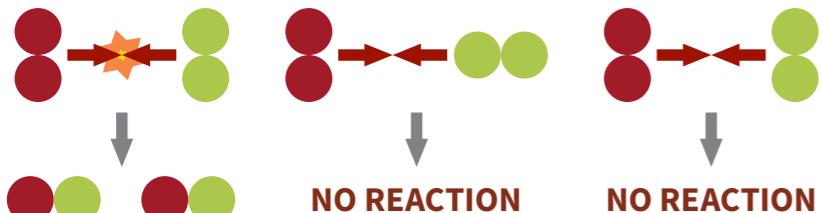


MAKING CHEMICAL REACTIONS HAPPEN FASTER

There are a number of different things that we can change to make a chemical reaction faster. Here, we explain the concept of collision theory, and how it can be used to explain the effects of five different factors on the rate of a chemical reaction.

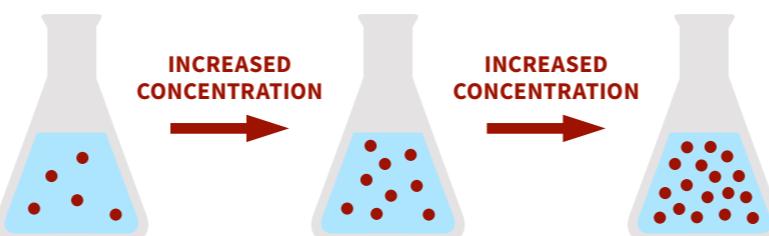
COLLISION THEORY



**CORRECT ORIENTATION
SUFFICIENT ENERGY** **WRONG ORIENTATION** **INSUFFICIENT ENERGY**

Collision theory states that, for a reaction to occur, particles must collide with the correct orientation and with sufficient energy for a reaction to occur. Different factors affect the rate of the reaction by affecting the frequency of particle collisions, and/or the proportion of collisions that have enough energy to react.

INCREASE CONCENTRATION OF REACTANTS

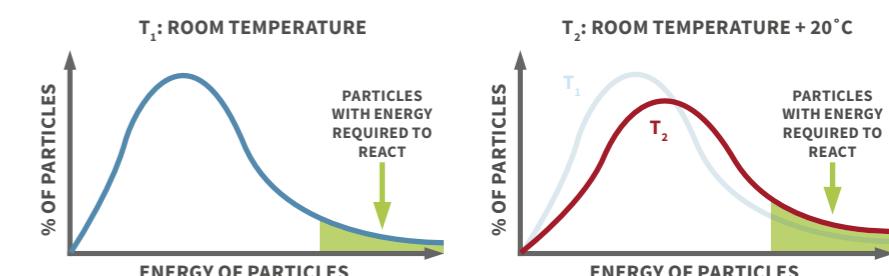


**↑ FREQUENCY OF
COLLISIONS**

**- % SUCCESSFUL
COLLISIONS**

Increasing the concentration of reactants in solution increases the rate of reaction as there are a greater number of particles available to react. This increases the frequency of collisions between particles.

INCREASE TEMPERATURE OF REACTION

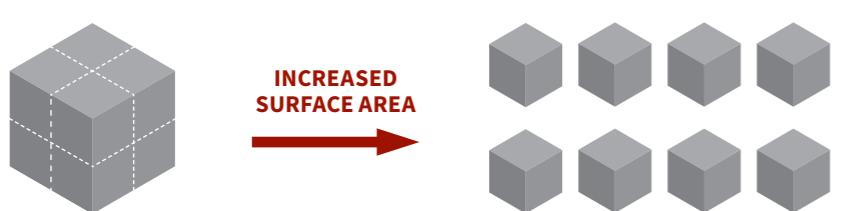


**↑ FREQUENCY OF
COLLISIONS**

**↑ % SUCCESSFUL
COLLISIONS**

Increasing the temperature increases the kinetic energy of particles. This increases the frequency of particle collisions, and a greater proportion of collisions will have the energy required to react.

INCREASE SURFACE AREA OF REACTANTS

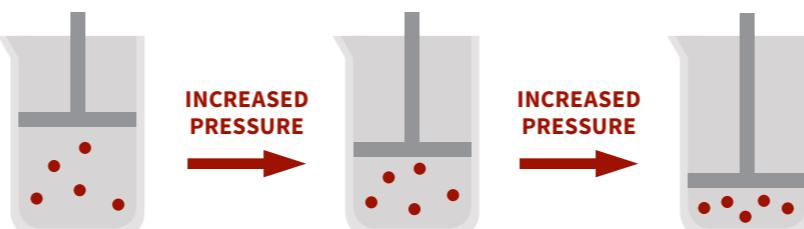


**↑ FREQUENCY OF
COLLISIONS**

**- % SUCCESSFUL
COLLISIONS**

Increasing the surface area of solid reactants increases the number of particles that are exposed and available to react, and as a consequence this increases the frequency of particle collisions, increasing rate.

INCREASE PRESSURE OF REACTION

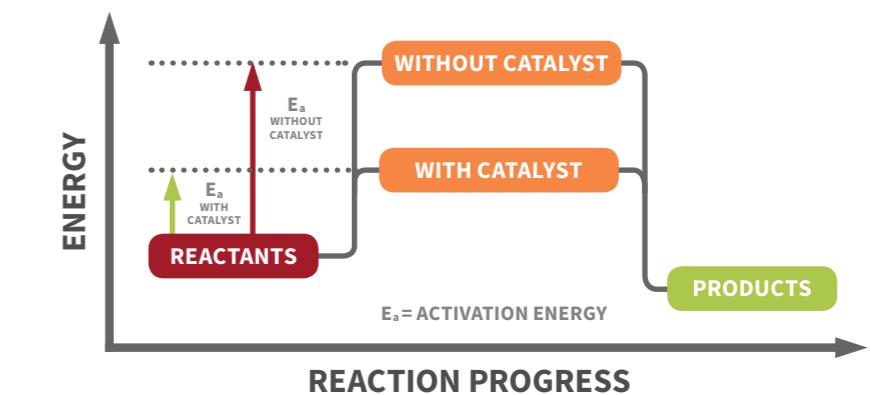


**↑ FREQUENCY OF
COLLISIONS**

**- % SUCCESSFUL
COLLISIONS**

Increasing the pressure of a reaction involving gases forces the gas particles closer together. This will increase the frequency of particle collisions, and therefore increase the rate of reaction.

USE A CATALYST IN THE REACTION



A catalyst provides an alternative route for the reaction, with a lower activation energy. This means that particle collisions need less energy in order for a reaction to occur, increasing the rate of the reaction.

