

## Rates of Reaction

Collision theory...

- Particles can only react if they **collide** with enough **energy**
- The energy requirement is called the **activation energy**
- If you increase the **frequency of successful collisions**, you increase the **rate**

If you increase the **temperature**...

- At higher temperatures, particles have more **kinetic energy** and **move faster**
- **AND** more particles have **activation energy**
- There are more frequent successful collisions
- Therefore rate increases

If you increase the **concentration**...

- There are **more particles** in the **same volume** OR particles are **closer together**
- The frequency of **successful collisions** increases
- Therefore **rate** of reaction also **increases**

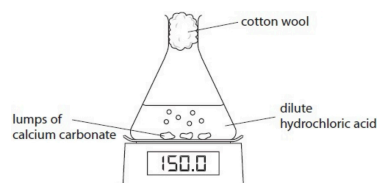
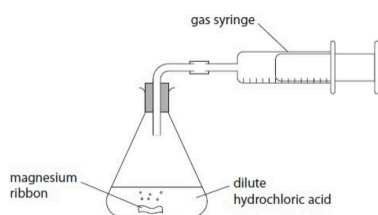
If you increase the **surface area**...

- The **frequency of successful collisions increases**
- Therefore rate of reaction also **increases**

A catalyst...

- Increases the rate of reaction (1) without being used up itself (1) OR while remaining chemically unchanged (1)
- Works by providing an alternative route (1) with a lower activation energy (1)

## Measuring Rates



## Rate Graphs

