

# Homeostasis

## Threshold Concept

Homeostasis is organisms maintaining a constant internal environment

## The nervous system:

- The central nervous system (CNS) - the brain and spinal cord.



- The peripheral nervous system - nerve cells that carry information to or from the CNS.

## Keywords

- **Nerves:** Specialised cells which carry electrical impulses
- **Hormones:** Chemical messenger produced in glands and carried by the blood to specific organs in the body.
- **Organism:** Living things that are capable of reacting to stimuli, reproduction, growth, and homeostasis.
- **Regulate:** control or maintain the rate or speed of a process so that it operates properly.
- **Response:** as a result of the stimulus that is detected by the receptor a response is caused

## Synapse:



## Body controls:

Homeostasis maintains optimal conditions for enzyme action throughout the body, as well as all cell functions.

In the human body these include the control of:

1. Blood glucose concentration
2. Body temperature
3. Water levels

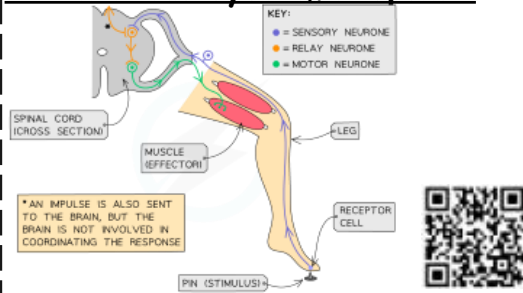


## The menstrual cycle

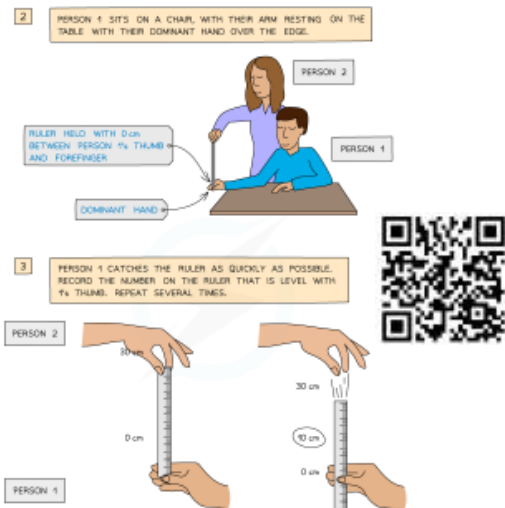
1. The menstrual cycle is the reproductive cycle in women, which starts with a period (menstruation), if the woman is not pregnant.
2. There are four hormones involved: follicle stimulating hormone, luteinising hormone, oestrogen & progesterone.
3. FSH (released by the pituitary gland) causes eggs to mature in the ovaries.
4. FSH stimulates ovaries to produce oestrogen.
5. Oestrogen inhibits further release of FSH and stimulates release of LH.
6. LH (released by the pituitary gland) stimulates the release of an egg (ovulation) from an ovary.
5. LH stimulates secretion of progesterone by the empty follicle.
6. Progesterone inhibits the release of LH and FSH.
7. Oestrogen and progesterone maintain the lining of the uterus.



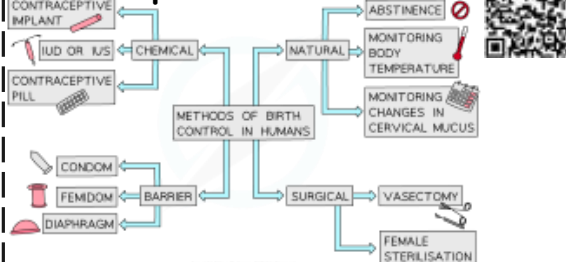
## The nervous system response:



## Required practical: Reaction time



## Contraception:



## Equations for this topic

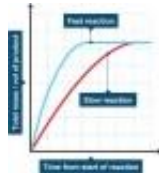
# Rates of Reaction

## Threshold Concept

All particles must collide with a minimum amount of energy in order to react

## Rate of reaction

Rate of reaction is how fast reactants are changed into products



## Collision theory and activation energy

The rate of reaction is directly proportional to the number of successful collisions.

- **To react:** particles must first **collide**
- with enough **activation energy** to be successful.

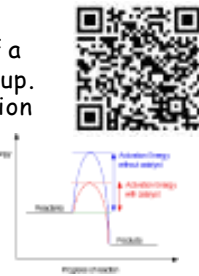


## Keywords

- Particle** - A particle is the smallest possible unit of matter
- Energy** - Energy is what holds the atoms in a molecule together
- Collision** - If the two molecules A and B are to react, they must get close enough to break and make the new bonds that are needed in the products
- Reactant** - A substance put into a chemical reaction
- Product** - A substance made in a chemical reaction

## Catalysts

- Catalysts: increase the rate of a reaction without getting used up.
- Catalysts decrease the activation energy required to begin the reaction.
- Catalysts are often used in industry to speed up chemical processes.



## Factors affecting rate of reaction

### Effect of Temperature:

- Increasing the temperature increases the speed that particles are moving
- This means there are more frequent collisions, and those collisions have more energy



Video of all

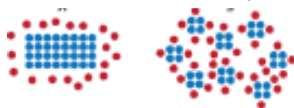
### Effect of Concentration:

- Increasing concentration increases the number of reacting particles.
- This increases the frequency of collisions



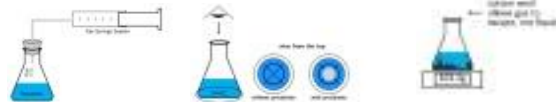
### Effect of Surface Area:

- Increasing the surface area increases the proportion of (solid) particles available to react.
- This increases the frequency of collisions.



## Measuring rate of reaction

- There are various ways to measure quantity of reactant used or quantity of product formed. Measuring the volume of gas collected can be the easiest way to measure.



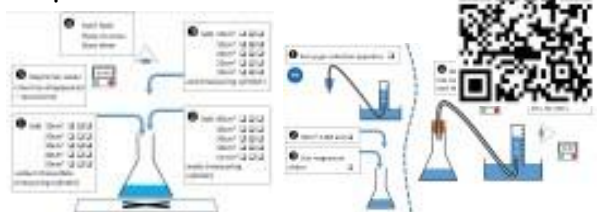
- The units of rate depend on what you are measuring. For example, when measuring gas in  $\text{cm}^3$  you will end up with rate units of  $\text{cm}^3/\text{s}$ . When measuring the change in mass ( $g$ ), you will end up with units of  $g/s$

$$\text{mean rate of reaction} = \frac{\text{quantity of reactant used}}{\text{time taken}}$$

$$\text{mean rate of reaction} = \frac{\text{quantity of product formed}}{\text{time taken}}$$



## Required Practical



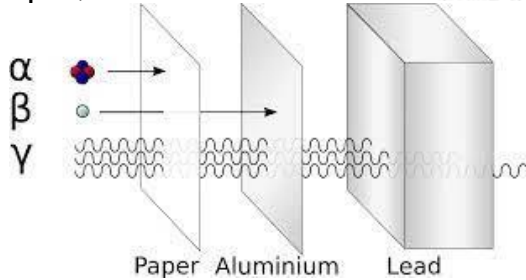
## Equations for this topic

# Atomic Structure

## Threshold Concept

Identify that there are three types of radiation

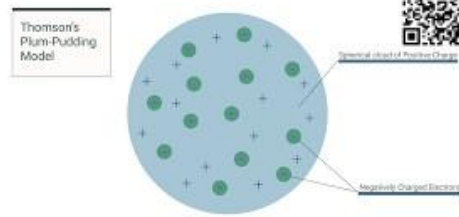
## Alpha, Beta and Gamma



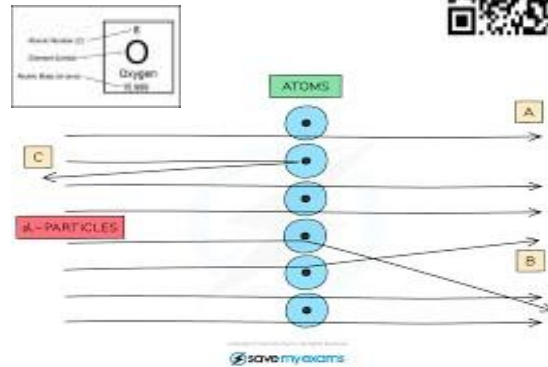
## Keywords

Atom - the smallest particle of a chemical element that can exist  
 Proton - positively charged particle  
 Neutron - Particle with no charge  
 Electron - Negatively charged particle  
 Wave - Energy transfer method

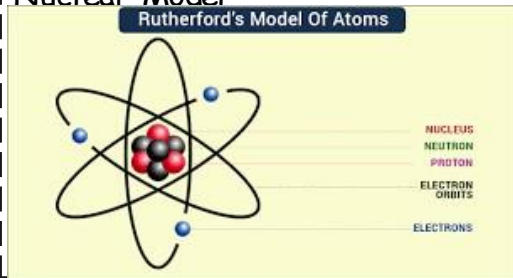
## Plum Pudding Model



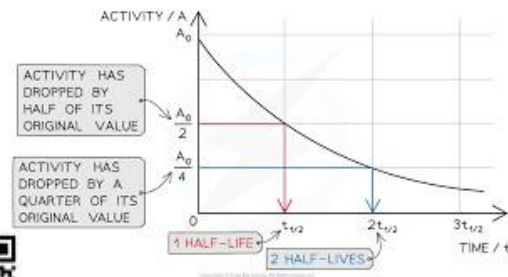
## Rutherford's Scattering Experiment



## Nuclear Model



## Half Life



## Uses and Dangers of Radiation

	Irradiation	Contamination
Description	Object is exposed to radiation but does not become radioactive	Object becomes radioactive and emits radiation
Source	Danger is from radiation emitted outside the object	Danger from radiation emitted within the object
Prevention	Prevented by using shielding, such as lead clothing	Prevented by safe handling of sources and airtight safety clothing
Causes	Caused by the presence of radioactive sources outside the body	Caused by inhalation or ingestion of radioactive sources

## Equations for this topic

