

Science – Reactions

Chemical Reactions

A **chemical reaction** is a change in which atoms are rearranged to make new substances

A **reversible** reaction is one where the products can react to get back the substances which you started with, most chemical reactions are not reversible

You can look for **signs** that a chemical reaction has taken place such as flames, smells, heat change, a loud bang or gentle fizz



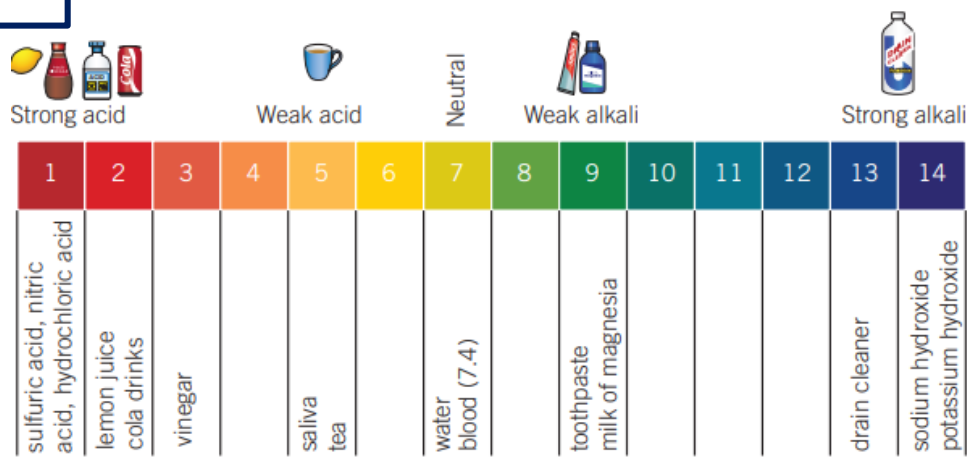
Acids and Alkalis

Acids and **alkalis** are the chemical opposites of one another

Both acids and alkalis can be

corrosive and **irritants**.

To see whether a substance is an acid or an alkali, we can use an **indicator**. Indicators show how acidic or how alkaline a solution is by showing its position on the pH scale, one example of this is universal indicator



If the solution has a **pH value of 1–6** it is **acidic**. If the solution has a **pH value of 8–14** it is **alkaline**.

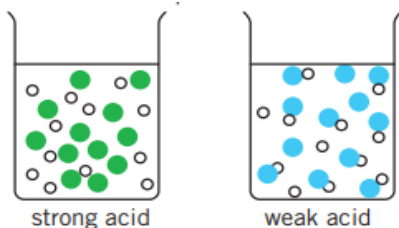
If the solution has a **pH value of 7** it is known as **neutral**

Acid Strength

The **strength** of an acid depends on how much of the acid has broken apart when it has dissolved in water

Hydrogen chloride dissolves in water to form **hydrochloric acid**, this is a **strong acid** as all of the particles split up

A **weak acid** will have particles that do not all split up

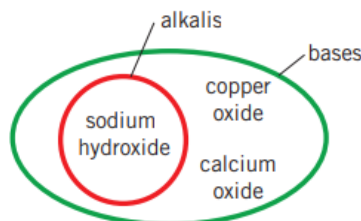


The **concentration** of the acid is the amount of acid which has dissolved in 1 litre of water. The more **concentrated** the acid, the lower the pH

Neutralisation

Neutralisation reactions are any reaction in which acids react with a base to cancel out the effect of the acid. These reactions form a neutral solution with a pH of seven.

A **base** is any substance which neutralises an acid. An **alkali** is a base which has been dissolved in water

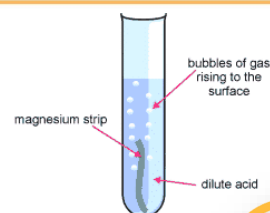
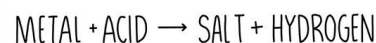


Salts

Salts are substances which are formed when an **acid** reacts with a **metal** or **metal compound**

Different acids form different types of salts:

Hydrochloric acids form **-chlorides**
Sulphuric acids form **-sulphates**
Nitric acids form **-nitrate**



Key words and Vocabulary

Acid, acidic, alkali, alkaline, base, chemical, chemical reaction, concentration, concentrated, corrosive, displacement, hydroxide, indicator, irritant, neutral, neutralisation, oxide, oxidation, pH scale, reversible, reactivity, reactivity series, salt, strong acid





Metal Reactions

Metal + Acid

When a metal reacts with an acid it will produce a salt and hydrogen gas, the fizzing that you see is the hydrogen gas being given off:



Metal + Oxygen

When a metal reacts with oxygen a metal oxide is formed, this process is known as oxidation:



Metal + Water

When a **metal** reacts with **water** it forms a **metal hydroxide** and **hydrogen** gas. The **alkali** (group 1) metals react most **vigorously**, giving off a brightly coloured flame:



Displacement Reactions

When a **more reactive metal** reacts with a compound containing a **less reactive metal**, it can take its place, this is known as a **displacement reaction**.

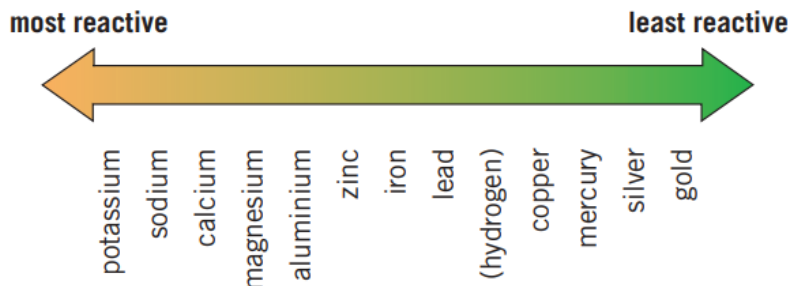


Higher in the reactivity series than the metal in the compound, a **reaction** will take place

Lower in the reactivity series than the metal in the compound, a **reaction** will **not** take place

The Reactivity Series

The **reactivity series** describes how reactive different metals are compared to one another. The **higher** the metal is in the reactivity series the **more reactive** it will be this means that it will react much more **vigorously**.



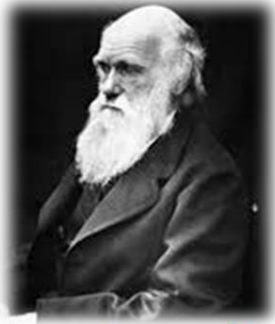
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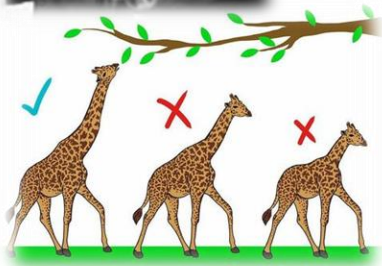
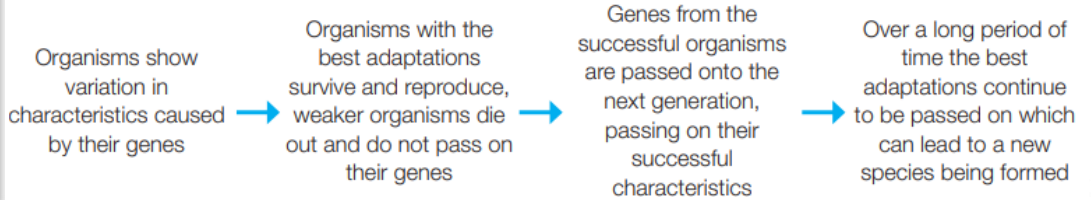
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Natural Selection

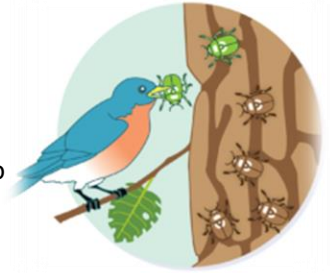


Scientists believe that the organisms which we see on Earth today have gradually developed over millions of years, this is known as **evolution**.

Charles Darwin came up with the concept of **natural selection**. **Natural selection** describes how:



One example of natural selection can be seen in **giraffes**. Only the giraffes with the longest necks would be able to eat from trees, the ones with shorter necks would not be able to eat and die out. This would mean that only the **gene for long necks** would be passed on to **offspring**, leading to more giraffes having long necks and after many generations, all having long necks.



Extinction

A **species** will become **extinct** when all of a species **die out**. The **fossil record** shows us that animals have existed in the past which have now become **extinct**. Extinction can be caused by:

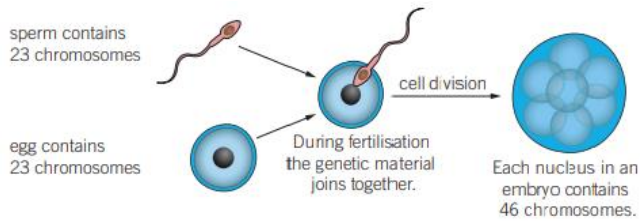
- Changes to the **environment**
- Destruction of **habitat**
- New **diseases**
- Introduction of new **predators**
- Increased **competition**



When a species becomes extinct, the variety of species within an ecosystem is reduced, this is also known as a reduction in biodiversity. The more diverse a population is, the more likely they are to survive environmental changes.

Inheritance

Characteristics are passed along from parents to their offspring. **Half** of the **genetic information** comes from each **parent**, this is passed on through the **sex cells** (egg & sperm) in the process of fertilisation.



DNA is the material which contains all of this genetic information

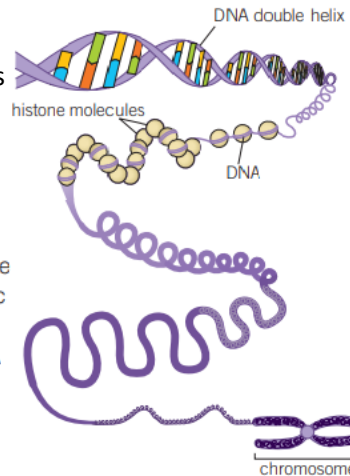
DNA – in the shape of a double helix

↓

Genes – a section of DNA which hold the information for a particular characteristic

↓

Chromosomes – long strands of DNA which hold many genes, humans have 46 of these in the nucleus of cells



DNA molecule

DNA combined with histones

DNA – histone complex is coiled

Coils fold to form loops

Loops coil and pack together to form the chromosome

Key words and Vocabulary

Allele, biodiversity, characteristics, chromosome, competition, DNA, dominant, evolution, extinct, fossil record, gene, genetic modification, mutation, natural selection, population, Punnet square, recessive



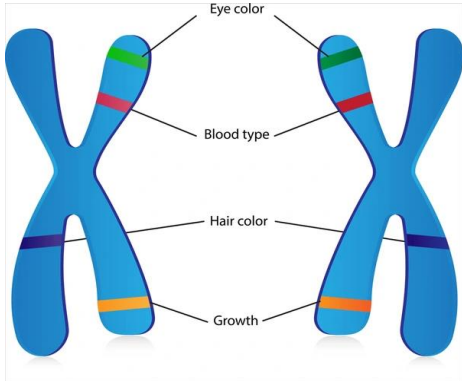
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Genetics

For every **characteristic** an organism will have two **alleles**, this is two different **genes** which can **code** for the same **characteristic**, one is inherited from **each parent**.

Dominant alleles will cause the characteristic to be **displayed** even if they are with another allele, this is represented by a **capital letter**
Recessive alleles will not be displayed as characteristics unless there are two of the **same allele**, they are the characteristic least likely to be shown. This is represented by a **lower case letter**.

We can predict the inheritance of characteristics using a **Punnet square**:



		Possible alleles from father	
		B	b
		(dominant allele for brown eyes)	(recessive allele for blue eyes)
Possible alleles from mother	b	Bb Offspring will have brown eyes as B is dominant	bb Offspring will have blue eyes as both alleles are recessive
	b	Bb Offspring will have brown eyes as B is dominant	bb Offspring will have blue eyes as both alleles are recessive

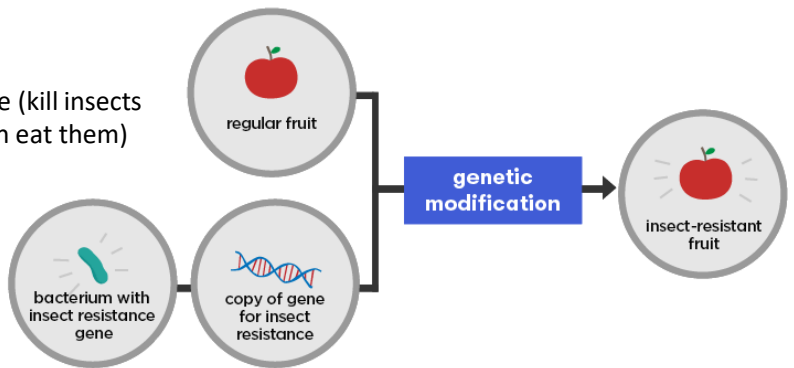
Punnet Square

Genetic Modification

Genetic modification is the process which scientists can use in order to **alter** the **genes** of an organism

Examples of this include:

- altering cotton to produce higher yields
- altering bacteria genes to produce medicines
- altering crops to produce their own insecticide (kill insects which eat them)



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