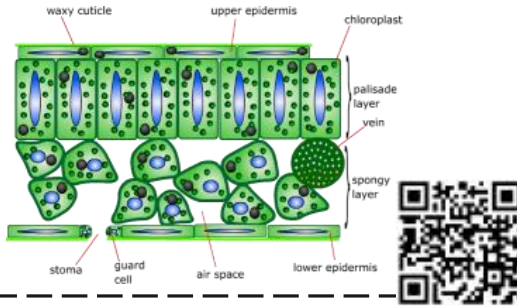


Bioenergetics

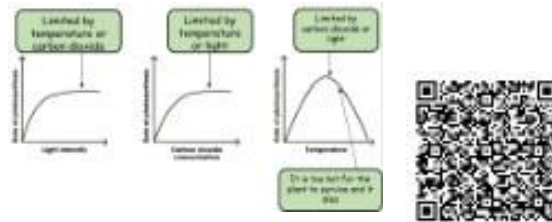
Threshold Concept

Respiration and photosynthesis are chemical processes that provide plants and animals with energy.

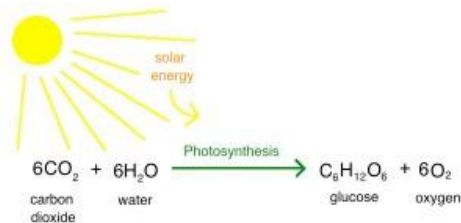
Structure of the leaf



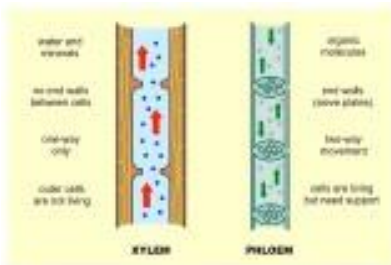
Limiting factors of photosynthesis



Photosynthesis



Xylem and Phloem

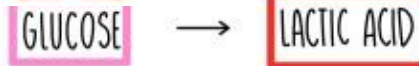
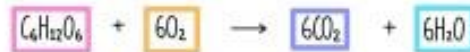
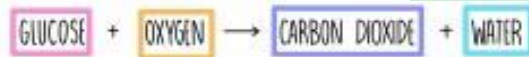


Keywords

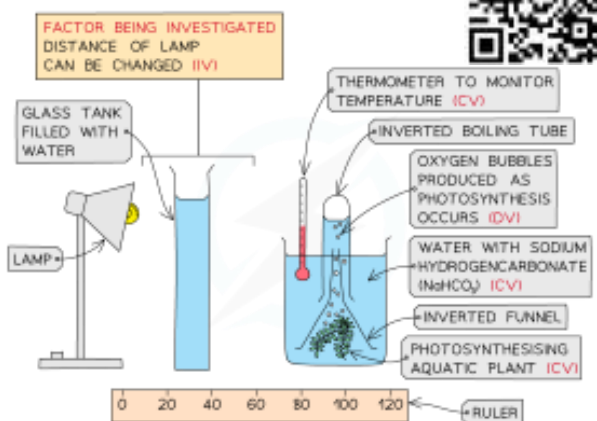
- **Respiration:** Respiration is the body's way of producing energy from the food we eat. It involves the breakdown of glucose in the presence of oxygen into carbon dioxide and water with the release of energy-generating molecules called ATP.
- **Photosynthesis:** is a chemical reaction that takes place in the chloroplasts of green plant cells, where light energy is used to convert carbon dioxide and water into glucose and oxygen.
- **Energy:** The ability to do work
- **Limiting factors:** Limiting factors affect the rate of a reaction. A limiting factor is a condition, that when in shortage, slows down the rate of a reaction.
- **Reaction:** A chemical reaction is when one or more substances change and produce one or more new chemical substances.



Respiration



Required practical



Equations for this topic

$$\text{REACTION RATE} = \frac{\text{CHANGE IN MASS OF REACTANT OR PRODUCT}}{\text{TIME}}$$

Bonding Part 2

Threshold Concept

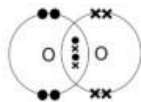
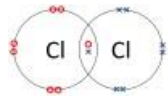
How do 100 elements make up everything in the universe?

Covalent bonds

Two nonmetals will form a covalent bond. The atoms share electrons to make themselves stable.



- 1 shared pair = a single bond
- 2 shared pairs = a double bond
- 3 shared pairs = a triple bond



Keywords

Electron - a subatomic particle with a negative charge

Electrostatic attraction - strong attraction between oppositely charged ions

Weak intermolecular forces - force of attraction between atoms, elements and molecules

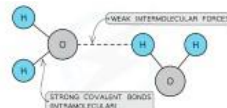
Delocalised electron - free moving electron that isn't a part of any atom

Ion - a charged particle

Simple Covalent compounds

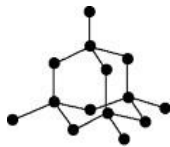
Simple covalent compounds have strong covalent bonds between atoms and weak intermolecular forces between molecules.

Properties – low m.p and b.p
- cannot conduct electricity

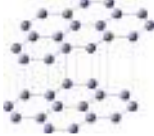


Giant Covalent Structures

Diamond



Graphite



Silicon dioxide



Graphene



Fullerenes



Metallic bonding

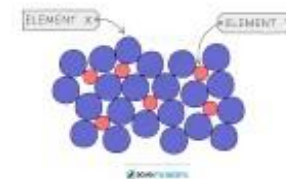
Metals consist of a giant metallic structure. They are positive metal ions surrounded by a sea of delocalised electrons.



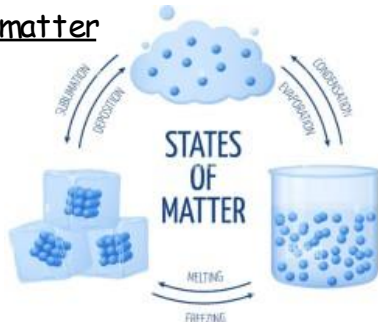
Alloys

Alloys are a mixture of metals and another element.

Alloys are stronger than metals as the different sized atoms distort the layers.



States of matter



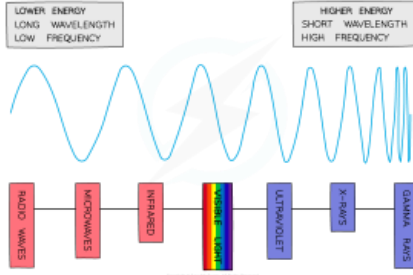
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EM Spectrum

Threshold Concept

Electromagnetic waves are waves in different frequencies

Types of electromagnetic waves:



Keywords

Frequency: The number of complete waves passing a certain point per second or the number of waves produced by a source per second. Measured in Hertz, Hz

Wave: An oscillation that transfers energy without transferring any matter

Spectrum: Used to classify something in terms of its position on a scale between two extreme points.

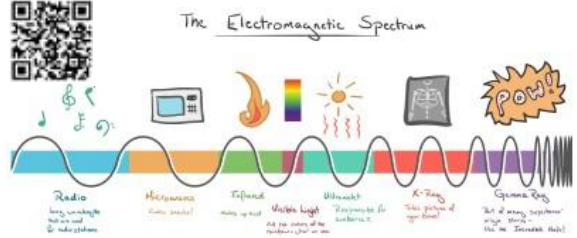
Energy: Is a key principle in physics, as it allows work to be done

Speed: The maximum rate at which an individual is able to perform a movement or cover a distance in a period of time

Properties of electromagnetic waves:

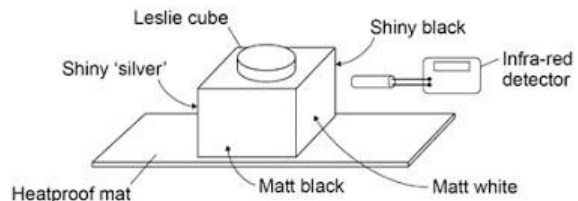
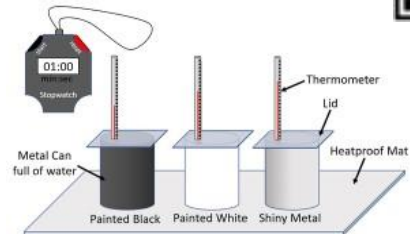
GAMMA RAYS	X RAYS	ULTRA VIOLET	VISIBLE	INFRA RED	MICROWAVES	TELEVISION	RADIO
Wavelength: around 1 pm Detector: Film, Geiger counter Properties/uses: Medical, sterilising food, checking metal castings, checking water flow	Wavelength: around 1 nm Detector: Film Properties/uses: Medical X rays, defects in metals, checking paintings	Wavelength: 0.001 – 0.4 μm Detector: Skin, film Properties/uses: Sun tan, sun burn, theatre, checking documents, microscopes	Wavelength: 0.4-0.7 μm Detector: Eye, film Properties/uses: We use it to see the world around us	Wavelength: 0.7-10 μm Detector: Skin, thermometer, film Properties/uses: Physiotherapy, night sight, locating people trapped in smoke or ruins, Remote controls	Wavelength: 1 mm – 50 cm Detector: Aerial Properties/uses: Microwave ovens, radio telescopes, radar	Wavelength: around 50 cm Detector: Aerial Properties/uses: Television	Wavelength: 1 m – 1500 m Detector: Aerial Properties/uses: Radio communication
Source: Nuclei	Source: Atoms	Source: Atoms	Source: Atoms	Source: Atoms	Source: Electronics	Source: Electronics	Source: Electronics

Uses and applications of electromagnetic waves

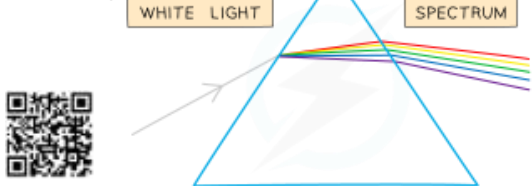


Required practical:

EM infrared RP



Visible light:



Communications:

Electromagnetic radiation is used for communications and transmission of information. The waves that are used in this way are radio waves, microwaves, infrared radiation and light.



Equations for this topic

wave speed = frequency × wavelength	$v = f \lambda$
time period = $\frac{1}{\text{frequency}}$	$T = \frac{1}{f}$