Chemistry chapter 9

The evolution of the atmosphere

Scientist not completely sure atmosphere formed because it happened 4.6 billion years ago but this is the most accepted idea

Phase 1 volcanoes made the first atmosphere

- **In the first billion years Earth had a lot of volcanoes**
- **Volcanoes release many gases**
- **This created the early atmosphere**
- **this early atmosphere was mostly carbon dioxide and almost no oxygen**
- **It was similar to the atmosphere of Mars and Venus today**

Volcano also released

- **Nitrogen this built or of our the time**
- **Small amount of Methane and ammonia**

Phase 2 to Ocean algie plants are moved carbon dioxide

- **Water vapour cool and condensed forming oceans**
- **carbon dioxide dissolved in the oceans**
- **This carbon dioxide formed carbonates which became sediments on the sea bed**
- **Later Marine animals Marine are those animals that live in water evolve their shells and skeleton contains carbonates**
- **Algae and green plants evolve and remove carbon dioxide by photosynthesis**

Carbon became locked in Rock and fossil

- **When plants and Marine animals die they fall to the seabed**
- **over million of years ago they were compressed and became sentimentery rocks oil natural gas**
- **This trap carbon and keep it out of the atmosphere**

Phase 3 plants produce oxygen

- **algae started photosynthesis 2.7 billion years ago**
- **green plants evolved later**
- **oxygen levels increased over the time**
- **higher oxygen allowed animals and complex life to evolve**
- **about 200 million years ago the atmosphere became similar to today**

- 80% nitrogen
- 20% oxygen
- 1% other gases like carbon dioxide noble gases water vapour

How scientist know about old atmosphere

Scientist can study

- air Bubbles in Antarctica ice that shows passed gas levels
- chemicals in rocks
- fossils of plants and algae tells when oxygen started increasing

Climate change and greenhouse gases

Greenhouse gases are important

Main greenhouse gases

- carbon dioxide
- Methane
- water vapour

they act like a blanket in the atmosphere

How it works

- Sun sends short wave radiation and earth will absorbed
- Earth releases long wave of heat radiation back
- greenhouse gases absorb the long wave radiation
- they re radiate in all direction including back to earth
- this warms earth that is called greenhouse effect

We need greenhouse effect without it earth would be too cold to live

Carbon footprints

- A carbon footprint is the total amount of carbon dioxide and other greenhouse gases release during full life cycle of something
- It can be for a service like a bus or an event or a product like toaster

Why it is hard to Measure

- Many things create emission
- Because there are so many steps it is very difficult or sometimes impossible to measure the exact carbon footprint
- Still even a rough estimate help us understand which things cause the most pollution

How to reduce carbon footprints

Even if we can't measure perfectly we can still reduce the emission

- **we can use renewable energy**
- **use more efficient processes**
- **governments can tax emission**
- **government can set a limit**
- **carbon capture Technology**

Why reducing emissions is difficult

Technology is still developing

- **carbon capture is a new and still been improved**
- **Renewable Energy Equipment is still expensive**

Government worry about economy

- **cutting emissions may Slow Down economy growth especially in developing country**
- **how to make international agreement countries don't want to reduce emissions if others are not doing the same**
- **stopping deforestation is important people must change their lifestyle like walking cycling instead of driving**
- **some people do not want to change**

Air pollution

Burning fossil fuels releases many harmful gases not carbon dioxide

Combustion of fossil fuels

- **Fossil fuels contain hydrocarbon**
- **when they burn**
- **with enough oxygen this is called complete combustion**
- **and they will form carbon dioxide and water**
- **when with not enough oxygen so this is called incomplete combustion**

Problems caused by particulate soot

- **If breath in they can damage lungs and cause breathing problems**
- **they cause Global deming because they reflect sunlight away from the Earth**

Problems caused by carbon monoxide

- **Very dangerous gas**
- **stops blood from carrying oxygen because its stick to hemoglobin**
- **can cause fainting or death**

- **It has no colour and no smell so it's hard to detect**

Sulphur dioxide and nitrogen oxides

- **Sulphur dioxide is made when coal with Sulphur impurities is burnt**
- **nitrogen oxides form when nitrogen and oxygen react inside hot car engine**

these gases can cause

- **Acid rain**
- **breathing problems**

testing for Sulphur impurities

- **Bubbles the gas through universal indicator**
- **if sulphur is present so indicator will turn into red acidic**