

Early Atmosphere evolving

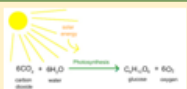
Volcanoes produced Carbon dioxide, nitrogen (and a bit of methane and ammonia)



Oceans formed

From condensed water. Carbon dioxide dissolved in the oceans. Carbonates precipitated (turned into solid bits) to form sediments.

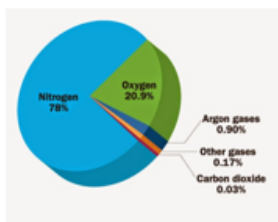
Green plants and algae



Took in CO₂ and released O₂ in photosynthesis.

Sedimentary rocks and fossil fuels were formed:

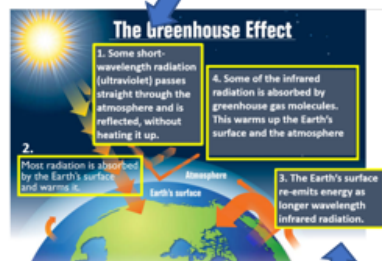
Decreased the CO₂ levels



Greenhouse Gases and Climate change

Carbon dioxide
Methane
Water Vapour

Short wavelength doesn't interact with the gases



Longer wavelength emitted does interact with the gases

Human activities increase the levels of CO₂ and CH₄

- CO₂
- burning fossil fuels
 - Deforestation
- Methane
- Cows (and rice paddies)
 - landfill

C14 The Earth's Atmosphere

Effects of climate change:

- Rising sea levels
- Droughts
- Extreme weather events
- Changes in wildlife distribution

Why do some people deny humans cause climate change?????

Difficult to model.
Models are simplified.
Media can be biased.
MUST check the evidence is PEER REVIEWED



Carbon footprint
'Total amount of CO₂ and other greenhouse gases emitted over the full life cycle of a product, service or event'

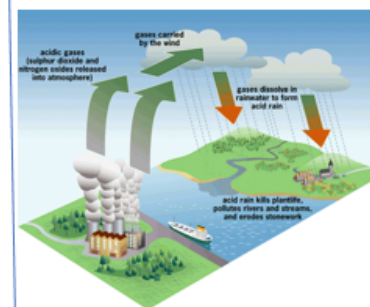
Solution:

- Reduce carbon footprint (emissions of CO₂ and methane)
- Use less fossil fuels
 - Carbon capture and storage
 - Eat less meat
 - Send less food waste to landfill

Atmospheric Pollutants

Gases released in combustion of fossil fuels and their effects:

Gases	Released when	Effects caused
Carbon dioxide	All fossil fuels burn	Global warming
Water vapour	All fossil fuels burn	None
Carbon monoxide	Incomplete combustion of fuels (not enough O ₂)	Poisonous gas
Solid particulates	Solid fuels burn incompletely	Global dimming Asthma
Sulphur dioxide	Coal burns (sulphur is an impurity in coal)	Acid rain Respiratory problems
Nitrous oxides	Nitrogen in air reacts with oxygen at high temperatures	Acid rain Respiratory problems



C14 The Earth's Resources

Finite and Renewable

What do the words mean??
Finite = Will run out eventually
Renewable = We can replace them as we use them
Sustainable = meets the needs of the current generation without compromising the ability of future generations to meet their needs.



What do we use the earth's resources for?
 • **Warmth**
 • **Shelter**
 • **Food**
 • **Transport**

We can use them as natural resources or process them.

'Natural resources' + agriculture provides
 • **Food**
 • **Timber**
 • **Clothes**

Finite resources are processed to get us
 • **Energy**
 • **materials**

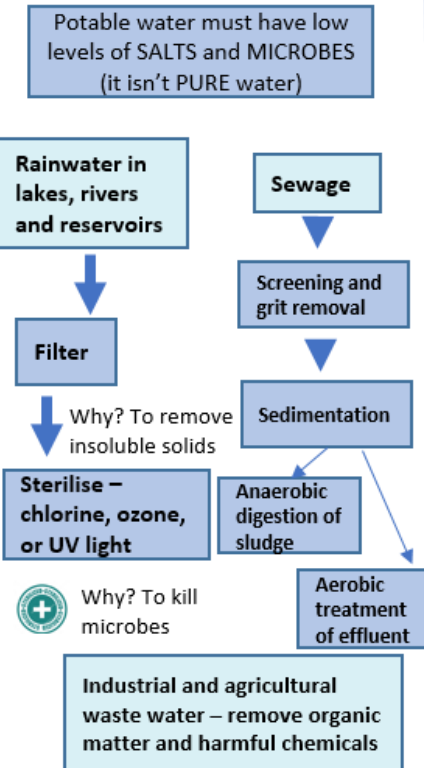


e.g. Cotton is natural and we grow cotton plants. OR we can use synthetic materials e.g. nylon

e.g. Coal, oil and gas are used for energy.
 e.g. metal ores are mined to get metals.



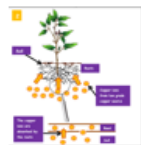
Treating water



HT ONLY: Alternative Metal Extraction

Why bother?
Running out of metal ores

Phytomining



Plants take in copper

- BURN plants
- React ASH with sulphuric acid

Bioleaching



Bacteria feed on metal ore

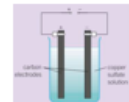
- 'leachate solution' contains copper compounds

How to get the copper from the compound

Displacement using scrap iron

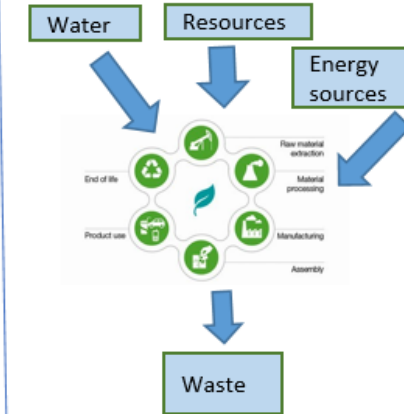


Electrolysis



LCA and RRR

Life Cycle Assessments



Reducing use of resources

Why bother?
Reduce...use of limited resources

1 TON OF PLASTIC BAGS EQUALS 11 BARRELS OF OIL

Why bother?
Reduce...use of energy resources

Why bother?
Reduce...waste and environmental impacts



Quantitative Chemistry Knowledge Organiser

Know the facts		Key words	
1	The law of conservation of mass states that no atoms are lost or made during a chemical reaction so the mass of the products equals the mass of the reactants.	1	Avogadro constant the number of atoms, molecules, or ions in a mole of any substance (i.e., 6.02×10^{23} per mol)
2	In a balanced chemical equation, the sum of the relative formula masses of the reactants in the quantities shown equals the sum of the relative formula masses of the products in the quantities shown.	2	mole the amount of substance in the relative atomic or formula mass of a substance in gram. The symbol for the unit mole is mol
3	When a metal reacts with oxygen the mass of the oxide produced is greater than the mass of the metal	3	concentration the amount of a substance dissolved in a given volume of liquid
4	In thermal decompositions of metal carbonates carbon dioxide is produced and escapes into the atmosphere leaving the metal oxide as the only solid product.	4	limiting reactant the reactant in a chemical reaction that when used up causes the reaction to stop
5	<p>The masses of reactants and products can be calculated from balanced symbol equations. Chemical equations can be interpreted in terms of moles</p> $Mg + 2HCl \rightarrow MgCl_2 + H_2$ <p>shows that one mole of magnesium reacts with two moles of hydrochloric acid to produce one mole of magnesium chloride and one mole of hydrogen gas.</p>	5	<p>percentage yield the actual mass of product collected in a reaction divided by the maximum mass that could have been formed in theory, multiplied by 100</p> <p>The amount of a product obtained is known as the yield</p> $\% \text{ Yield} = \frac{\text{Mass of product actually made}}{\text{Maximum theoretical mass of product}} \times 100$
6	In a chemical reaction involving two reactants, it is common to use an excess of one of the reactants to ensure that all of the other reactant is used.	6	relative formula mass M_r the total of the relative atomic masses, added up in the ratio shown in the chemical formula, of a substance
7	<p>The percentage atom economy of a reaction is calculated using the balanced equation for the reaction as follows:</p> $\frac{\text{Relative formula mass of desired product from equation}}{\text{Sum of relative formula masses of all reactants from equation}} \times 100\%$	7	relative atomic mass A_r the average mass of the atoms of an element compared with carbon-12 (which is given a mass of exactly 12). The average mass must take into account the proportions of the naturally occurring isotopes of the element