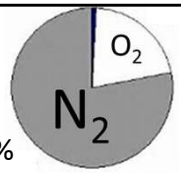
Key points to learn

1 Atmosphere	Layer of gas around Earth
2. Earth's early atmosphere theory	Volcanos released carbon dioxide (CO_2), water vapour (H_2O) and nitrogen (N_2)
	Similar to Mars and Venus
3. Photosynthesis	We think it was responsible for changing early atmosphere
	Removes carbon dioxide and makes oxygen
	Carbon + Water → Oxygen + Glucose Dioxide
4. Fossil fuels	Coal, crude oil and natural gas. Formed from fossilised remains of plants and animals
5. Carbon 'locked into' rock	Carbon stored in shells and skeletons turned into limestone
	Carbon in living things was also locked away as fossil fuels
6. Ammonia and methane	Removed from atmosphere by reactions with oxygen
7. Earth's atmosphere today	Nitrogen: 78% Oxygen: 21% Argon: 0.9% Carbon dioxide: 0.04% Trace amounts of other gases 
8. Ozone layer	Nothing to do with Global warming or the Greenhouse Effect. A layer of O_3 protecting us from UV rays
9. Incomplete combustion	If not enough oxygen is available then poisonous carbon monoxide and soot are produced

Key points to learn

10. Greenhouse effect	Greenhouse gases stop heat escaping from the Earth into space. This results in Earth getting hotter
11. Greenhouse gases	1. Carbon dioxide: released from burning fossil fuels 2. Methane: released from swamps, rice fields 3. Water vapour (eg steam and clouds)
12. Risks of global climate change	1. Rising sea levels as a result of melting ice caps 2. Extreme weather eg storms 3. Changes to temperature and rainfall patterns 4. Ecosystems under threat
13 Issues with reducing greenhouse gas emission	1. It will cost money 2. There is still disagreement that it is a problem 3. It is difficult to implement
14. Carbon footprint	The CO_2 released as a result of a persons activities over a year
15. Ideas for reducing our carbon footprint	1. Burn less fossil fuels 2. Carbon capture 3. Reduce demand for beef 4. Planting more trees
16. Carbon capture	Pumping and storing CO_2 underground in rocks
17. Nitrogen oxide	Released by burning fossil fuels. Causes acid rain and breathing issues
18 . Sulfur dioxide	Released by burning fossil fuels. Causes acid rain

Trilogy C11: The Earth's atmosphere

Collins revision guide: Chemistry of the atmosphere

Knowledge Organiser

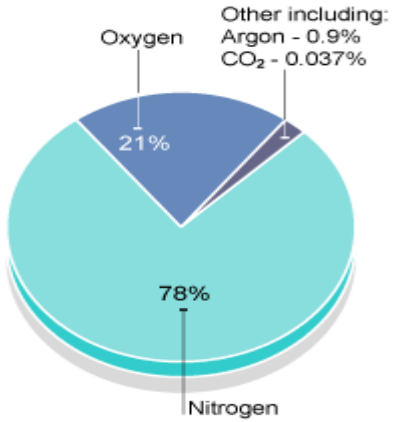
Big picture (Chemistry Paper 2)

- Rates, equilibrium and organic chemistry
  - Rates and equilibrium
  - Crude oil and fuels
- Analysis and the Earth's resources
  - Chemical analysis
  - **The Earth's atmosphere**
  - The Earth's resources

Background

The bubble of gas around our planet that we call Earth's atmosphere does far more than provide the oxygen we need for respiration. In Europe, winters are almost two weeks shorter than they were 40 years ago. Extreme weather seems more common than ever. Cases of asthma and respiratory difficulties increase year-on-year and we are always looking at ways of making our air cleaner .

Year 9 Chemistry topic 3 learning journey.



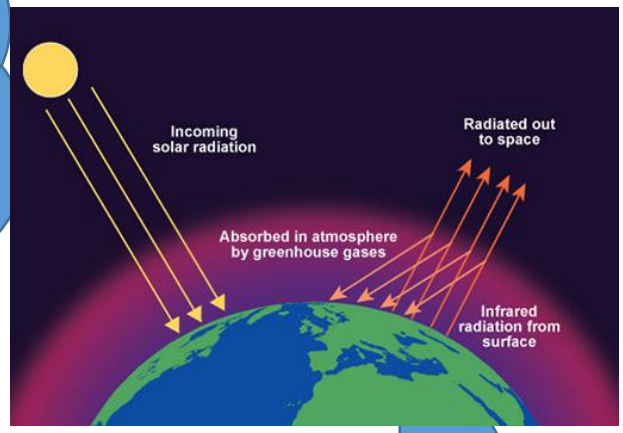
What I already know from year 7 and 8:

Why we get complete and incomplete combustion

Human activities that releases CO_2 and what impact it has on the atmosphere

Impact of acid rain on the environment

Interpret data from graphs



Describe the composition of the early atmosphere and todays atmosphere.
Explain how the atmosphere has changed
Evaluate other theories about how the atmosphere has changed

Explain why some gases are described as greenhouse gases.
Describe how human activities are increasing the amount of greenhouse gases.
Describe different consequences of climate change on the environment

Explain what a carbon footprint is, and how it can be reduced

identify the products formed from complete and incomplete combustion and the combustion of impurities in fuels and nitrogen in air.

Describe the problems caused by burning fuels with impurities AND nitrogen oxidation in engines

Future learning

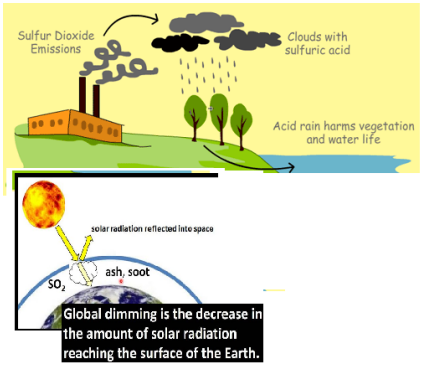
Separating crude oil

Consequences of burning petrol/fuels

Using resources and raw materials and link energy demands to global warming

Vocabulary:

Combustion, atmosphere, carbon footprint, global warming , acid rain, global dimming, photosynthesis, sedimentary rocks, crude oil, radiation, greenhouse, methane , carbon dioxide, carbon monoxide, sulfur dioxide, particulates (soot/ash), ice caps, deforestation, Carbon neutral, carbon off-setting, carbon capture and storage, oxidation



Vocabulary:

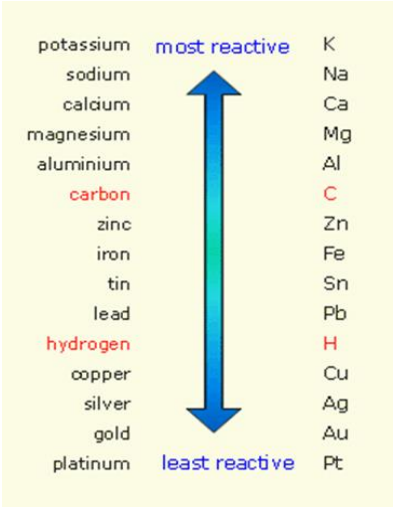
Reactivity series, displacement, reduction, electrolysis, salt, electrolyte, electrode, ion, alloy

Reaction of Metals

Metal	Heated with Oxygen	With Water	With Acid
Potassium	Burst into flames and oxide forms very vigorously	Produces hydrogen with cold water	Violent reaction
Sodium			
Calcium		Produces hydrogen with steam	Rate of reaction decreases down the table
Magnesium			
Aluminium			
Zinc			
Iron	Glows and oxide forms slowly		
Lead	Oxide forms without glowing or bursting into flames	No reaction with water or steam	Very slow reaction
Copper			No reaction
Silver	No reaction		
Gold			

Alloy	Ingredients and Composition	Use
Steel	Iron 99% Carbon 1%	Rail and wheels, , engine, ship, vehicles, crane, weapons, knives, scissors, watch spring, magnet, agriculture tools
Rust free steel (Stainless Steel)	Iron 74% Chromium 18% Nickel 8%	Knives, fork, kitchen sink, containers of chemical industries, operation tools
Brass	Copper 65% Zinc 35%	Ornaments, ball-bearing, electric switch, door knob, utensils
Bronze	Copper 90% Tin 10%	Melting machineries, plates, glasses
Duralumin	Aluminium 95% Copper 4% Magnesium, Manganese and iron 1%	Body or airplane, bicycle parts

Displacement reactions and metal extraction



Reactivity depends on tendency to form metal ion

A and C are Cations (Positive Ions)
B and D are Anions (Negative Ions)

Double Displacement Reaction

HT: OILRIG
Oxidation Is Loss of electrons
Reduction Is Gain of electrons

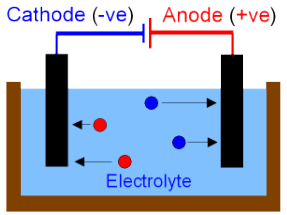
Metal + Oxygen → Metal Oxide

Metal + Water → Metal Hydroxide + hydrogen

Metal + acid → Metal salt + Hydrogen

Electrolysis

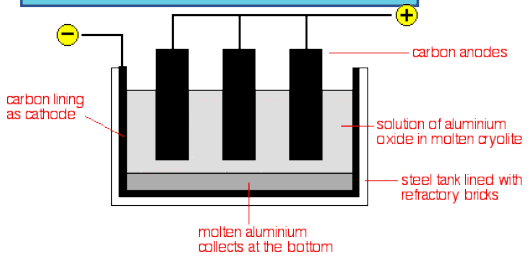
..of molten:



Higher:
At the cathode
$Pb^{2+} + 2e^- \rightarrow Pb$

Higher:
At the anode
$2Br^- \rightarrow Br_2 + 2e^-$
or
$2Br^- - 2e^- \rightarrow Br_2$

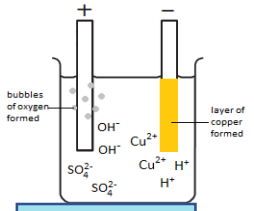
..to extract aluminium:



Oxygen goes to anode → CO_2 (needs replacing)

Cryolite reduces the melting point

..of solutions:



At the anode:
Halide (Gp7)
Oxygen

At the cathode:
Least reactive

Year 9 Chemistry topic 2 learning journey.

increasing reactivity

potassium
sodium
calcium
magnesium
aluminium
carbon
zinc
iron
tin
lead
hydrogen
copper
silver
gold
platinum

More reactive than carbon
Extracted by electrolysis

Less reactive than carbon
Extracted by reduction

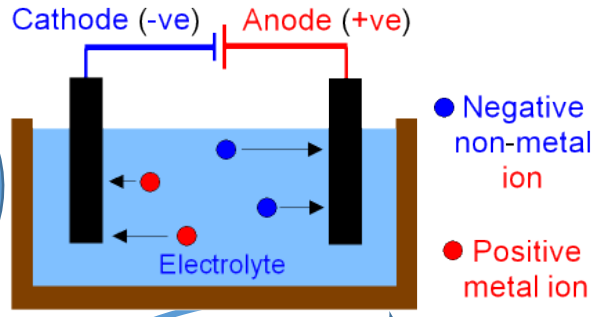
Very unreactive
Found in their native state

What I already know from year 7 and 8:

Elements can be grouped as metals or non-metals due to their properties.

Metals can be put in order of reactivity from practical observations.

Metals are extracted from the Earth by quarrying and then heating with carbon. This has impact on our environment.



Metals react with oxygen to form metal oxides in an oxidation reaction. Some metals react with water or acids and can be put in an order of reactivity using observations. Simple equations can be used to represent these reactions.

When metals react with acids a gas is released this is hydrogen and can be tested for using a lit splint.

A salt is also made which comes from the metal replacing the hydrogen in the acid.

This can be represented by word equations.

Metals less reactive than carbon can be extracted from their ores by heating with carbon. The metal losses oxygen so is reduced and the carbon gains oxygen so is oxidised.

Metals more reactive than carbon are extracted by electrolysis, this is where electricity is paced through a molten electrolyte containing positive metal ions and negative non-metal ions. Because they are charged the ions will separate and move to the opposite electrode.

Alloys are mixtures containing metals that improve properties such as strength or corrosion resistance. Know about the alloys; Bronze, brass, gold, aluminium, High carbon steel, low carbon steel, stainless steel.

Future learning

Ions and bonding.

Detailed electrolysis.

Reactions of acids and neutralisation.

Saving the Earth's resources by recycling and using low grade ores.

Vocabulary:

Reactivity series, displacement, reduction, electrolysis, salt,

electrolyte, electrode, ion, alloy