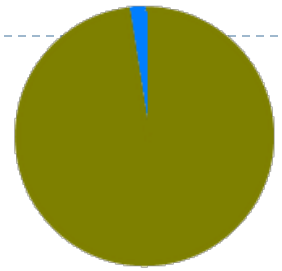
Gases and the Atmosphere

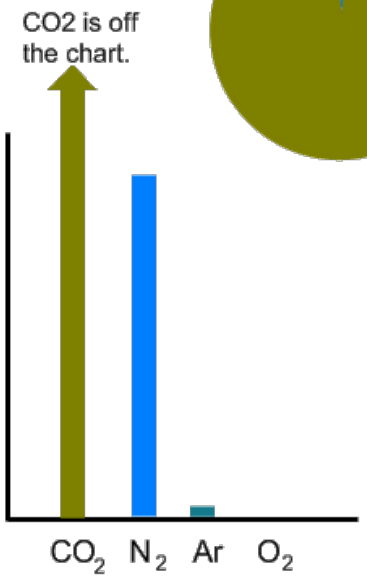
CHANGES IN ATMOSPHERIC COMPOSITION

- The atmosphere is an important part of what makes earth fit for human habitation. It blocks some of the Sun's dangerous rays from reaching Earth. It traps heat, making earth a comfortable temperature. It is consisted mainly of Carbon Dioxide (CO2), Ammonia (NH3), Methane(CH4), and water.

Standard Atmosphere of a Terrestrial Planet

96.5% Carbon Dioxide
3.5% Nitrogen
Trace Argon

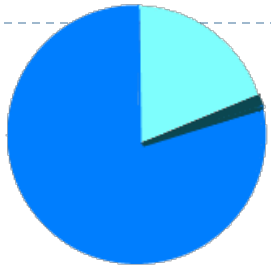


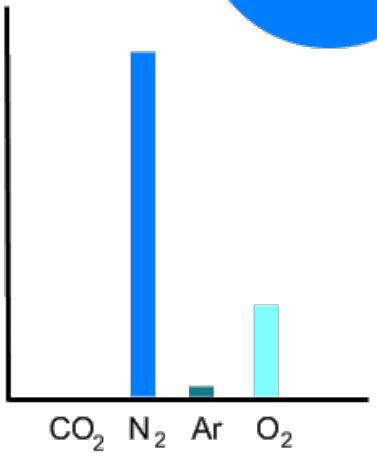


As a result of water on Earth carbon dioxide is removed and oxygen is added.

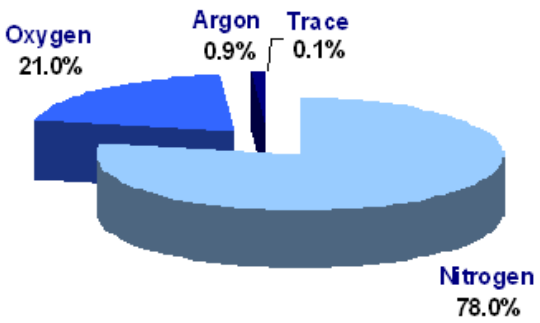
Earth's Present Atmosphere

78% Nitrogen
21% Oxygen
1% Argon
Trace CO2

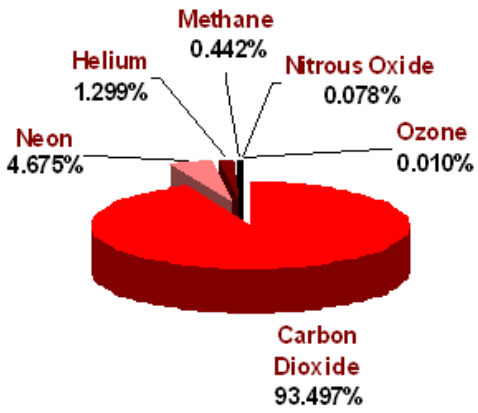




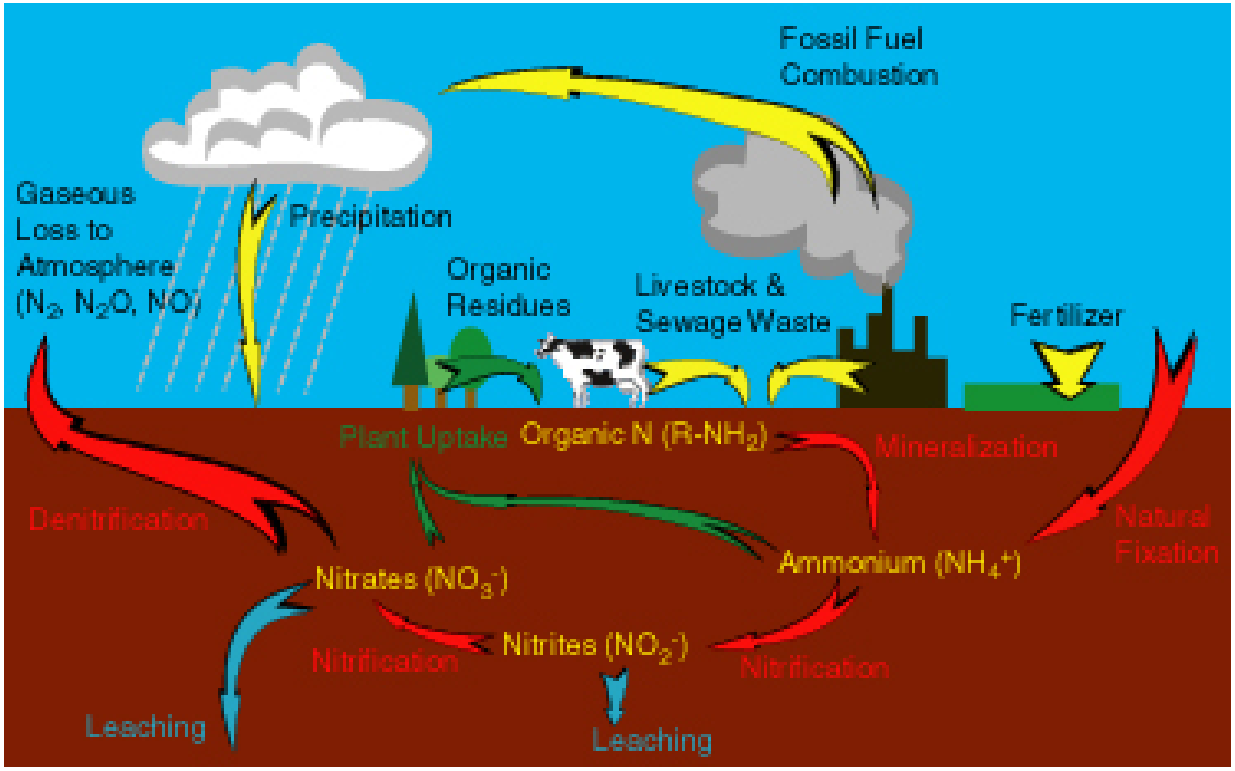
Atmospheric Composition



Trace Gases



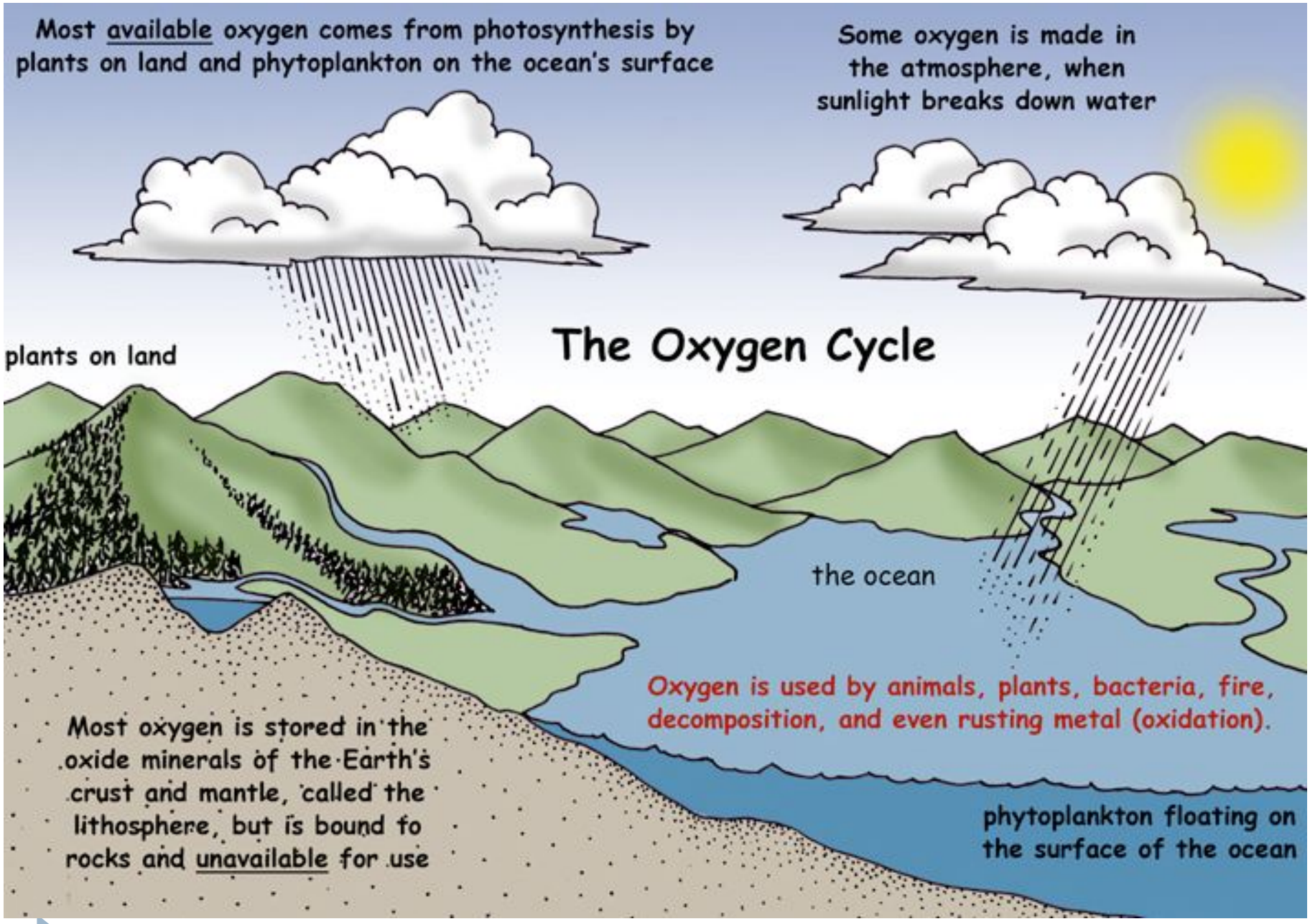
Nitrogen



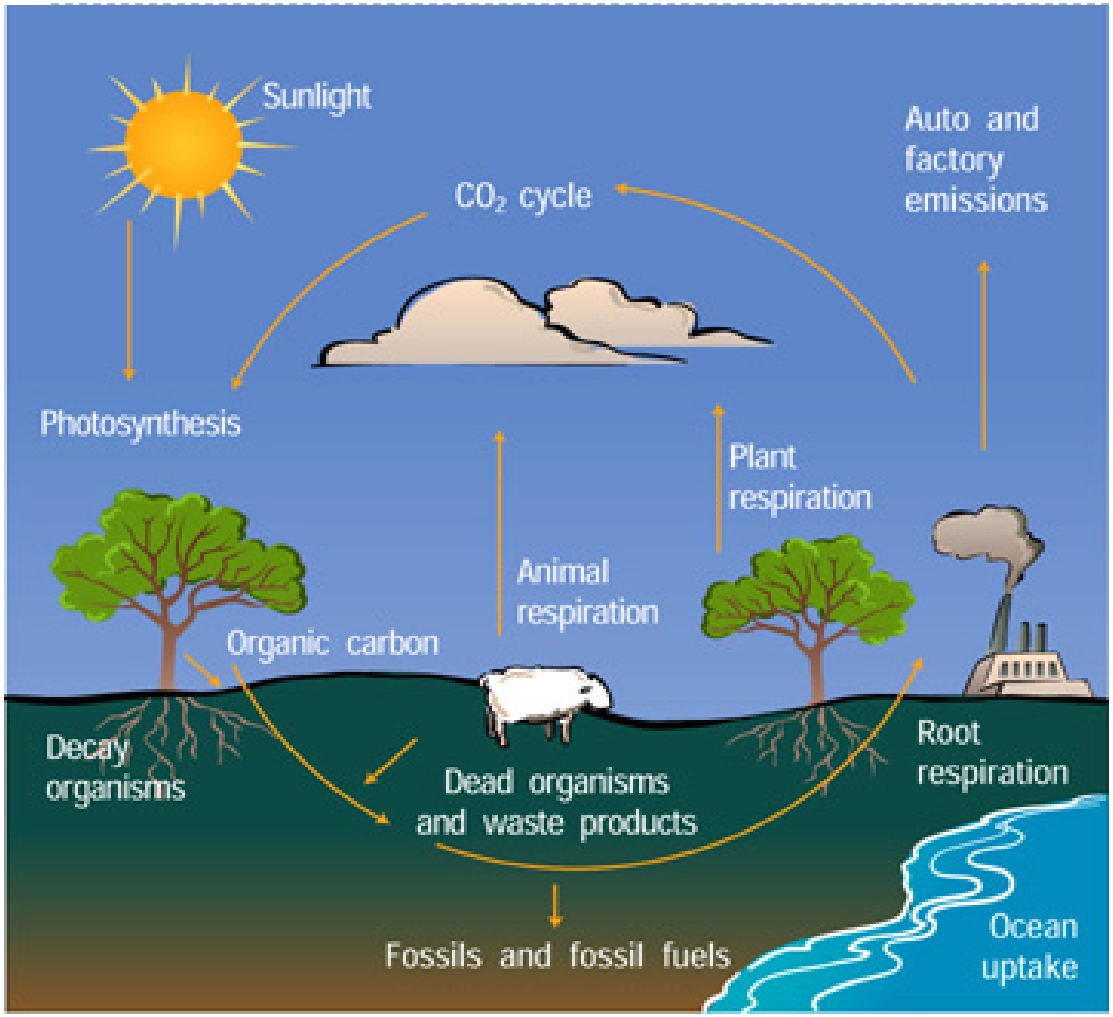
- Nitrogen is one of the primary nutrients critical for the survival of all living organisms. It is created through volcanic eruptions, burning biomass, and denitrification.

Oxygen

- Oxygen in the atmosphere is the second most abundant gas in the atmosphere behind nitrogen. Earth's atmosphere did not always have oxygen. The addition of oxygen occurred slowly from about 3.5 billion years ago to about 2.5 billion years ago. Once respiration was able to take place, accelerated oxygen buildup in the atmosphere occurred. Once there was enough oxygen to form a protective ozone layer, other forms of life were able to thrive on Earth. It is deposited by photosynthesis, and used in respiration, and combustion.


Most available oxygen comes from photosynthesis by plants on land and phytoplankton on the ocean's surface
Some oxygen is made in the atmosphere, when sunlight breaks down water
The Oxygen Cycle
plants on land
the ocean
Oxygen is used by animals, plants, bacteria, fire, decomposition, and even rusting metal (oxidation).
Most oxygen is stored in the oxide minerals of the Earth's crust and mantle, called the lithosphere, but is bound to rocks and unavailable for use
phytoplankton floating on the surface of the ocean

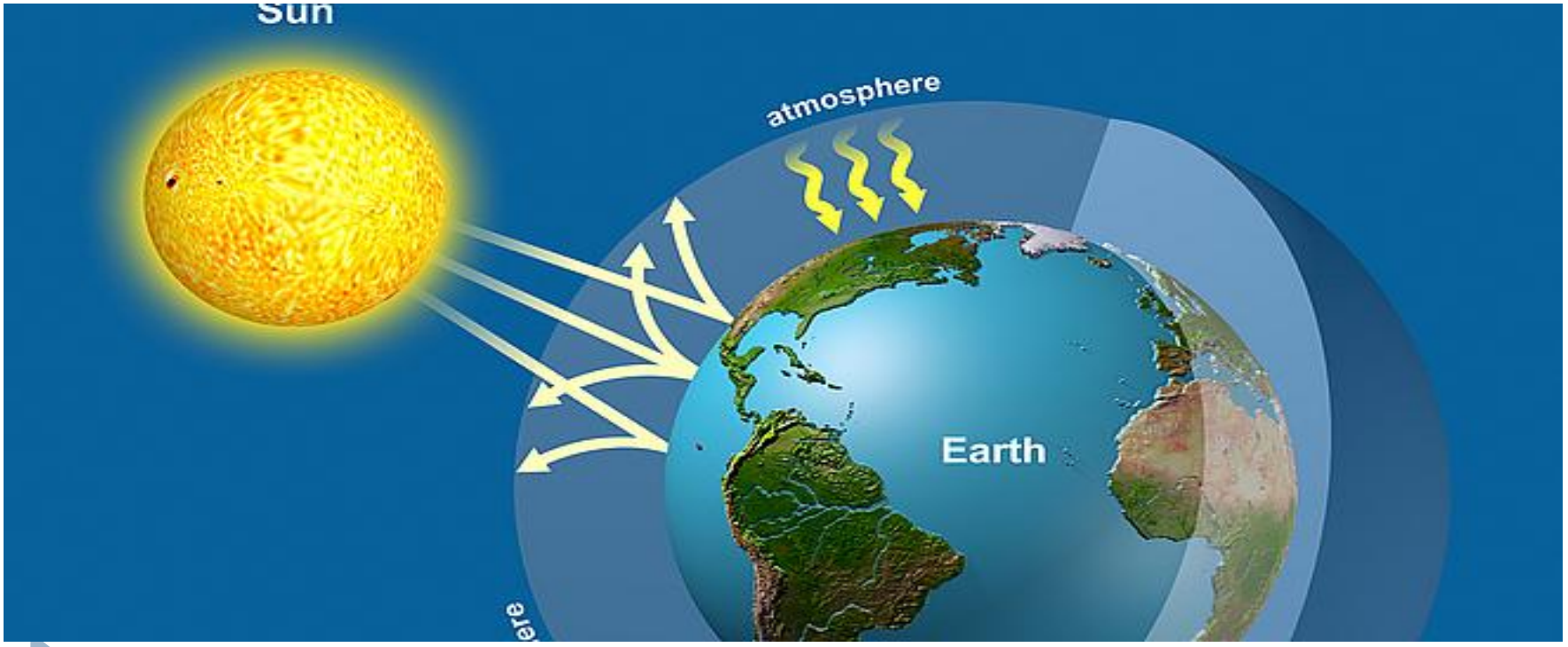
Carbon dioxide



- Carbon dioxide is a green house gas. That means it helps trap heat coming from the Sun in our atmosphere through the greenhouse effect. Without carbon dioxide in the air, the earth would be very cold. It comes from the combustion of fossil fuels, volcanic eruptions, and respiration.

The Greenhouse effect

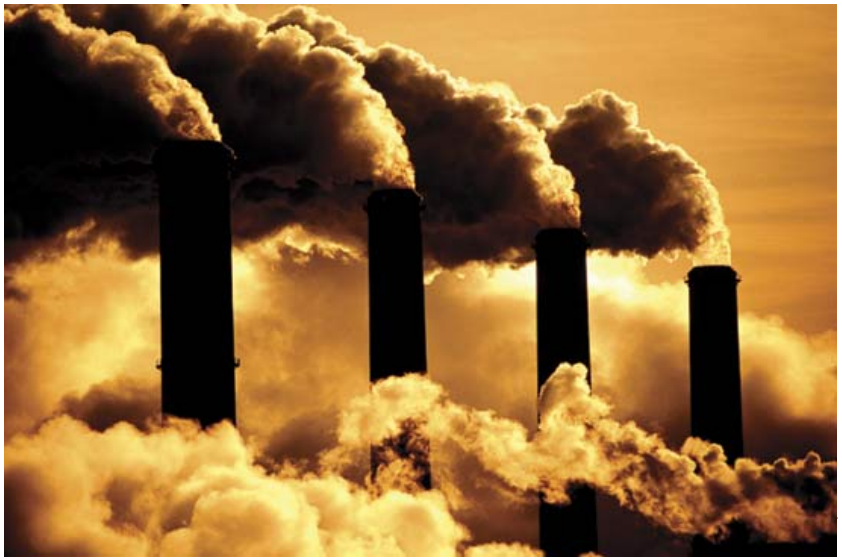
- The earth is surrounded by a blanket of gases. This blanket traps energy in the atmosphere, much the same way as glass traps heat inside a greenhouse. This results in an build up of energy, and the overall warming of the atmosphere. The greenhouse effect is a natural process which made life on Earth possible.



The main sources of these emissions, particularly carbon dioxide, methane and nitrous oxide, are:

- **the combustion of large amounts of fossil fuels** (producing CO_2)

- **deforestation** (less trees mean that less CO_2 is being mopped up)



Unfortunately global warming will probably result in big swings in weather patterns across the world. Summers will become dryer and hotter, Winters will be wetter and colder. Other things will start to happen:

- Thermal expansion of the water and melting of continental glaciers would cause sea levels to rise, possibly as much as two feet, by the end of next century.
- Rising temperatures could lead to changes in regional wind systems which would influence global rainfall distribution and lead to the redistribution and frequency of floods, droughts and forest fires.
- Increased sea temperatures would cause the destruction of coral reefs around the world.
- Climate change would create favourable conditions for growth in insect populations. This would likely have a bad effect on agriculture and human health and result in a spread of malaria and other tropical diseases.
- Water supplies would become disrupted and droughts would be more common

NASA Climate Predictions Show Serious Threat To Humanity

- https://www.youtube.com/watch?v=Mmh9mbVhh08

Pressure

- It is the force that a gas exerts on a certain area.
- The standard unit for pressure is the Pascal, which is a Newton per square meter.

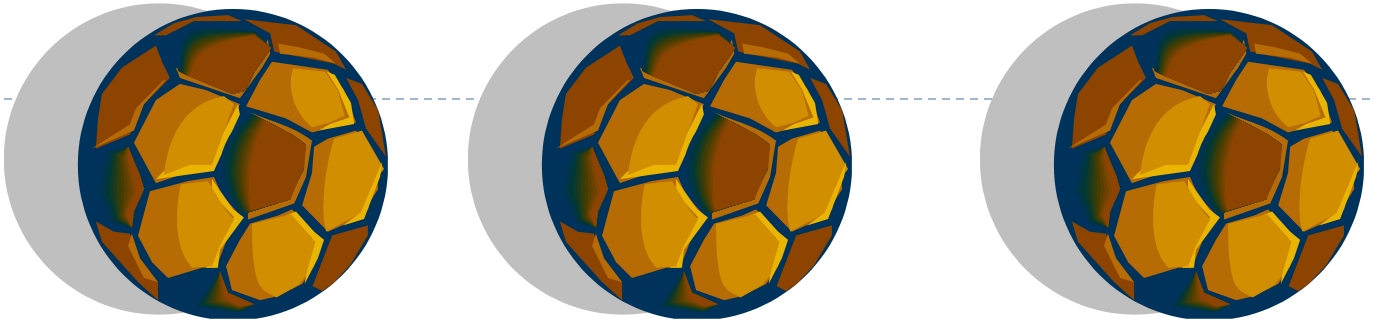
- Air Pressure_The Egg and Bottle
- https://www.youtube.com/watch?v=28TIyWdfxxc

Atmospheric Pressure

- Atmospheric pressure is defined as the force per unit area exerted against a surface by the weight of the air above that surface.

Charles Law

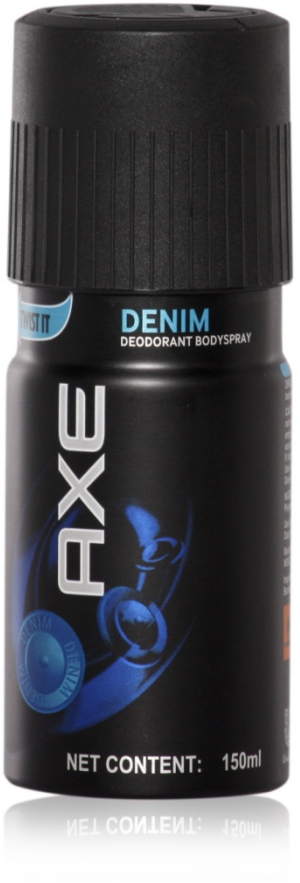
- Doubling the temperature of a gas doubles its volume, as long as the pressure of the gas and the amount of gas isn't changed.



- A inflated soccer ball taken outdoors on a winter day shrinks slightly. This is because of the change in temperature from the warm indoors to the chilly outdoors. When the ball was brought outside the temperature dropped and proving Charles law, the pressure of the air inside the ball dropped too, making the ball seem deflated.

Deodorant cans

- when you use a spray deodorant can of any sort and spray for a few seconds, the can tends to become cooler. This is a perfect example of Charles Law. When you spray the can, the liquid spray of the can is released hence decreasing pressure inside it a bit. Since the can's volume does not change the temperature falls showing the fact that with the decrease in pressure the temperature falls proportionally.



Boyle's Law

- Doubling the pressure on a gas halves its volume, as long as the temperature of the gas and the amount of gas aren't changed .

Using a Medicine Dropper

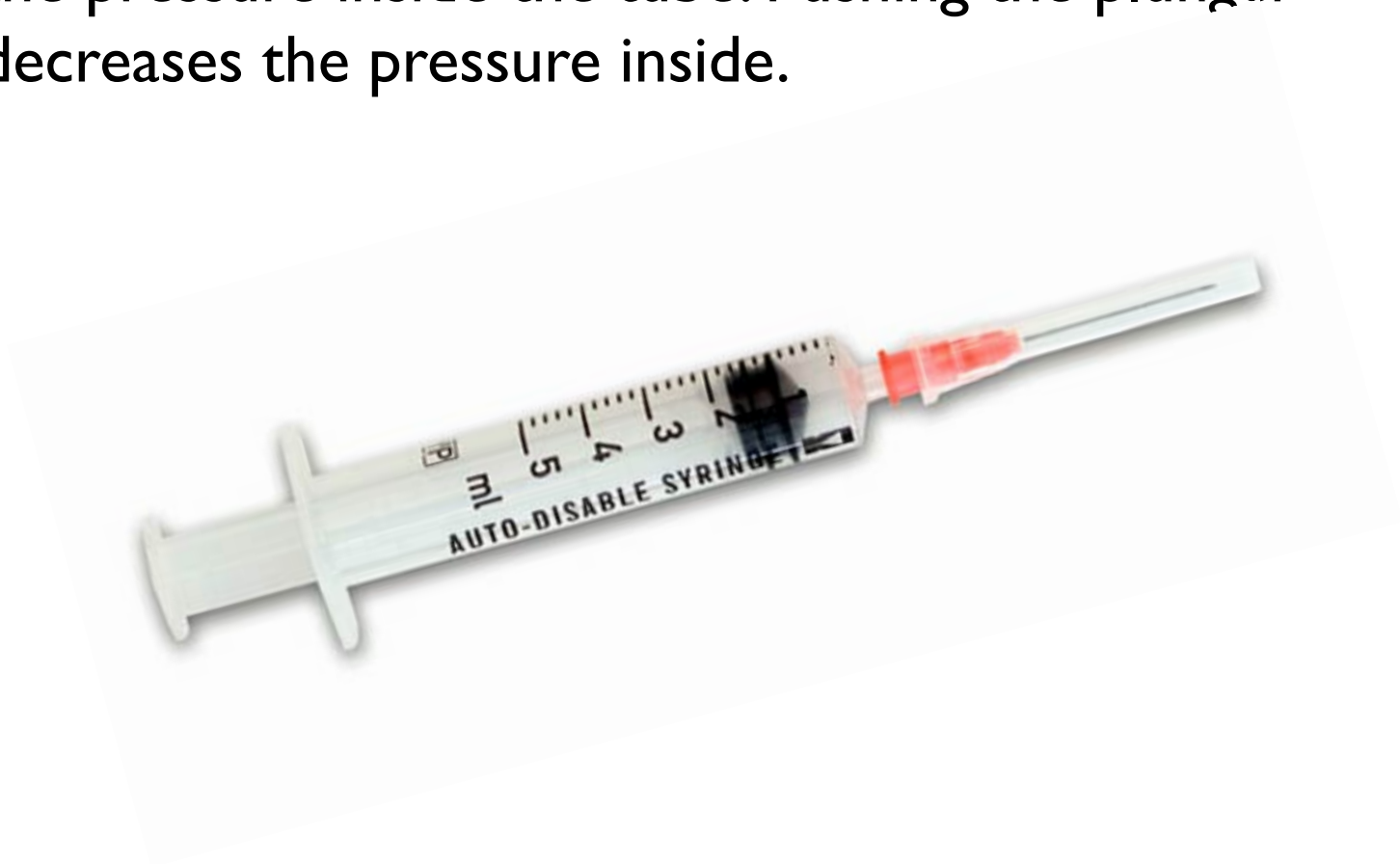
You decrease the volume inside the medicine dropper by squeezing the bulb (exerting pressure).

Straws

- With the straw just sitting in the glass, the pressure on the surface of the water is the same all over, including on the little bit of surface inside the straw. When you suck the air out of the straw, you decrease the pressure inside the straw, allowing the higher pressure on the rest of the surface to push the water up the straw and into your mouth.

Syringe

- When using pull the plunger of the syringe, you increase the pressure inside the tube. Pushing the plunger decreases the pressure inside.



Lussac's Law

- Doubling the temperature of a gas doubles its pressure

Popping party balloons

- During outdoor parties a common nuisance is having to replace popped party balloons. When the air inside the balloon heats up due to the sun they pop due to increased pressure.

- pressure cooker

- The only way to make the steam hotter (and/or to boil the water at a higher temperature) is to put the system under pressure. This is what a pressure cooker does. The trapped steam increases the atmospheric pressure inside the cooker by 15 pounds per square inch (psi), or 15 pounds above normal sea-level pressure.