WEEK TWO (22ND-26TH MARCH 2020)

CHEMISTRY

Chapter 11:

1. Air (completed)
2. Water (completed)
3. Nitrogen and Fertilisers (completed)
4. Carbondioxide and Methane

Air and Water
Carbon dioxide and Methane

Greenhouse gases

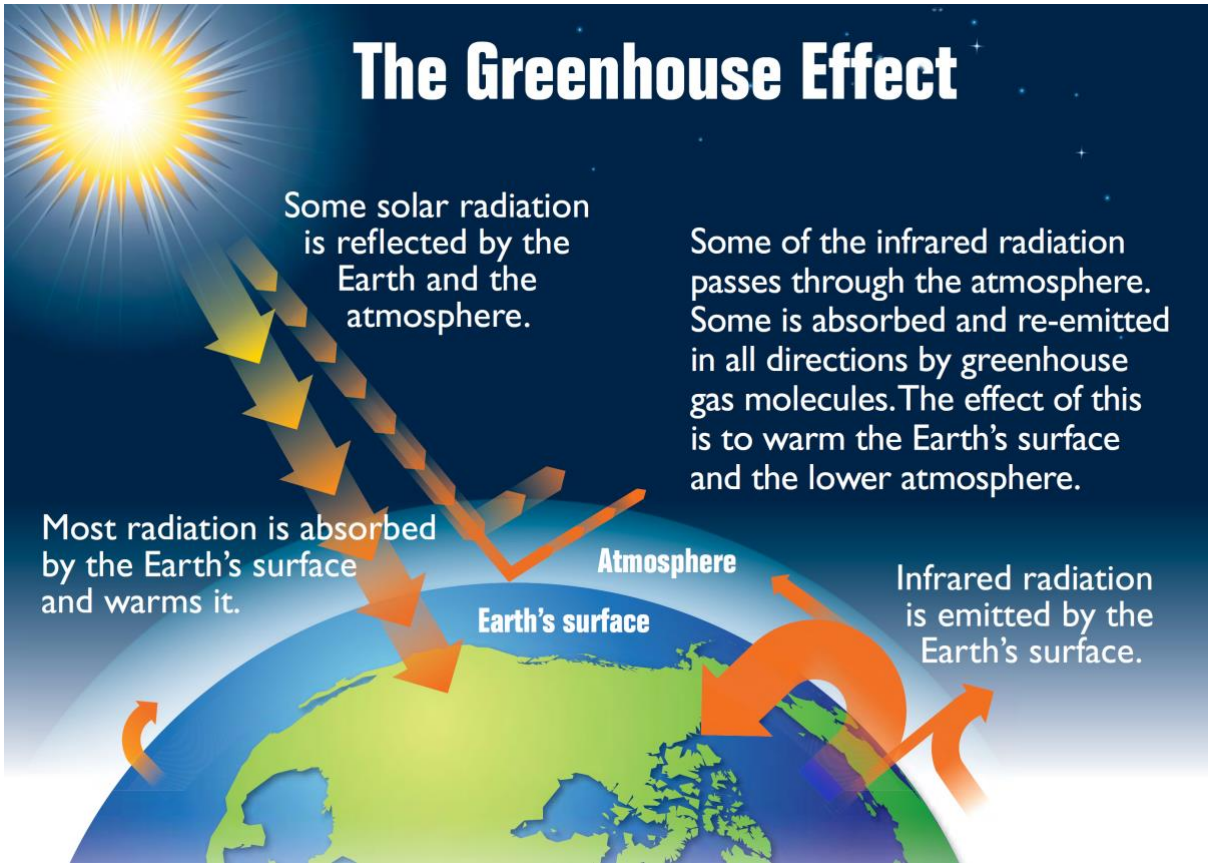
- When shortwave radiation from the sun strikes the Earth's surface it is absorbed and re-emitted from the surface of the Earth as infrared radiation.
- However much of the I.R. energy is trapped inside the Earth's atmosphere by greenhouse gases which can absorb and hold the radiation.
- Some such gases are carbon dioxide, methane water vapour.
- They both lead to climate change as they trap heat energy from escaping the Earth's atmosphere, leading to global warming.

Carbon dioxide- **Sources**: combustion of wood and fossil fuels, respiration of plants and animals, thermal decomposition of carbonate rocks and the effect of acids on carbonates.

Methane- **Sources**: digestive processes of animals, decomposition of vegetation, bacterial action in swamps and in rice paddy fields.

The Greenhouse Effect

Caused by the increased concentration and effect of Greenhouse gases, mainly methane and carbon dioxide.



Consequences:

- Climate change (increase in average global temperature) due to the increase in Earth's temperature.
- Water levels will rise as glaciers melt because of high temperatures, causing flooding in low-lying countries.
- Extinction of species due to the destruction of natural habitats.
- Migration of species as they will move to areas that are more habitable (no droughts).
- Spread of diseases eg. cancers caused by warmer climate.
- Loss of habitat due to climate change (animals that live on glaciers).

The Carbon Cycle

The carbon cycle describes the movement of carbon between the seas, land and atmosphere. In the atmosphere, the main source of carbon is carbon dioxide.

Sources of CO_2 in the atmosphere

- Combustion of fossil fuels, e.g: methane:

$$CH_4 + 2O_2 \rightarrow CO_2 + H_2O$$

- Respiration: the production of energy in living things. The overall reaction of respiration is represented by the equation:

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$$

- Decomposition of limestone.
- Reactions of acids with carbonates.

Removal of carbon dioxide from the atmosphere

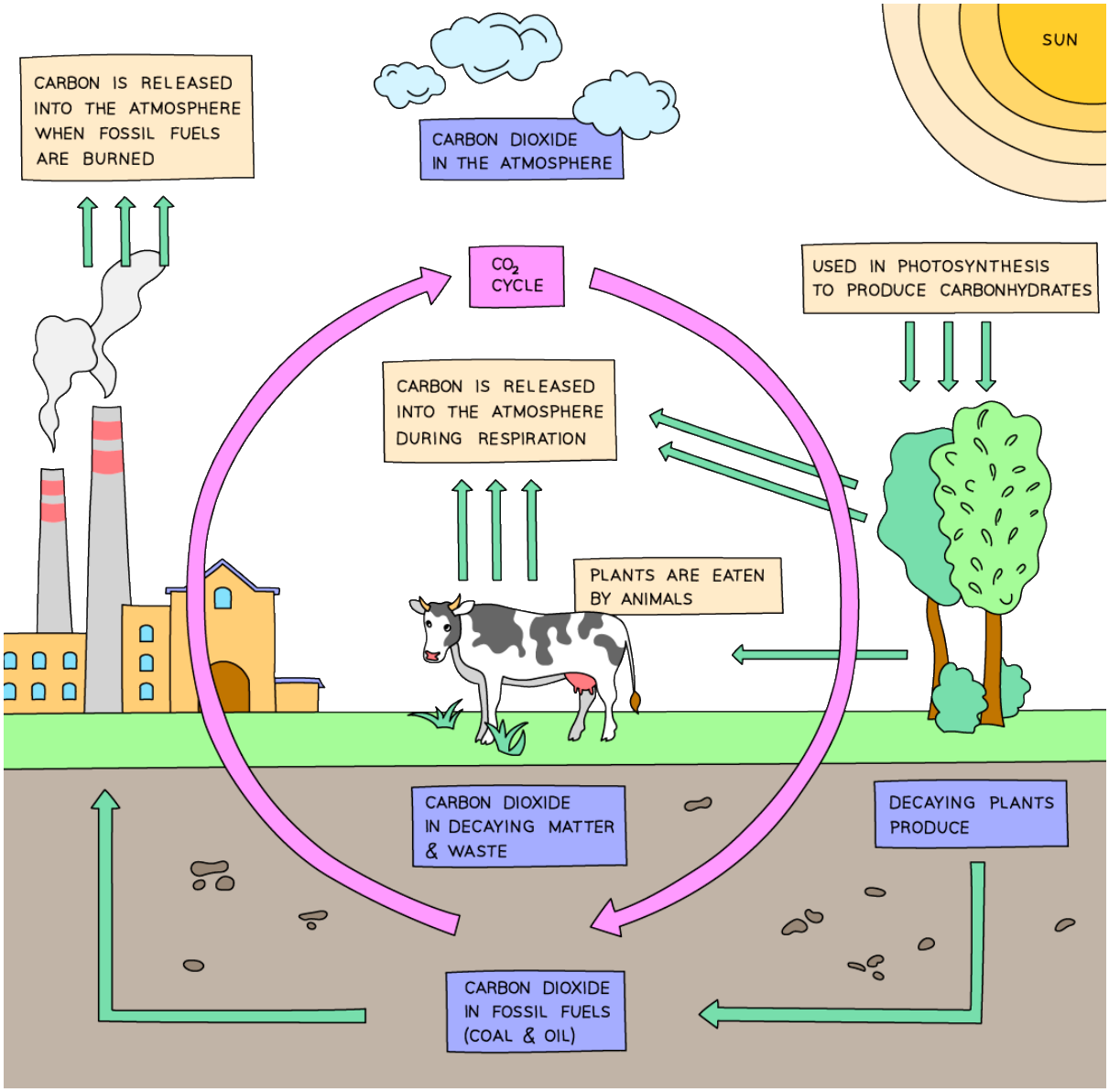
- Photosynthesis: the process of producing glucose and oxygen from carbon and water in plants in the presence of chlorophyll and light:

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

- Carbon dioxide dissolves in the water in sea and oceans and is removed by shellfish for making their calcium carbonate shells.

Balancing the carbon

- Carbon as carbonate, carbon dioxide or organic carbon compounds is present in the sea, the air and under the Earth.
- There is a continuous cycle of these compounds between these sources called the carbon cycle.
- There is a constant amount of carbon compounds in the sea, atmosphere and under the Earth.
- As long as these are balanced, the amount of carbon dioxide in the atmosphere remains **constant**.
- Scientists are worried that increasing the amounts of fossil fuels burned will increase global warming and unbalance the carbon cycle.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CARBON IS RELEASED INTO THE ATMOSPHERE WHEN FOSSIL FUELS ARE BURNED
CARBON DIOXIDE IN THE ATMOSPHERE
CO_2 CYCLE
USED IN PHOTOSYNTHESIS TO PRODUCE CARBONHYDRATES
CARBON IS RELEASED INTO THE ATMOSPHERE DURING RESPIRATION
PLANTS ARE EATEN BY ANIMALS
CARBON DIOXIDE IN DECAYING MATTER & WASTE
DECAYING PLANTS PRODUCE
CARBON DIOXIDE IN FOSSIL FUELS (COAL & OIL)