

1ST LAW OF THERMODYNAMICS

It says that energy cannot be created nor destroyed, just converted from one form to another, so the total energy in the universe is constant so it means that

The amount of chemical energy consumed when a fossil fuel is burnt **equals** the amount of heat energy released

LAW OF CONSERVATION OF MATTER

It says that in a chemical reaction, the quantity of matter does not change

So it means that

When burning coal and organic matter “hydrocarbons”, the carbon and hydrogen do not get destroyed, they just get new forms, aka water and carbon dioxide

Reservoirs of carbon

Are areas that contain carbon without minding its form, for example

- Atmosphere => carbon as CO₂
- Biomass => organic matter / hydrocarbons
- Solids => limestone and coal
- Liquid => oil and hydrocarbon petroleum
- Gas => natural gas (methane, pentane, heptane, etc.)

Fun fact : the ocean is the largest reservoir of carbon

Carbon cycle

It is the concept that many processes work together to create a global movement of carbon from one reservoir to another, basically how carbon changes forms

It goes like this

- Carbon dioxide exists in the atmosphere
- It gets turned into organic carbon in the form of sugars and what not by photosynthesis in plants
- When plants and animals die, their organic makeups turn into fossil fuels
- When animals and plants consume organic compounds in respiration, they emit carbon dioxide
- When we burn fossil fuels, we emit carbon dioxide
- Cycle returns

Anthropogenic

something that is caused or produced by human activities, for example, anthropogenic pollution means pollution caused by human activities, for example

- Scientists discovered that the levels of CO₂ in the atmosphere have increased by 25% in the last 150 years due to human activity (the industrial age)

Green house gasses

Are gasses that keep the heat energy inside the atmosphere and do not let it out, making the temperature increase

ACID AND BASE

Acid -> pH lower than 7, indicates a lot of hydrogen (H)

Base -> pH higher than 7, indicates a lot of hydroxide (OH)

pH scale is a measure to acidity and base by a range from 0 to 14

Natural rain water is mildly acidic at a pH of 5.7, because the carbon dioxide dissolves in the water to create the weak acid H₂CO₃ or carbonic acid

When burning coal, sulfur is released in the form of sulfur dioxide SO₂, which dissolves in the water creating the strong acid H₂SO₄ or sulfuric acid, which causes dangerous acidic rain

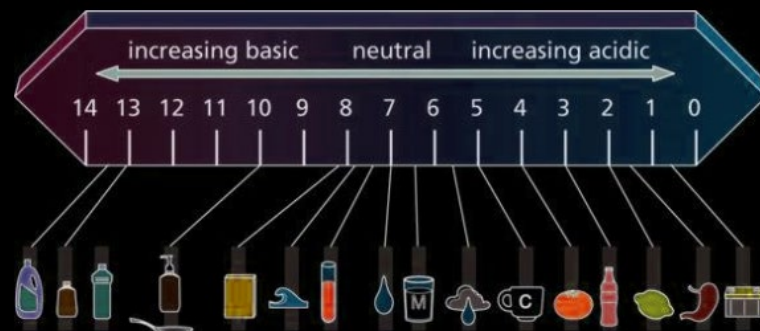
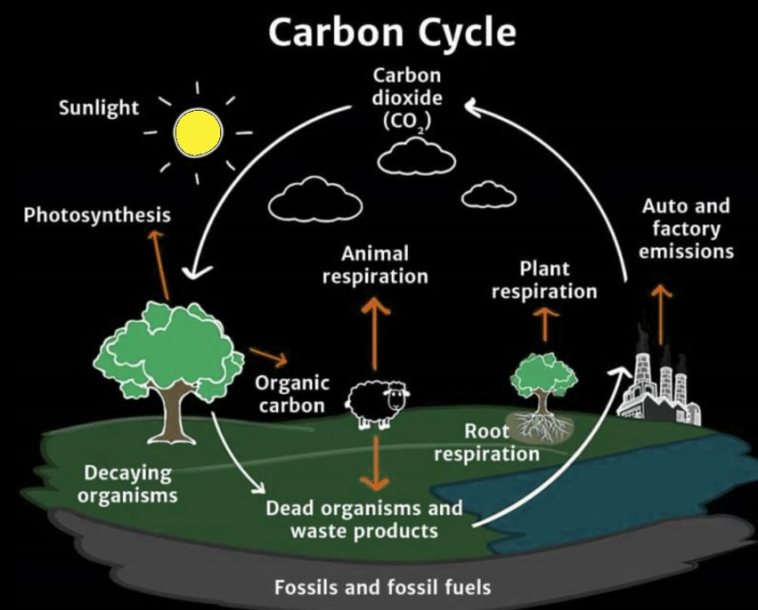
Burning of fuel produces Nitrogen oxide gasses, which turn into Nitric acid that creates acidic rain similar to sulfur

Effects of high acidity on lakes

Acid rains make lakes too acidic, which kills fish, insects, aquatic plants and planktons, this will remove the whole food web of the lake and make it “dead”

Biggest example of acidic dead lakes is Lake Aci in Italy

NOTE -> these bad byproducts of burning fossil fuels are called “flue gas”



NOTE:

Burning of coal is not the only source of sulfuric acid and nitric acid. Petroleum fueled power plants, smelters, mills, refineries, and motor vehicles produce these acids as well.



Scrubbing

Is the removal of sulfur dioxide, ash, and other harmful by products from burning fossil fuels

- Flue gas enters the chamber
- It is sprayed with calcium carbonate that carries the acids with it, cleans gasses like oxygen pass normally
- An oxidizing gas is pumped into them to create gypsum from the flue gas, the SO₂ Is turned into calcium sulfate
- The contaminated liquid is pumped throw limestone for purification then goes back to the spray tower
- Cycle continues

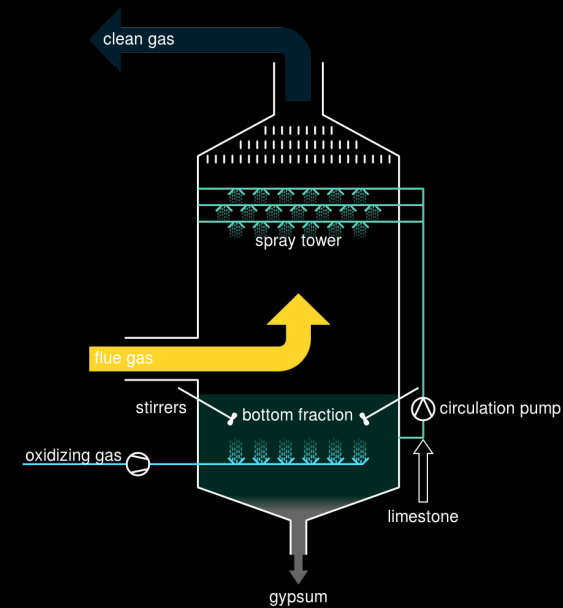
The effects of oil spills on life

When shipping oil from country to country, some of it might spill

- Contamination of coastal and marine ecosystems
- Impact on human health, either from inhaling toxic fumes, consumption of contaminated fish or shellfish
- Disruption of coastal vegetation due to oil-saturated beach sand and gravel
- Decrease in recreational activities like fishing, boating, swimming and scuba diving
- Long term effect on economies depending on sea activity

Efforts to clean up spills

- **(the riser)**
It is a pipe that connects the well at the ocean floor to the drilling platform, instead of just letting it spill around
- **(fire booms)**
U-shaped devices that were towed behind boats and used to pull oil to controlled areas by safe burnings
- **(Dispersants)**
Chemicals change the properties of oil to reduce its potential effects
- **(sand berms)**
Stuff constructed along the gulf coast to capture oil from the spill



ADVANTAGES AND DISADVANTAGES OF ENERGY RESOURCES

Aspect	Positive Impact	Negative Impact
Quality of Life	Maintained at a very high level	Deterioration due to air pollution from burning fossil fuels
Employment	Indirectly provides jobs for many people	Potential financial burden on households due to energy costs
Environmental Impact	-	- Acid rain - Possible contribution to global warming - Groundwater contamination
Community Responsibility	Opportunity to reduce negative impacts through personal and community actions	