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The Big Bang created the solar system, and with that the first elements. Hydrogen and helium. Dying low-mass stars then created the following 3 elements, lithium, carbon and nitrogen. The cosmic ray fission next brought beryllium and boron to the galaxy. Lastly, massive exploding stars created oxygen, phosphorus, sulfur..., rubidium.

The events that lead to organic chemicals becoming life include any of the events that occurred in the Ga section of the diagram. It's this time that held the events that lead to this "change" because, during this time the universe was created, sun, moon, earth, and so on. If these events didn't happen a billion years ago, the elements wouldn't have developed into what they are today.

Solar Energy ³ Radiation

Solar energy can effect everything living on earth dramatically. There are 3 levels to the ocean, the Euphotic (daylight), zone at the surface level, it's where photosynthesis can occur because sunlight can reach there. The Dysphotic (twilight) zone is at approximately 660ft below the surface, almost no light can get to here. Lastly the Aphotic (midnight) zone which is approximately 3300ft below sea level, no light can get to this level, so no photosynthesis can occur here. The only light source is created by bioluminescent organisms. When sunlight hit the water it spreads. 5-10% of sunlight that goes into the water is scattered. 90% of sunlight is absorbed at 2 meters into the surface level (which transfers heat). The amount of sunlight depends on the sun's position. Through convection and wind heat transfers across the entire ocean surface. Under the surface microscopic organisms give off oxygen and absorb C_2 . Fish closer to the surface are able to identify colour with more ease because they receive sunlight. Fish with UV vision see clear fish in deeper waters, they don't receive sun. Most of photosynthesis comes from the seas. PAR is the light range for photosynthesis, it's 400-700 nm range. All living organisms are dependent on photosynthesis because it keeps us alive. UV, UVA, URB effects this process. If water is covered by snow or ice it will stunt the process of photosynthesis. The surface of the earth reflects and traps radiation, this warms the earth (aka warm air). Then, hot air rises. UV light comes from the sun, it decreases photosynthesis by 20%. Although, our clouds and atmosphere block most of the radiation. Infrared light is 49.9% and is unable to go below ocean level.

Bases Of Life



Our bodies need oxygen, hydrogen and carbon dioxide to survive for the following reasons. Oxygen is what fuels our cells and assists in supplying the necessary building blocks our bodies need to survive each day. The cells inside us merge oxygen with nitrogen and hydrogen to make many proteins that create new cells.

Our bodies are made up of mostly water, water is made from one part hydrogen and one part oxygen. Without hydrogen, basically there's no life that can exist. Hydrogen, is connected to carbon and nitrogen, is almost part of every molecule in the human body: DNA, proteins, sugars, fats.

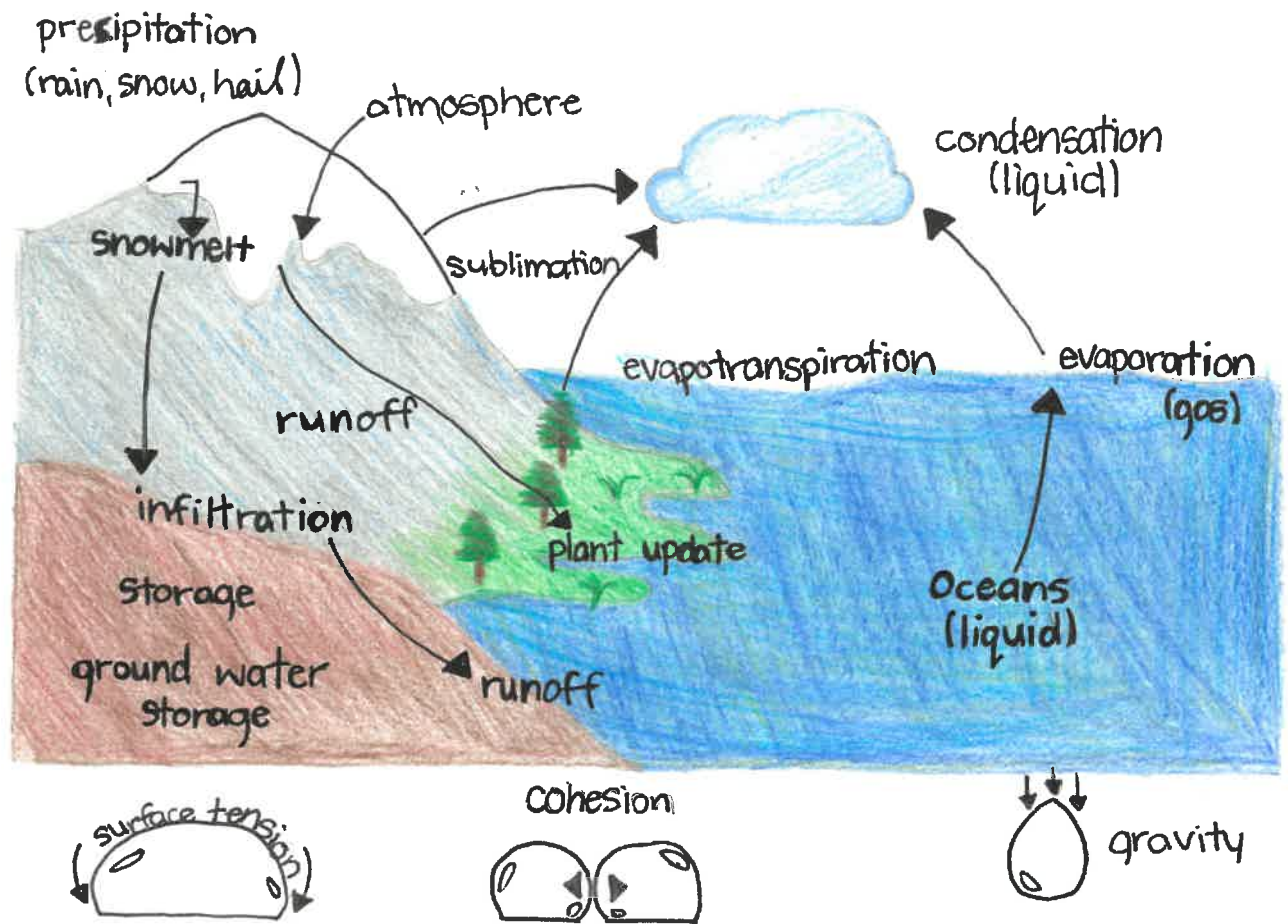
Carbon dioxide is formed in our bodies because of cellular respiration, basically important nutrients are turned into energy in the company of oxygen. The carbon dioxide created is then taken out of our bodies by parting in our blood and through connecting with hemoglobin to be taken to our lungs, where you breathe it out. Carbon dioxide is important because without it we would be taking in more air than we were giving out and our lungs would get so full they would burst.

<https://www.scienceabc.com/humans/why-does-the-human-body-release-carbon-dioxide.html>

<https://answers.yahoo.com/question/index?qid=20070518204705AAL3ZG8>

<https://www.vitalitymedical.com/to-air-is-human-why-your-body-needs-oxygen>

The Water Cycle

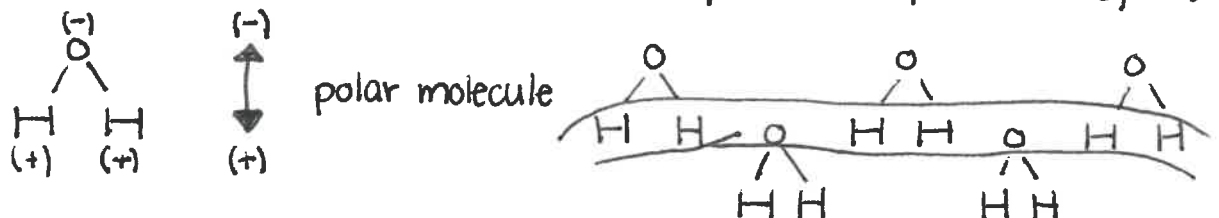


Three behaviours of water:

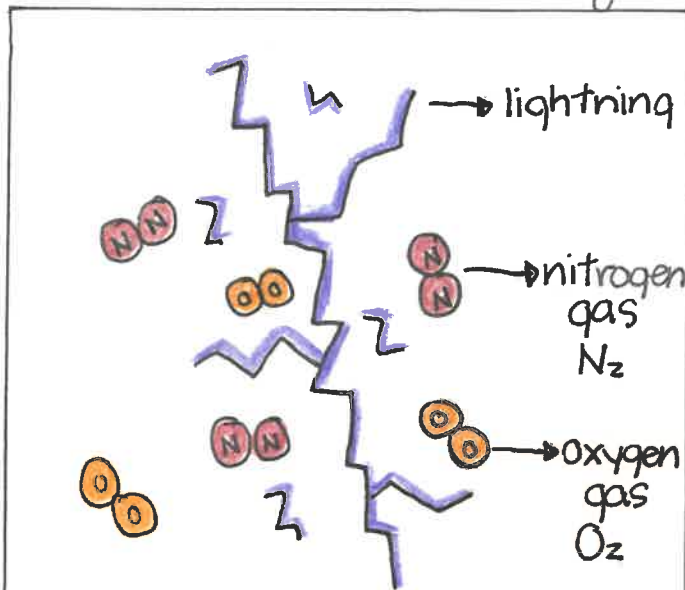
1. liquid water travels down due to gravity
2. water will form a film due to surface tension
3. water will shock together and merge with other water due to cohesion

cohesion is water's ability (desire) to form a whole and merge with other bodies of water. Due to the polar nature of H_2O .

surface tension is water's ability to hold together (through attractive forces) at its surface. It creates a film, or connected barrier, which can hold up (floating) solid objects.

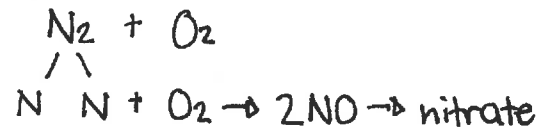


The Nitrogen Cycle

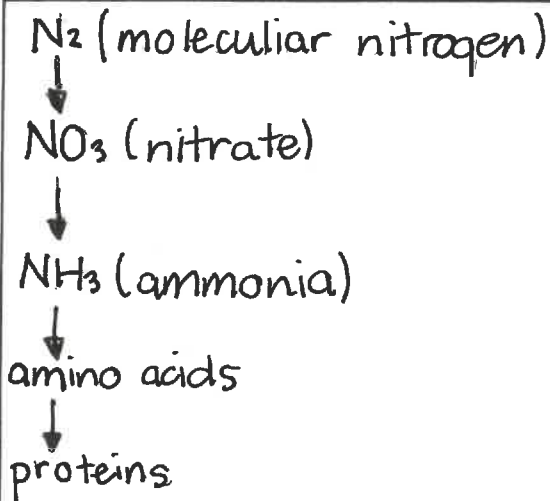


Nitrogen

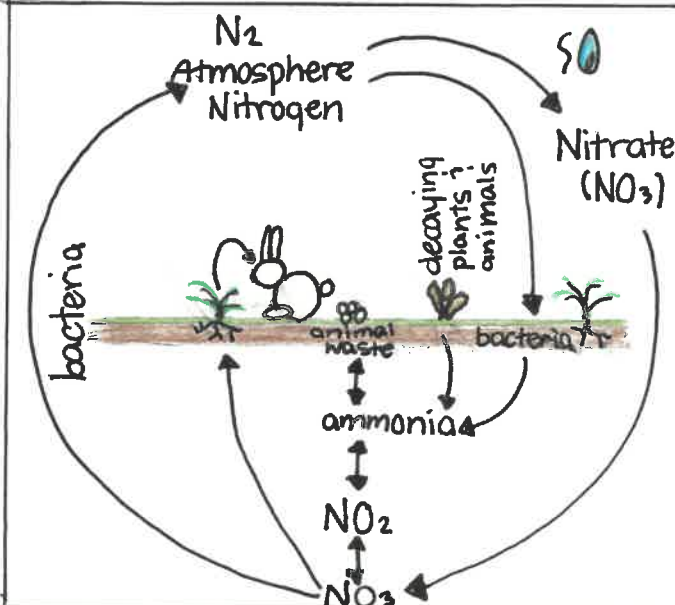
Lightning splits N_2 (gas) into $N+N$, unstable single N pairs with oxygen.



Rain then brings NO to the soil where the cycle continues.

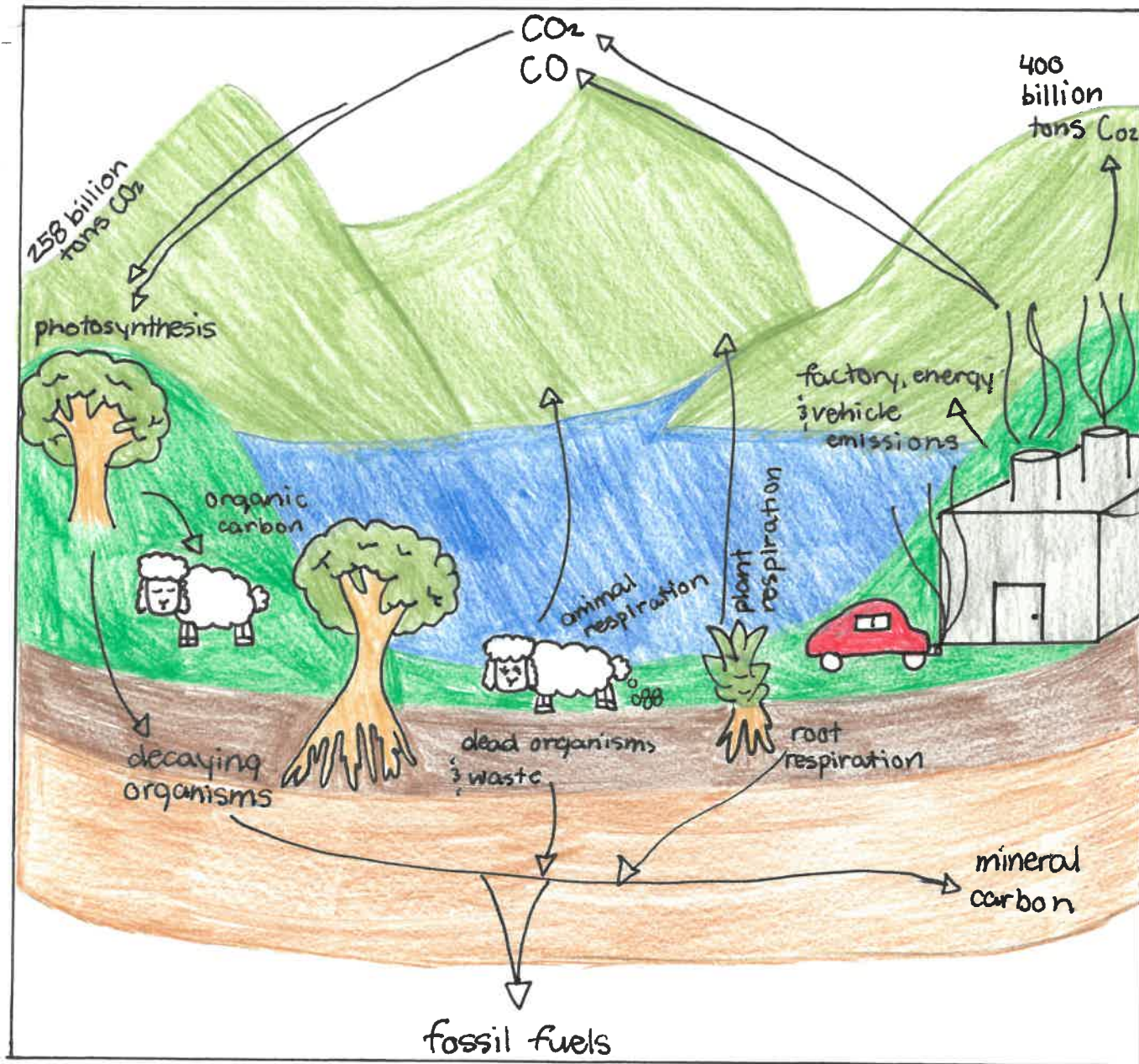


Nitrogen is the 7th element on the periodic table, it's a non-metal like carbon and oxygen. Nitrogen's atomic mass is 14.01. It makes up 3% of the human body and over 70% of the atmosphere is Nitrogen. Nitrogen is a organic element, and has a natural gas state.

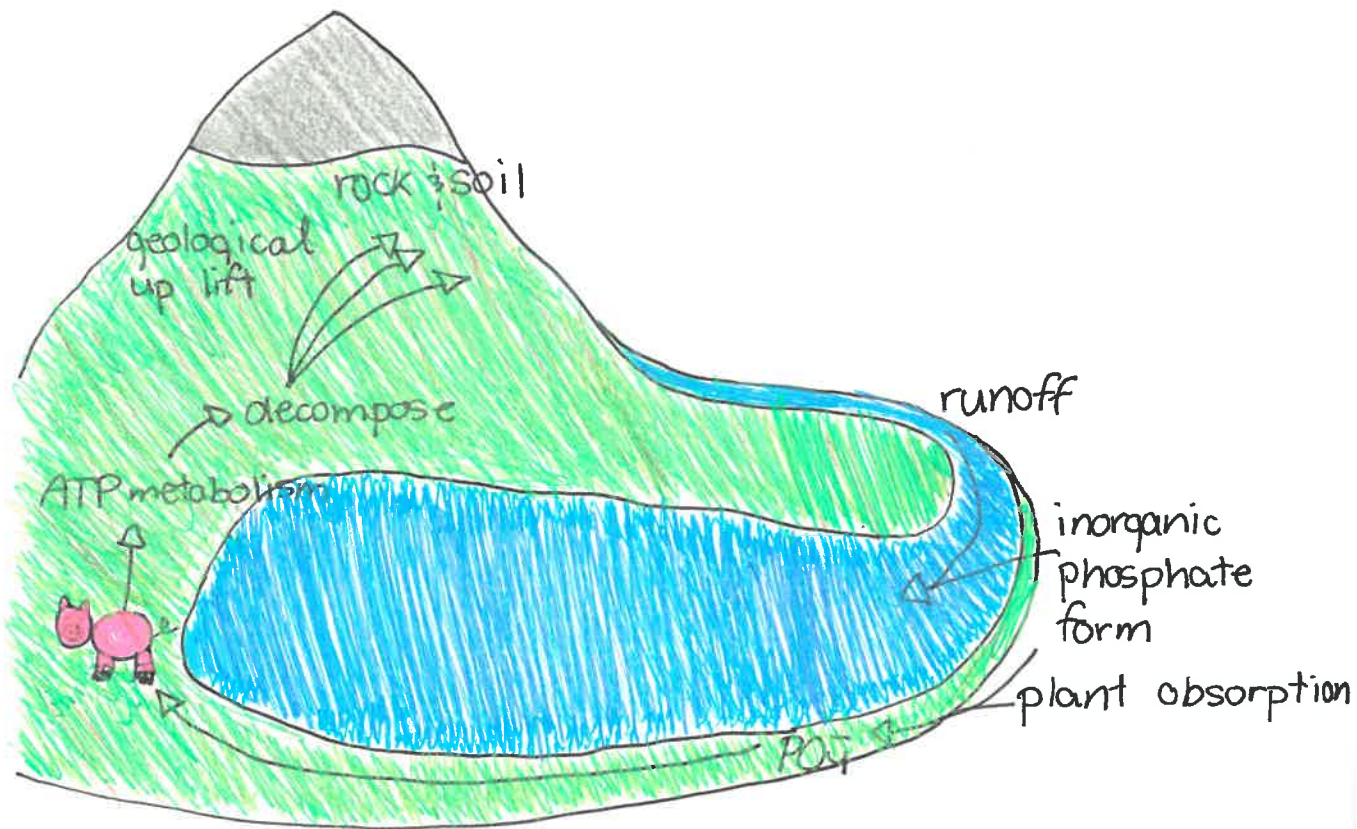


Plants need nitrogen to survive, they absorb it from the soil. The nitrogen molecules floating around in the air get struck by lightning, splitting them. Unstable single N pairs with oxygen, they search for water (H_2O). Rain dissolves NO and brings it to soil, plants absorb it from soil and we get our 3% from eating the plants.

The Carbon Cycle

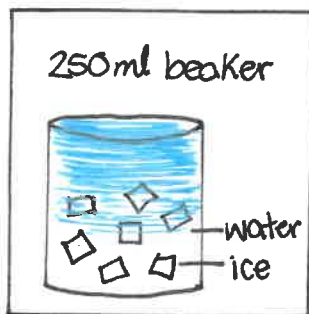


The Phosphorus Cycle



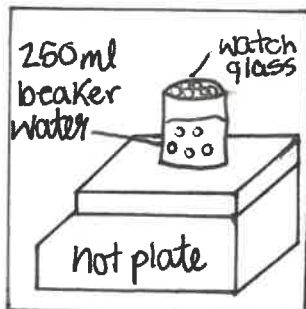
In main lesson this week I learned first hand just how much "learning involves recognizing the consequences of one's actions." A case that stood out the most for me was the carbon cycle. It's common knowledge the society transmits literal tons of carbon into our atmosphere. I had no idea just how much is actually produced each year. Learning about the carbon cycle gave me the opportunity to recognize how little actions I make can contribute to such a huge thing.

Condensation : Distillation



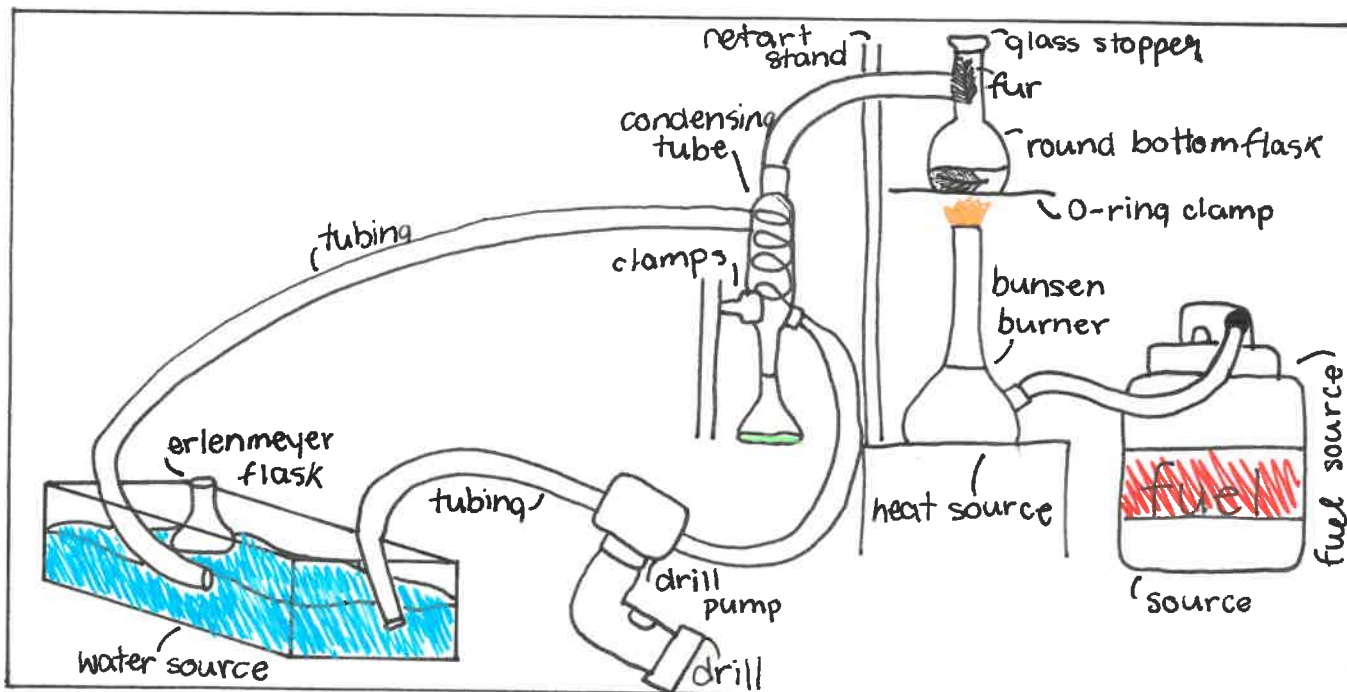
inference: ice & water in a warm beaker will melt & water will form on the outside.

hypothesis: if ice and water are placed inside a beaker, then the glass will change in temperature and condensation will start to form, because the room's temperature and the beaker's temperature are very different.



inference: a beaker with water heated will evaporate, then condense on the watch glass.

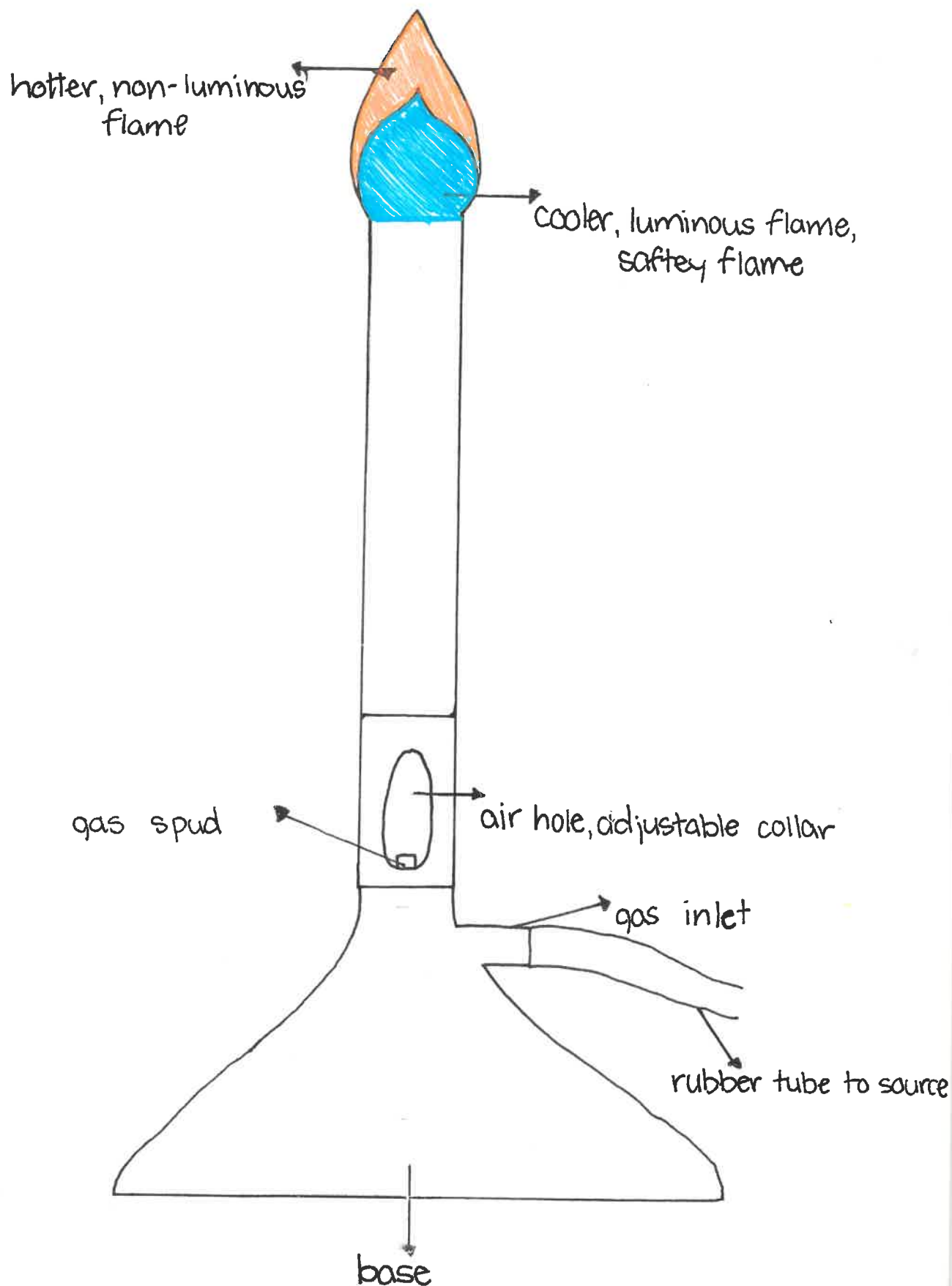
hypothesis: if water in a beaker with a watch glass on top is heated with a hot plate, then condensation will form on the watch glass because the bottom of the beaker is hot, the middle is warm and the top is cool.



inference: water heated over fur in a distillation apparatus will create 'fur' essential oil.

hypothesis: if water is warmed with the firs (plant matter) it will evaporate. Then it will condense because the evaporated plant water will be in close connection with cold water, it causes it to condense into a hydrosil because of the difference in water temperature.

Bunsen Burner



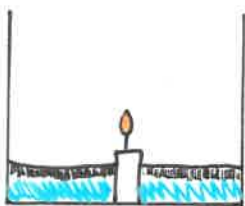
4 Combustion Demonstration

1. candle with water



A lit candle was placed inside a beaker, water was poured $\frac{3}{4}$ of the way up the candle. A erlenmeyer flask was placed over it. The flame went out instantly and the water started to fill the flask.

2. candle with limewater



limewater was poured into a beaker with a lit candle. After time, a cloudy film started to build on the water's surface. With more time the cloudy/foggy film started to seep from the surface. This fog slowly turned gray with time, when PH was tested it came out as 12.

3. flame on surface



a erlenmeyer flask and scuplia were placed just touching the safety flame. After time, a black residue began to develop on the bottom of the objects, where the flame touched. When rubbed, the black transferred to Mr. Powers finger.

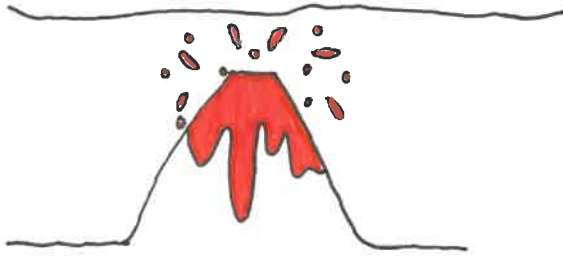
4. steel wool

beaker + wool	109.86g
beaker	101.83g
mass of steel	8.03g
beaker + wool after	110.49g
mass of steel	8.66g

Steel was a silver gray before burned, after burned the steel wool appeared darker. (a dark gray with a hint of blue). The steel became more brittle and started to break off. At first, the wool when burned sounded like it was popping, after it sounded as if it was growling. The mass from start to finish changed. It became heavier.

Precipitation

- snow, rain, hail
- lime water + CO_2
- super \rightarrow dissolved juice crystals left over time
- dissolving is a thing combining together, precipitation is the opposite where one thing "falls out" of something else
- metals precipitate out of water in pipes
- vents in bottom of ocean release sediment

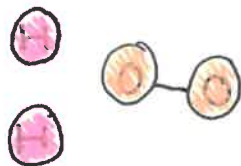


DNA precipitation

- a ziplock bag was filled approximately with 2.5 ounces of water, $2\frac{1}{2}$ pumps soap, 3 pinches of salt, $\frac{1}{4}$ chunk of banana.
- seal ziplock bag, release air from within.
- combine the ingredients (mix), try to leave no/few banana chunks.
- Place mesh over a test tube, pour the ziplock contents onto mesh, fill test tube $\frac{1}{3}$ full.
- Use a pipette to add $\frac{1}{3}$ ethanol to test tube.
- gently stir using stick, when the DNA is floating at surface level, scoop and have fun.

Organic Molecules

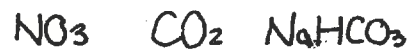
element
/
single atom of
a type



vs

compound

more than one type
of element




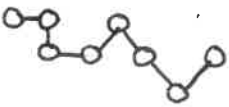

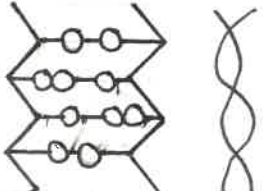
physical change

vs

chemical change

- change of state, or physical property, without changing the arrangement of element / compounds
- precipitation (rain)
- distillation
- condensation
- water cycle

- result of a reaction where a new chemical is formed, changing the arrangement of element / compounds
- nitrogen cycle
- photosynthesis
- combustion
- precipitation (DNA)
- CO_2 + limewater
- fermentation
- carbon cycle

Carbohydrates	Proteins	Lipids	Nucleic Acids
ex. grains, sugars, fiber, starch	ex. protein, building blocks, enzymes	ex. fats, phospholipids, waxes, steroids	ex. DNA, RNA, m RNA,
monosaccharides	amino acids (21 types)	fatty acids	nucleotides
			
building blocks			
• instant energy, fuel	• long-term energy, building blocks	• long-term energy, insulation	
function			

Naming Rules

LUPAC naming rules

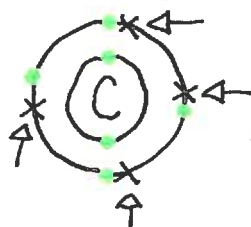
Elements: oxygen (O) hydrogen (H) carbon (C)

how many bonds can each element form?

Carbon 1. what is the atomic # = 6

2. how many electrons does it have = 6

3. in what order do we assemble electrons (valence shells) = 2, 8, 8, 16...

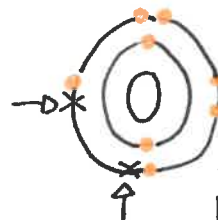


outer shell wants a complete set of 8 electrons... So it will search for 4 bonds

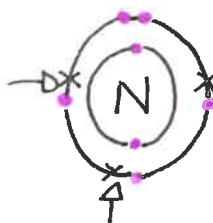
4. how many bonds will carbon form = 4



atomic # = 1
of e^- = 1
valence shell = first
bonds = 1



atomic # = 8
of e^- = 8
valence shell = first, second
bonds = 2



atomic # = 7
of e^- = 7
valence shell = first, second
bonds = 3

element	bonds
hydrogen	1
carbon	4
nitrogen	3
oxygen	2

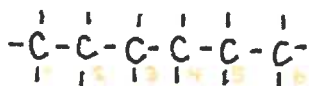
1- meth-	6- hex-
2- eth-	7- hept-
3- prop-	8- oct-
4- but-	9- non-
5- pent-	10- dec-

rules

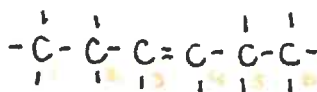
1. Know # of bonds
2. carbon forms the backbone
3. name the backbone depending on the prefix
4. add the ending depending on molecule type
5. only spaces (bonds) left. Fill with hydrogen

Alkenes double bonded 'hydro carbon' molecules

ex 1 (-ane)



ex 2 (-ene)



Naming Rules #2

Alkynes (-yne)	Alkynes (-yl)
propyne $-C_1 \equiv C_2 - \overset{\overset{ }{C_3}}{\underset{\underset{ }{ }}{C_4}}$	$ \begin{array}{c} H_3C-CH_2 \\ \quad \quad \quad \diagdown \\ \quad \quad \quad CH-CH_3 \\ \quad \quad \quad / \\ H_2C-CH_2 \\ \\ CH_3 \end{array} $ 3-methylhexane

Rules for Alkyls

- identify the backbone (it's the longest parent chain)
- using the prefix, identify the ending (meth, eth, dim, tri)
- determine how many chains there are
- recognize which carbon molecule has chain branches coming off
- using the prefix, figure out how many molecules are in that chain. Put the correct name (hex, dec, hept, etc) in front of (-yl)
- repeat for each chain(s)
- put name (hex, dec, hept, etc) in front of (meth, eth, dim, tri)

Veterinarian

When we are feeling ill, we give our doctors a call. Animals can't communicate how they feel, their biology is unlike ours. We must take them to a specially trained animal doctor, better known as veterinarians or vets.

Vets diagnose/treat sick and injured animals. A animal doesn't always go to the vet just because they're sick, vets also supply preventive medical care. They vaccinate and do check-ups on your animal to make sure they are/remain healthy and happy. Vets will also give pet owners advice about animal care and breeding.

- examining animals
- doing blood tests or x-rays
- diagnosing sicknesses
- treating diseases or injuries
- performing operations
- vaccinating animals
- euthanize old/sick animals
- may specialize in the care of small household pets or large farm animals

Core Tasks

- 50-60 hours a week, with some evenings & weekends
- may travel locally to visit animals
- some animals are dangerous or can transmit diseases to humans
- work inside in offices and treatment rooms, or outside at farms & zoos
- work with animals, talk to owners, vets, and farm or zoo workers
- working including large animals may be physically demanding

Workplace

You need a professional degree from a vet school. You can start preparing in highschool by getting good grades and taking lots of math and science classes. After highschool, 2-4 years of university are needed to just apply for a vet school. You need very high marks to go to a veterinary medicine program.

It takes 4-5 years to finish vet school. When done, you get your Doctor of Veterinary medicine degree. Before being able to practice, you must pass the national board exams for veterinary medicine. You must also be a member of your provincial veterinary medical association.

Aleen Cust

Aleen was born February 7, 1868 in Cordangan Manor near Tipperary town. She was born into an aristocratic English family, in 1878 her father Leopold Cust died abruptly and the Cust family of 4 boys and 2 girls moved to England with their mother.

Aleen joined New Veterinary Collage Edinburgh in 1894 as a student against her families better judgement, the Royal Collage of Veterinary Surgeons felt the same. In 1900, she left because she was denied the right to sit the final exams. She did however get a letter of recommendation from the collage principal. She got a job as a Veterinary Assistant by William Augustine Byrne MRCVS, she later was appointed to the post of Veterinary Inspector by Galway Co. Council.

In 1910, William Byrne passed and she ran his veterinary practice with succes.

In 1915, Aleen ventured to France to help at the Veterinary Corps treating warhorses although she still had not been recognised professionally by the British Army.

On December 23, 1919 the Sex Disqualification (Removal) Act came into law. The Royal Collage Veterinary Surgeons were no longer able to refuse Aleen the right to practice veterinary medicine.

Aleen Cust was finally granted the ability to sit the final exams and get her diploma from the RCVS on December 21, 1922. Making Aleen Cust the first female veterinary surgeon in Britain and Ireland.