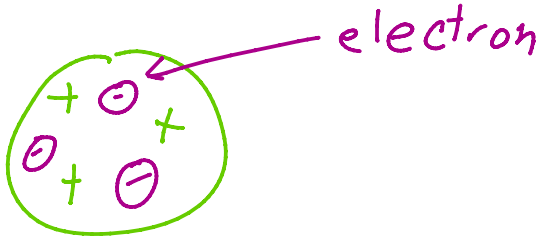
Atoms and Elements Review - Period 5

October 21, 2019 8:32 AM

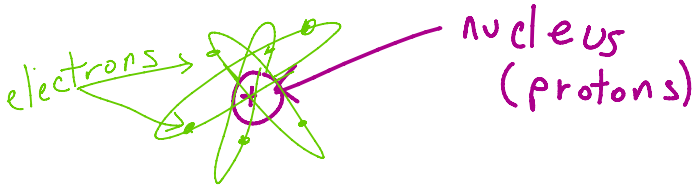
Chemistry Review

- **History**
  - Who were the people and scientists we discussed that contributed to the model of an atom?
    - What was each person's belief or goal, and if they had a model of an atom, what was it?
    - Include: Aristotle, Democritus, John Dalton, J.J. Thomson, Ernest Rutherford, Niels Bohr
    - **Aristotle:** 4 Element Theory - everything was made up of 4 elements: earth, air/wind, water, fire.
    - **Democritus**: Everything was made up of tiny, indivisible particles: called them '*atomos*'
    - **John Dalton**: Billiard ball model - atoms were tiny, indivisible spheres. They could not be broken, and made everything up.
      - Atomic Theory

    - **JJ Thomson**: Plum Pudding Model - atoms were positive spheres with negative electrons spread throughout.
      - He discovered the electron



    - **Ernest Rutherford**: Nuclear Model - atoms have a dense positive nucleus, and had electrons in empty space around the nucleus.
      - He discovered the proton



    - **Niels Bohr**: Planetary Model (Bohr Diagram) - atoms have a nucleus with protons and neutrons, and the electrons are organized onto different energy levels (orbits/shells)
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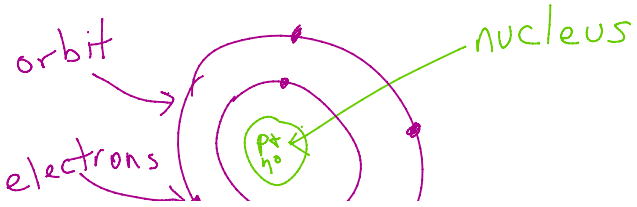
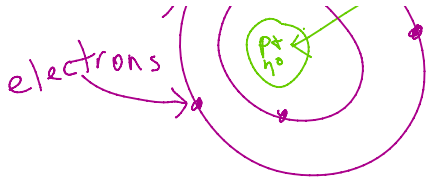


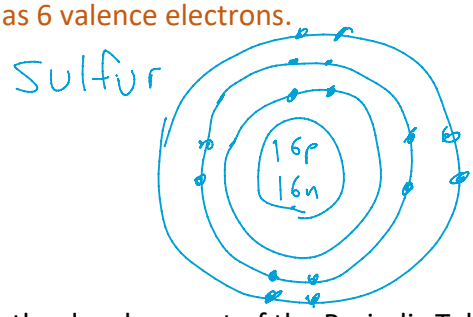


- **Model of an atom**
  - What are the 3 subatomic particles?
    - Protons
    - Electrons
    - Neutrons
    - What are the charges of each particle?
      - Protons - positive (pros are good!)
      - Electrons - negative (electrocution is bad)
      - Neutrons - neutral (NEU-tral)
    - What is the mass (or weight) of each particle?
      - Protons - 1 atomic mass unit (amu)
      - Electrons - have no mass
      - Neutrons - 1 atomic mass unit (amu)

      *****This is why we take the mass subtract protons to figure out the number of neutrons!)
    - Where is each particle found in the model of an atom?
      - Protons - in the nucleus
      - Electrons - around the nucleus/on orbits
      - Neutrons - in the nucleus
      - ***Think of Bohr Diagrams!!!!
    - How can you find the number of each particle from the periodic table?
      - Protons = atomic number
      - Electrons = same as protons (atomic number)
      - Neutrons = atomic mass subtract the protons (atomic number)

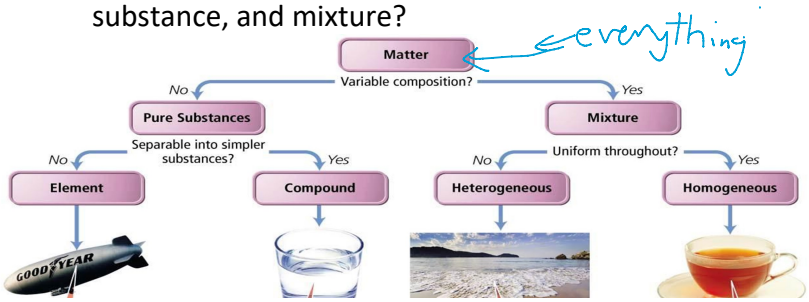
- **Bohr Diagrams**
  - How do you draw a Bohr diagram?
    - Step 1: Determine number the protons, neutrons, and electrons
    - Step 2: Draw the nucleus, and put the number of protons and neutrons inside.
    - Step 3: Draw the correct number of orbits (period number = number of orbits)
    - Step 4: Draw the correct number of electrons on each orbit.
    - How do you determine the amount of protons and neutrons?
      - Protons = atomic number
      - Neutrons = atomic mass subtract the atomic number
    - Where do the protons and neutrons belong in the diagram?
      - In the nucleus
    - How many electrons belong on each orbit/shell?
      - 1st orbit = 2 electrons
      - 2nd orbit = 8 electrons
      - 3rd orbit = 8 electrons
      - ***Remember to look at the number of elements in each period!
    - What is the valence orbit/shell?
      - The outermost shell/orbit
    - What are valence electrons?

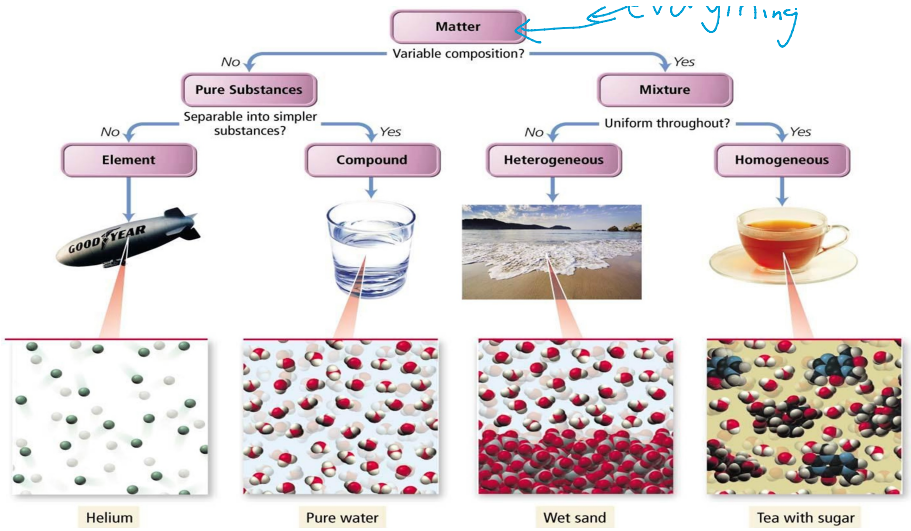
- The electrons on the outermost orbit/shell
- What is an easy way to find the number of valence electrons using your Periodic Table?
  - Count across the periods!
  - Ex: Sulfur - when you count across the 3rd period, sulfur is the 6th element. That means that sulfur has 6 valence electrons.



- **Periodic Table**
  - Who were the scientists that lead to the development of the Periodic Table?
    - **Mendeleev**: organized elements based on their atomic mass
      - He's the father of the periodic table!
      - He predicted elements that were not discovered yet!
    - **Moseley**: organized elements based on their atomic number (proton number)
  - What are the columns of the Periodic Table called?
    - What do these columns have in common?
    - Columns are called **groups**
      - **Families** are groups with special names
    - They have the same number of valence electrons, and they react/have similar properties
  - What are the rows of the Periodic Table called?
    - What do these rows have in common?
    - Row are called periods!
    - The elements in a period have the same number of orbits/shells
    - **The period number will tell you the number of orbits/shells
  - What are the names of specific groups or families that are coloured on your Periodic Table?
    - Include: Alkali Metals, Alkaline Earth Metals, Halogens, Nobel Gases
    - Group 1 2 17 18
    - ***This is on your periodic table!!! DO NOT FORGET IT!!!!
  - Where do you find metals on the Periodic Table?
    - Left of the staircase
  - Where do you find metalloids on the Periodic Table?
    - Above and below each step of the staircase (exception is aluminum)
  - Where do you find non-metals on the Periodic Table?
    - Right of the staircase

- **Classifying Matter**
  - What is matter?
    - What is the difference between the terms atom, element, compound, molecule, pure substance, and mixture?





- How is matter classified into metals, non-metals, and metalloids?
  - What are the common properties of metals and non-metals?
  - **Metals**: shiny, malleable (bendable), ductile, conduct electricity and heat, solid at room temperature (except for Mercury)
  - **Nonmetals**: dull, brittle, poor conductors, solid or gas at room temperature (except Bromine)
  - **Metalloids**: each metalloid is different (variety) because they act like both metals and nonmetals
  - ***Table in Notes 1.05
- What is the difference between a physical property and a chemical property?
  - What are examples of each?
  - **Physical**: trait (characteristic) of a substance that can be observed without changing the substance/atoms
    - Ex: colour, hardness, malleability, elasticity, shape, state, lustre, ductility, odor, density, magneticity, boiling or melting points, viscosity, solubility, conductivity, texture, etc.
  - **Chemical**: trait can only be observed by changing the substance/atoms
    - Ex: reactivity, corrosion, combustibility/flammability, toxicity, oxidation, etc.
  - ** Notes 1.05 and Assignment 1.05
- What is the difference between a physical change and a chemical change?
  - What are examples of each?
  - **Physical**: change in the physical properties
    - Does not change the substance at an atomic level, or it can be reversed.
    - Ex: melting ice, crushing chalk, cutting paper, inflating a ball, etc.
  - **Chemical**: change in the chemical properties
    - Does change the substance (something new has formed)
    - It cannot be reversed (easily)
    - Ex: burning a match, baking soda with vinegar, lab with aluminum foil, etc.
  - **Notes 1.05 and Assignment 1.05b
  - How do you know a chemical change has taken place?
    - 5 Signs of a Chemical Change

1. Change in colour
2. Change in smell (odor)
3. Change in energy (heat, light, sound)
4. New solid forms from liquids (precipitate)
5. New gas forms (bubbling or fizzing)

- **Counting Atoms**
  - How do you determine the elements that are written in a formula?
    - Look for the symbols!!
    - **Remember, each capital letter is a new element!!!
      - CO = 1 atom of carbon, 1 atom of oxygen
      - Co = 1 atom of cobalt
      - CI = 1 atom of carbon, 1 atom of iodine
      - Cl = 1 atom of chlorine
  - How do you determine the number of each type of atom in a formula?
    - Look at the subscript directly after the symbol
    - If there is a coefficient, multiply the subscript by the coefficient
  - How do you determine the number of molecules from the written formula?
    - Look at the coefficient!
  - What is the difference between a subscript and a coefficient?
    - **Subscript**: small numbers that follow the symbols
      - Tell you how many atoms of each element there are in one molecule
    - **Coefficient**: large numbers in front of the entire formula
      - Tell you how many molecules of the formula you have
  - Know how to determine the number of atoms in a formula that involves a bracket.
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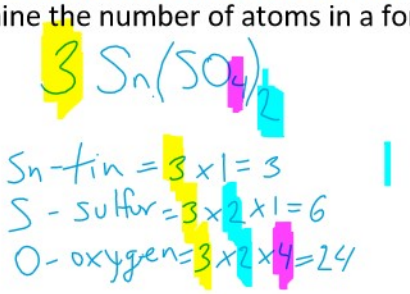

Vocabulary

These are terms that you should understand. Read through the list and write out definitions to any word you do not understand the meaning of. Words in *italics* are names of people/scientists.

- alchemy
- Alkali metals
- Alkaline Earth metals
- atom
- atomic mass
- atomic number
- Bohr Diagram
- combustibility
- compound
- conductivity
- corrosion
- *Dalton*
- *Democritus*
- ductility
- electron
- element
- energy level
- family
- group
- Halogens
- Law of Conservation of Matter
- lustre

- malleability
- *Mendeleev*
- metalloid
- molecule
- neutral
- neutron
- Noble gases
- nucleus
- orbit
- oxidation
- period
- precipitate
- proton
- reactivity
- *Rutherford*
- solubility
- state/phase
- subatomic
- *Thomson*
- toxicity
- valence

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