Atoms and Elements Review - Period 2

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 out of 4 elements - earth, air/wind, fire, water
    - **Democritus**: everything was made up of tiny, indivisible particles - he called them '*atomos*'
    - **John Dalton:** Billiard Ball Model - atoms are tiny, dense spheres that cannot be broken.
      - Had a basic atomic theory.
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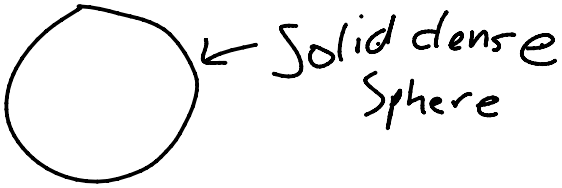
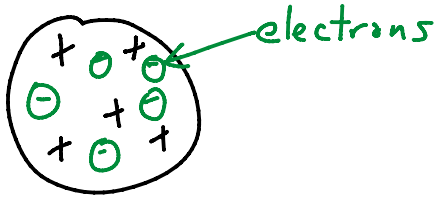
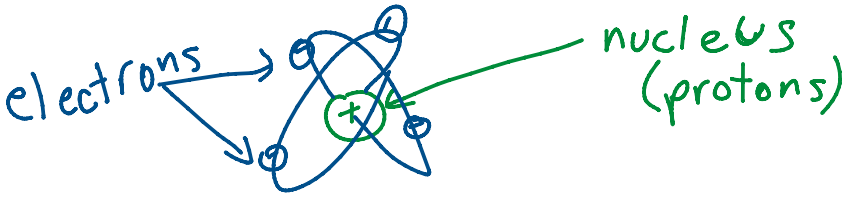


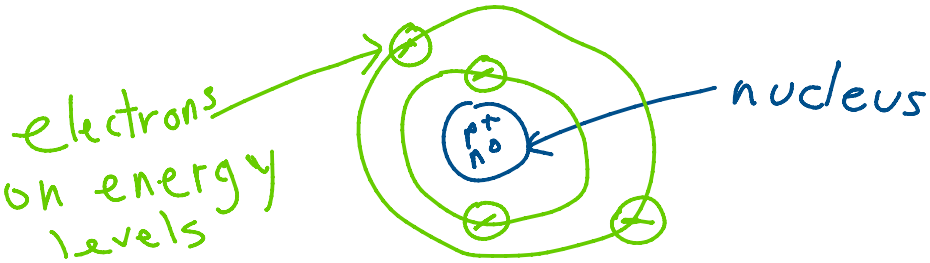
    - **JJ Thomson:** Plum Pudding Model - atoms are dense positive spheres, with negative electrons spread throughout.
      - He discovered the electrons.



    - **Ernest Rutherford:** Nuclear Model - atoms have a dense positive nucleus with protons, and the electrons occupied empty space around the nucleus.
      - He discovered protons.



    - **Niels Bohr:** Planetary Model (Bohr Diagrams) - electrons are organized into energy levels or 'orbits' around the positive nucleus.
      - He discovered the energy levels/orbits



- **Model of an atom**

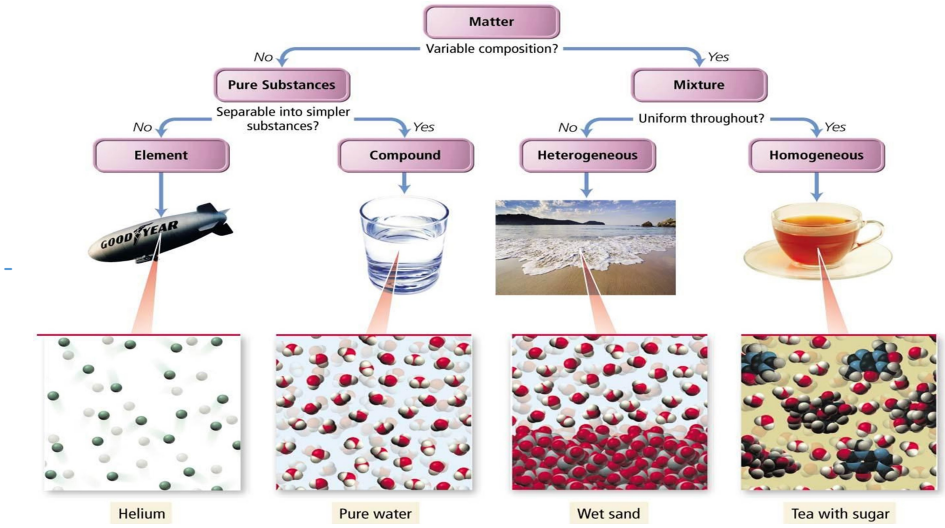
- What are the 3 subatomic particles?
  - Protons, neutrons, electrons
  - What are the charges of each particle?
    - Protons = positive
    - Neutrons = neutral
    - Electrons = negative
  - What is the mass (or weight) of each particle?
    - Protons = 1 atomic mass unit (amu)
    - Neutrons = 1 atomic mass unit (amu)
    - Electrons = no mass
  - Where is each particle found in the model of an atom?
    - Protons = in the nucleus
    - Neutrons = in the nucleus
    - Electrons = around the nucleus on orbits
  - How can you find the number of each particle from the periodic table?
    - Protons = atomic number
    - Neutrons = atomic mass subtract the atomic number
    - Electrons = number of protons (atomic number)
    -

- **Bohr Diagrams**
  - How do you draw a Bohr diagram?
    - Step 1: Draw nucleus, and place correct number of protons and neutrons into it.
    - Step 2: draw the correct number of electron orbits.
    - Step 3: place the correct number of electrons on each orbit.
    - How do you determine the amount of protons and neutrons?
      - Protons are is the atomic number
      - Neutrons is the 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
        - ***orbits need to be filled before moving onto the next orbit.
    - What is the valence orbit/shell?
      - Outermost electron orbit
    - What are valence electrons?
      - The electrons on the outermost orbit
      - What is an easy way to find the number of valence electrons using your Periodic Table?
        - Counting across the period (row)
          - Example: Carbon. It is the 4th element when you count from left to right across the period (row). That means there are 4 valence electrons in carbon.

- **Periodic Table**
  - Who were the scientists that lead to the development of the Periodic Table?
    - **Mendeleev**: first to organize elements based on atomic mass AND he predicted elements that were not yet discovered
    - **Mosely**: first to organize the 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 if they have a specific name, like Alkali Metals)
        - They have similar properties, and also the same number of valence electrons.
- What are the rows of the Periodic Table called?
    - What do these rows have in common?
        - Rows are called **periods**
        - Number of orbits (energy levels) is the same.
        - **The period number tells us how many orbits or energy levels the atom has
- 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
        - **see your periodic table!
        - Alkali Metals group 1
        - Alkaline Earth Metals group 2
        - Halogens group 17
        - Nobel gases group 18
- Where do you find metals on the Periodic Table?
    - To the left of the staircase
- Where do you find metalloids on the Periodic Table?
    - Above and below each step of the staircase (except for aluminum)
- Where do you find non-metals on the Periodic Table?
    - To right of the staircase

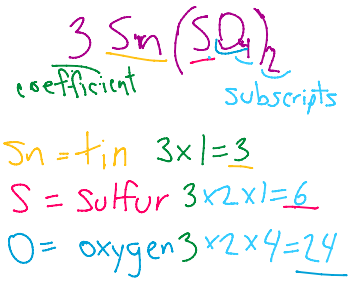
- **Classifying Matter**
    - What is matter?
        - What is the difference between the terms atom, element, compound, molecule, pure substance, and mixture?
            - **Atom** - smallest unit of an element. Made up of protons and neutron in the nucleus and electrons outside on orbits.
            - **Element** - substance that cannot be broken down into simpler parts (all made up of the same atoms)
            - **Compound** - substance that is made up of 2 or more elements (ex: water)
            - **Molecule** - the smallest unit of a compound. Includes 2 or more atoms of different elements
            - **Pure substance** - substance whose parts are all the same (element or compound)
            - **Mixture** - combination or two or more elements or compounds. The parts are not all the same!

- 

- How is matter classified into metals, non-metals, and metalloids?
  - What are the common properties of metals and non-metals?
    - **Metals**: shiny, malleable, ductile, conduct heat and electricity, solid at room temperature (except for Mercury)
    - **Non-metals**: dull, brittle, do not conduct heat or electricity, solid or gas at room temperature (except from Bromine)
    - **Metalloids**: they are a combination of metals and non-metals (Each is different)
    - **from the Table in Notes 1.05!
- What is the difference between a physical property and a chemical property?
  - What are examples of each?
  - **Physical**: trait (or characteristic) of a substance that can be measured without actually changing the substance.
    - Ex: lustre, malleability, ductility, conduction, state, shape, viscosity, solubility, magneticity, melting or boiling points, density, texture, colour, odor, hardness etc.
  - **Chemical**: trait of a substance that can only be measured or observed by changing the substance
    - Ex: reactivity, corrosion, oxidation, toxicity, combustion/flammability, etc.
  - **Refer to 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 of a substance.
    - This can be reversed, or at least no new substance is created.
    - Ex: change in state, change in shape, crush a piece of chalk
  - **Chemical**: Change in the chemical properties of a substance
    - This cannot be reversed, and a new substance is created.
    - Ex: frying a egg, baking soda in vinegar, burning a match,
  - **Refer to 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 (new odor)
    3. Change in energy (heat, light, sound)
    4. New solid formed 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 on the periodic table!
  - Remember: each new element begins with a capital letter!!
- How do you determine the number of each type of atom in a formula?
  - Look for subscript, and then multiply that by a coefficient (if there is one)
- How do you determine the number of molecules from the written formula?
  - You read the coefficient!
- What is the difference between a subscript and a coefficient?
  - **Subscript**: written as small numbers directly after an element symbol.
    - They refer to how many atoms are in a molecule
  - **Coefficient**: written as big number before the entire formula
    - They refer to how many molecules of the formula
- Know how to determine the number of atoms in a formula that involves a bracket.



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