Chem 001A
Week 2

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1 Monday Lecture

Test Go back and learn sig fig stuff...

2 Wednesday Lecture

2.1 Beginning of Unit 2: Now more Chem stuff rather than Phys

1. Early ideas in atomic theory
2. basic atomic structure and symbolism
3. Avg atomic mass
4. Representing chemical compounds
5. Periodic table
6. Ionic compounds
7. Nomenclature $\rightarrow$ Learn this on your own as HW, then do example problems in lecture. Less painful.

2.2 Atomic Theory

- Dalton's Atomic Theory (1805)
- Gave experiments that built the foundation of modern chemistry
- Mass of Oxygen and Chromium in two samples of Chromium Oxide
  - Dalton's experiment where he can predict the mass of oxygen based
  - THere are ratios in different colors of chromium oxide
  - Solving for the unknown value

  - Getting the ratio of red powder and how orange crystals has damn near 3x more oxygen for the same mass of chrmium between red powder and orange crystals
  - Cathode Ray Tubes shoot particles (electrons), discovered electrons
  - Shows that a positive coil, deflected electrons and negative coils attracted coils

- Rutherford Gold Foil Experiment (1911)
  - α particles, positively charged, was shot into a paper thin sheet of gold
  - 99.99% particles went straight through, and the rest were deflected (implying some were shot at protons)
  - Proved it is mostly empty space inside the atom
  - Helped us figure out the nucleus of the atom

- Chadwick Beryllium Experiment
  - Shot α particles through a Beryllium plate, then discovered neutrons
  - Discovered an electron cloud

- Doing quantum theory in unit 3 because atoms aren't really made of protons and neutrons with electron clouds

3 Friday Lecture: Oct 10^{th}

- Do 70% of the OLI unit completion in order to retake the Mastery Quiz
- We need the room in order to retake the quiz

3.1 Basic Atomic Structure

- The blueberry in a football field represents the size of the nucleus. Explains why the alpha particles flew right through. It is mostly empty space, but is quite heavy.
- Mass of nucleus represents the weight of the atom. Electrons are not accounted for.
- Fundamental unit of charge, a constant, something something Couloumbs of charge

3.2 Element differences to each other

- Atomic Number (Z) gives total number of protons. The value of Z represents the element according to periodic table.
- You can reference chemicals by their atomic symbols and chemical symbol (H, He, Li, Be...)

  We typically attach atomic number to the chemical symbol
- Mass number denoted by superscript on the left.

  The mass number differences represents an **Isotope**
- **Isotope**: two (or more) frms of an element that contains equal numbers of protons, but different # of neutrons
- Ex: Z = 24
- **Ions**: Charged atoms

  $$^{4}_{2}HE^{2+}$$

  Here, Helium has a charge of 2. Meaning we lost both electrons. (Funny enough, this is Rutherford's alpha particle)

  $$^{24}_{12}Mg^{2+}$$

  Here, Mg has 12-2 = 10 electrons
- **Average Atoomic Mass (amu)**
- Chlorine consists of 75.77% Chlorine-35 (34.969 amu) and 24.23% Chlorine-37 atoms (mass 36.966 amu)

  Atomic mass = 0.7577(34.969 amu) + 0.2423 (36.966 amu) = 35.45 amu

  (This is just the weighted average)
- Atomic Mass (average) = $\sum_n$ mass$_n$ $\times$ Abundance%$_n$
- **Fractional Abundance**:

  Fraction $^{1}_{1}H$ = X

  Fraction $^{2}_{1}H$ = 1 - X

  Fraction $^{3}_{1}H \simeq$ X
- Understand where the metals are in the periodic table. The metalloids, nonmetals, etc. Understand which are solid, liquid, or gas in room temperature.

  Remember the alkaline metals, alkaline earth metals, transition meteals, Halogens, and Noble Gases

  Unit 3 explains why the periodic table is arranged as is.