Notes
Introduction to Physical Chemistry

Basil R. Yap

2018 January

1 Week 1

Dalton's Atomic Theory:

- atoms are indestructible particles
  - disproved by nuclear fission/fusion
  - true in chemical reactions
- all atoms of a given element are identical and only distinguishable via atomic weight
- compounds are whole number ratios of atoms

From Dalton's Postulates:

- Law of Conservation of Mass: mass is not created or destroyed in a chemical reaction
- Law of Definite Proportion: compounds always contain the same proportion of elements
- Law of Multiple Proportions: the ratio of masses in a compound are whole numbers

Classical Atomic Models:

- Rutherford and Bohr proposed electrons move in an orbit
- Bohr had explanation for color emissions:
  - orbits have energy levels based on distance from nucleus
  - moving from one orbit to another releases energy corresponding to light
  - impossible for electron to exist between orbits

Failure of Classical model:

- based on classical mechanics
- electrons in motion similar to classical physics
  - electron should lose energy over time
- predicted emission patterns of hydrogen, but not other elements

Another atomic model needed: basis with wave-particle duality of matter