P1 - Atomic Structure

June 6, 2014

Atoms (Democritus)

- can exist alone or enter into chemical combination
- the smallest indivisible particle of an element

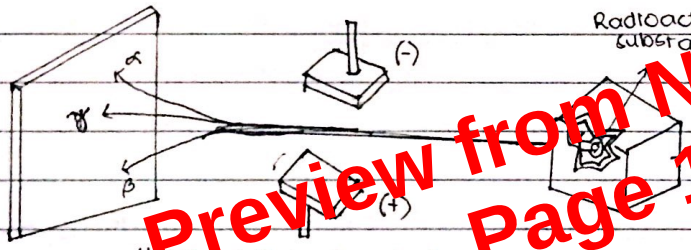
molecules

- a combination of atoms that has its own characteristic set of properties

Dalton's Atomic Theory

- Postulate 1
  - An element is composed of tiny particles called atoms (can be divided to subatomic particles)
  - All atoms of a given element show the same chemical properties (wrong; there is isotopes)
- postulate 2
  - Atoms of different elements have different properties (isobar)
- Postulate 3
  - compounds are formed when atoms of two or more elements combine
  - In a given compound, the relative number of atoms of each kind are definite and constant
- Postulate 4
  - In an ordinary chemical reaction, no atom of any element disappears or is changed into an atom of another element
  - chemical reactions involve changing the way in which the atoms are joined together

Radioactivity



three types of rays emitted by Radioactive Elements

Alpha - helium-4 nucleus

Beta - high energy electron

Gamma - energy resulting from transitions from nuclear energy to another level

Alpha Radiation

- composed of 2 protons and 2 neutrons
- thus, helium-4 nucleus
- +2 charge
- mass of 4 amu
- creates element with atomic number 2 lower ex. $^{224}Ra \rightarrow {}^{222}Rn + {}^{4}He(\alpha)$

Beta Radiation

- composed of a high energy electron which was ejected from the nucleus
- "neutron" converted to "proton"
- very little mass
- -1 charge
- creates element with atomic number 1 higher ex. $^{239}U \rightarrow {}^{239}Np + {}^{-1}\beta$

Cattleya