Unit 1-Atomic Structure

Outline-

1. Early Atomic Models
2. Quantum mechanical atom
3. Electron configuration
4. Valence electrons
5. Evidence for models
   - patterns in . atomic size
     . ionization E

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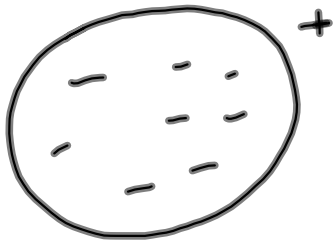
Early Models of the Atom

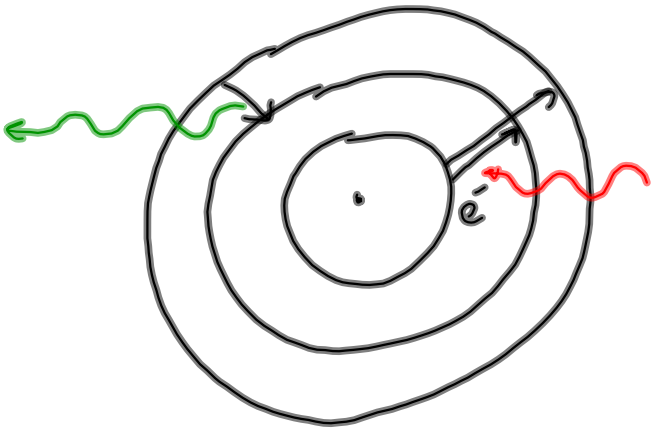
1. Greek – philosophers - atomos (uncut)

2. Dalton/Thomson



3. Rutherford - Gold foil experiment
   - nucleus (+ charge + mass)
   - most of the atom is empty space

4. Bohr – based on H atom
   - electrons orbit nucleus
   - spectral lines (colours)



ROYGBIV spectrum

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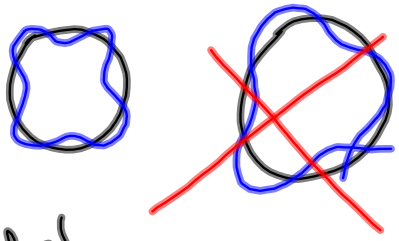
Quantum Mechanical Atom

De Broglie - Are electrons particles or waves?

- Small fast
- no mass
- mass predicts its motion

Wave Mechanical model.



Quantum Mechanical Model

- Electrons can only have a certain amount of energy.
- Heisenburg uncertainty principle
  - position + motion ?
  - "orbitals" → high probability of find electrons in a space (90%)

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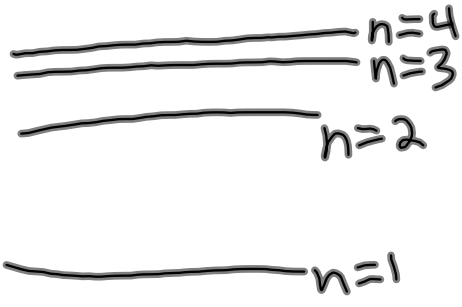
Electron Configuration

- Symbols show electron location.
- Aufbau - electrons fill the lowest energy levels first.

$n = 1, 2, 3, 4 \ldots\ldots$

Principle E level

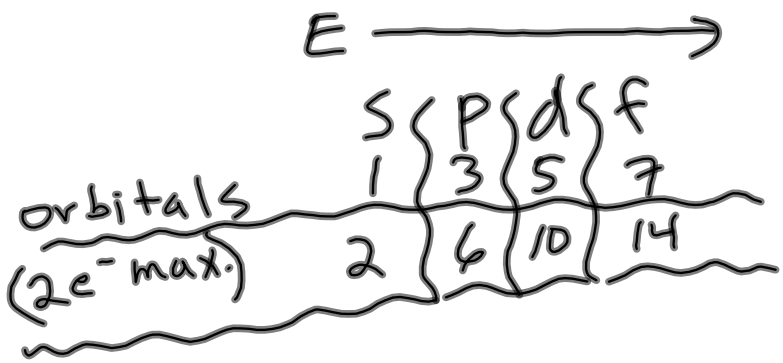


n	# e⁻
1	2
2	8
3	18
4	32

$\#e^- = 2n^2$

$n = 1, 2, 3 \ldots\ldots$

Electron Sub-levels



Writing Electron Configuration

Bohr- $_1H - 1s^1$ ← # e⁻

1 = principle E level

s = sub-level

} ground state

$_2He - 1s^2$

$_3Li - 1s^2 2s^1$

$_4Be - 1s^2 2s^2$

$_5B - 1s^2 2s^2 2p^1$

$_6C - 1s^2 2s^2 2p^2$

$_7N - 1s^2 2s^2 2p^3$

$_{10}Ne - 1s^2 2s^2 2p^6$

$_{11}Na - 1s^2 2s^2 2p^6 3s^1$

chart p. 137

Read p. 127-129

p. 137