

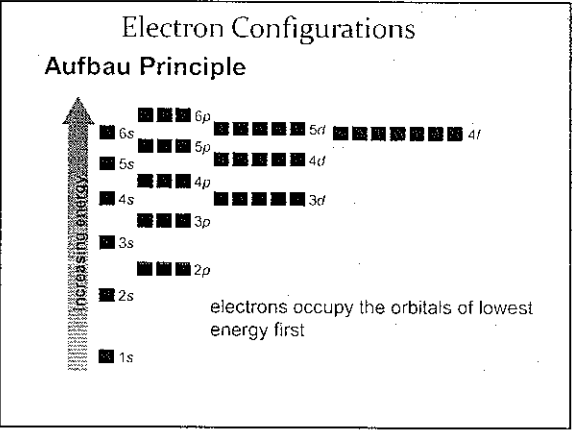
Electron Arrangement in Atoms

Electron Configurations

_____ : the way electrons are arranged in various orbitals

Three rules—the aufbau principle, the Pauli exclusion principle, and Hund's rule—

...tell you how to find the electron configurations of atoms.



Electron Configurations

Pauli Exclusion Principle

- An atomic orbital may describe at most _____ electrons.
- To occupy the same orbital, two electrons must have _____ spins
- A vertical arrow indicates an electron and its direction of spin (_____).
- An orbital containing paired electrons is written as $\uparrow\downarrow$.

Electron Configurations

Each orbital will have one electron before any have two

Three electrons would occupy three orbitals of equal energy as follows.

Then,

Electron Configurations

Look at the orbital filling diagram of the oxygen atom.

- An oxygen atom contains _____ electrons.

Element	1s	2s	2p _x	2p _y	2p _z	3s	Electron configuration
H	\uparrow						1s ¹
He	$\uparrow\downarrow$						1s ²
Li	$\uparrow\downarrow$	\uparrow					1s ² 2s ¹
C	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow	\uparrow			1s ² 2s ² 2p ²
N	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow	\uparrow	\uparrow		1s ² 2s ² 2p ³
O	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow	\uparrow		1s ² 2s ² 2p ⁴
F	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$			1s ² 2s ² 2p ⁵
Ne	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$		1s ² 2s ² 2p ⁶
Na	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	$\uparrow\downarrow$	\uparrow	1s ² 2s ² 2p ⁶ 3s ¹

Electron Configurations


- Shorthand method:
- (1) Write the _____ and the _____ for every sublevel occupied by an electron.
- (2) Indicate the number of _____ occupying that sublevel with a superscript.
- Hydrogen -
_____ - $1s^2 2s^2 2p^1$.

Sample Problem 5.1

Writing Electron Configurations

The atomic number of phosphorus is 15.

Write the electron configuration of a phosphorus atom.

 Check

What is the correct electron configuration of a sulfur atom?

- A. $1s^2 2s^2 2p^4 3s^2 3p^6$
- B. $1s^2 2s^2 2p^6 3s^2 3p^3$
- C. $1s^2 2s^2 2p^6 3s^2 3p^4$
- D. $1s^2 2s^2 2p^6 3s^6 3p^2$