

Warm-Up

Name	Symbol	⁺ Protons	⁻ Electrons	Ionic Charge
iron ion	Fe ²⁺	26	24	2+
chromium ion	Cr ³⁺	24	21	3+
silver atom	Ag	47	47	0
selenide ion	Se ²⁻	34	36	2-

atom : $\# p^+ = \# e^-$

ion : $\# p^+ \neq \# e^-$

positive
cation

Ex. $\frac{11p^+}{10e^-}$
It

negative
anion

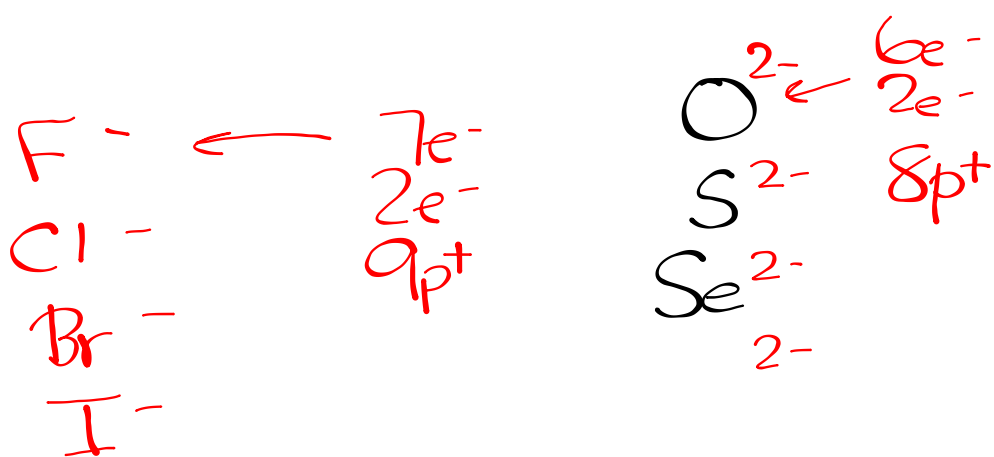
Ex. $\frac{17p^+}{18e^-}$
↓
↓
"negative"

Homework - Ions Worksheet

Selenide ion Se^{2-} 34 36 gain₂ 2-

rubidium ion Rb^+ 37 36 lose₁ 1+

Unniseptium atom Uns 107 107 0 0



Quantum Mechanical Model of an Atom

The quantum mechanical model determines the allowed energies an electron can have and **how likely** it is to find the electron in various locations around the nucleus.

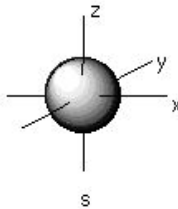
→ "probabilistic"

atomic orbital - region of space in which there is a high probability to find an electron

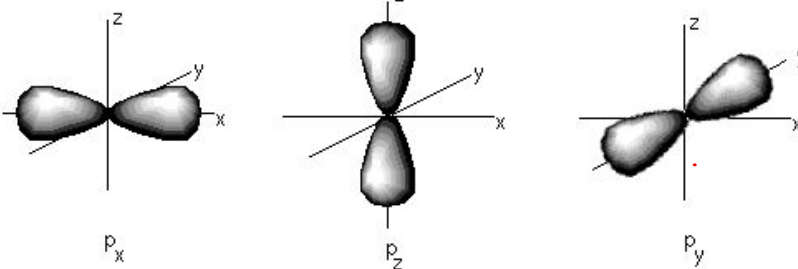
Principal quantum numbers (n) represent energy levels of electrons (i.e., $n = 1, 2, 3, 4$, etc.)

There may be several orbitals with different shapes at different energy levels.

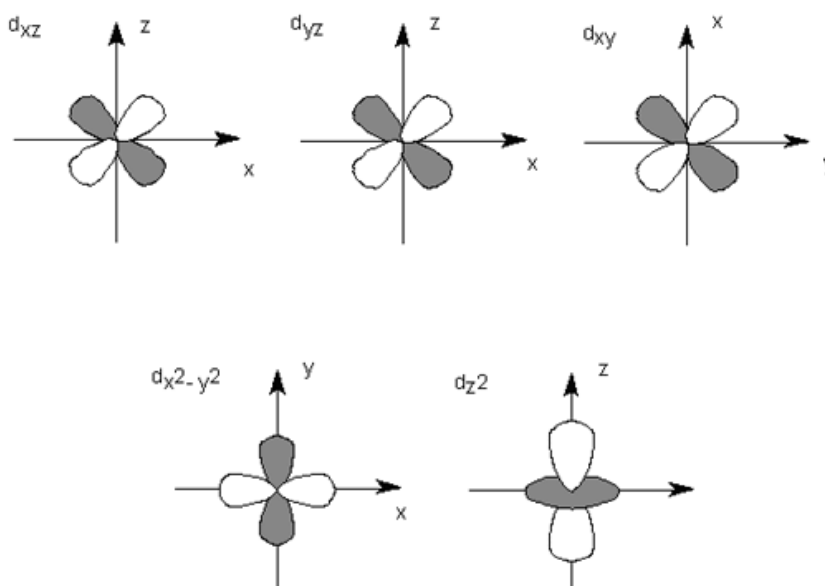
s orbital

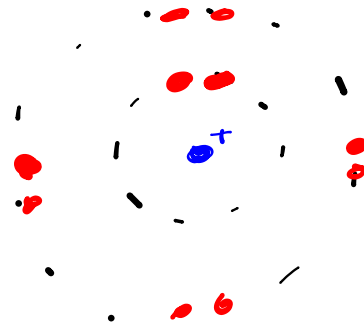


p orbitals



d orbitals





n^2 $2n^2$

Principal Energy Level	Number of Sublevels	Type of Sublevel	Number of Orbitals (n^2)	Number of Electrons ($2n^2$)
$n = 1$	1	1s (1 orbital)	1	2
$n = 2$	2	2s (1 orbital), 2p (3 orbitals)	4	8
$n = 3$	3	3s (1 orbital), 3p (3 orbitals), 3d (5 orbitals)	9	18
$n = 4$	4	4s (1 orbital), 4p (3 orbitals), 4d (5 orbitals), 4f (7 orbitals)	16	32

Electron Configurations

Electron configurations are the ways in which electrons are arranged in different orbitals around the nuclei of atoms, according to the quantum mechanical model (equivalent to the Bohr model of the Bohr Theory).

H $1s^1$

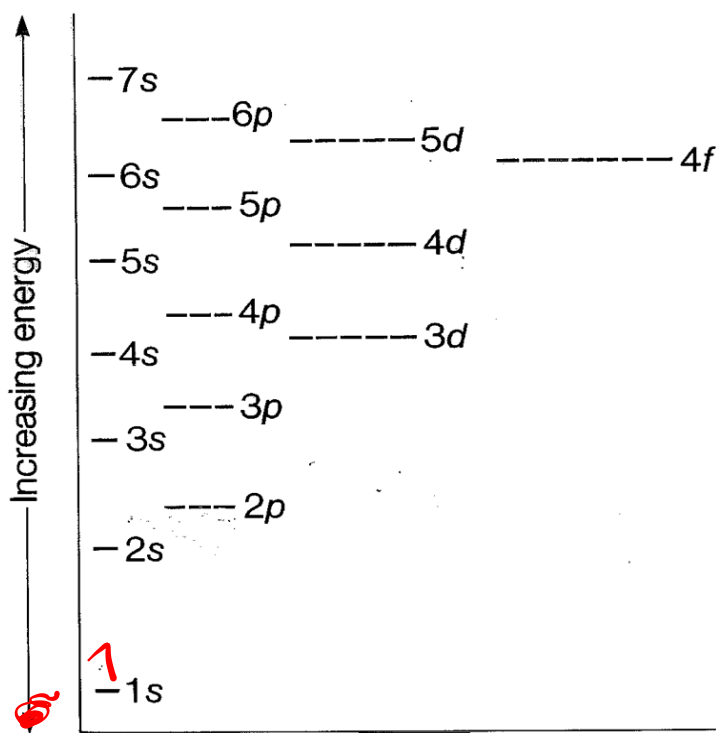
(1)

He

(2)

O

Aufbau principle - electrons occupy orbitals of lowest energy first



Pauli exclusion principle- an atomic orbital can describe at most two electrons

Hund's rule - one electron enters each orbital until all orbitals contain one electron with the same spin

