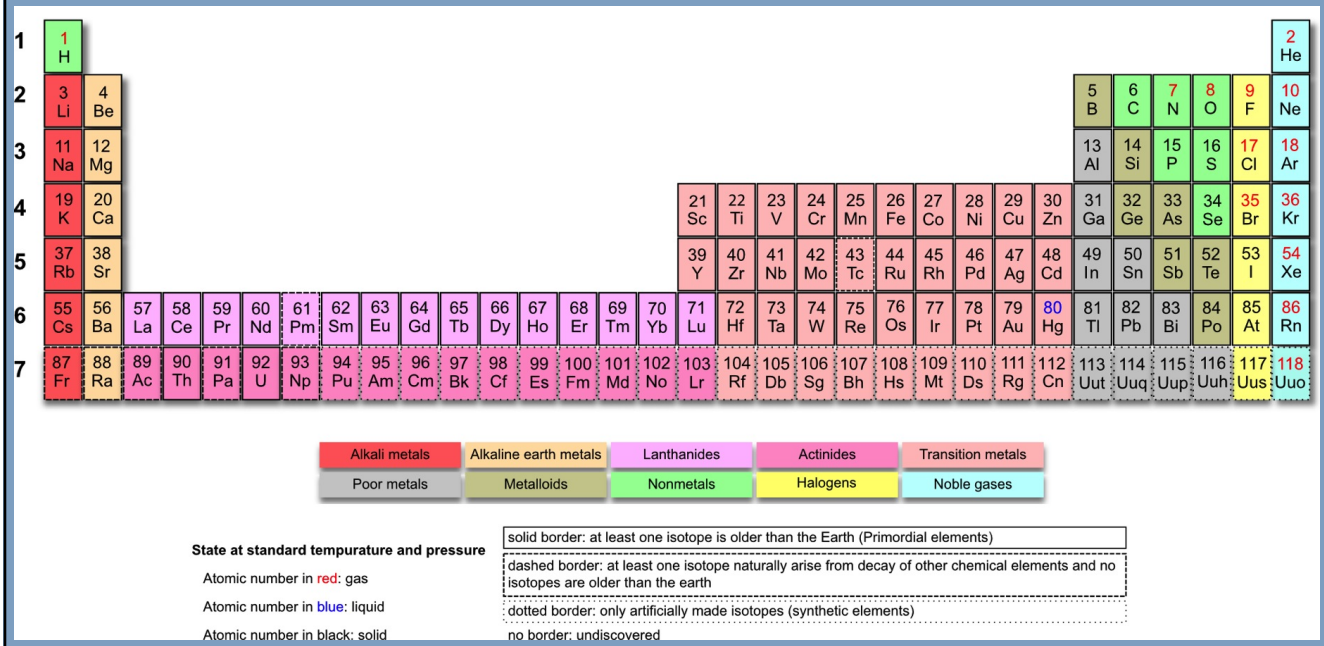
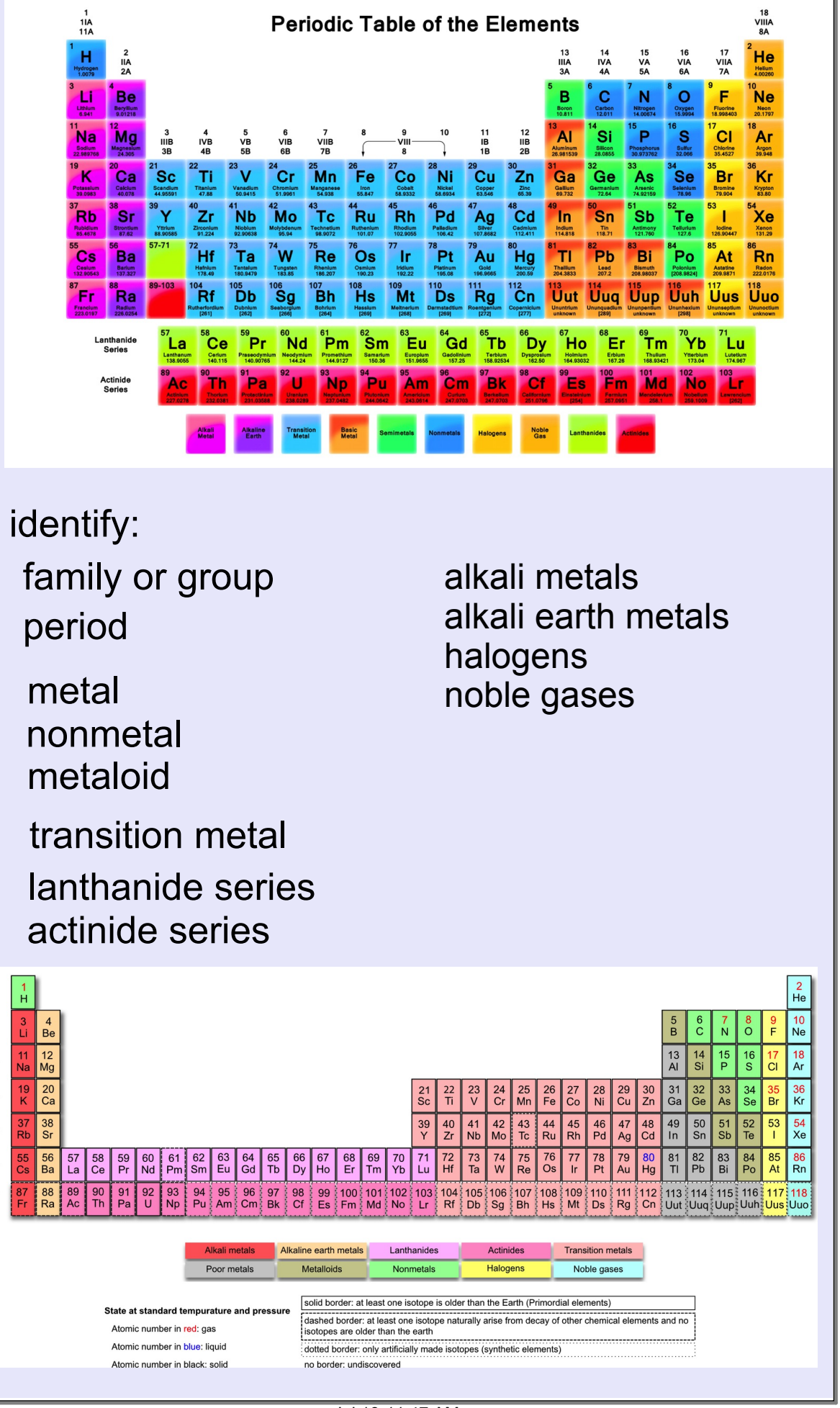
Periodic Table of Elements



Sep 25-4:43 PM



identify:

family or group

period

metal

nonmetal

metaloid

transition metal

lanthanide series

actinide series

alkali metals

alkali earth metals

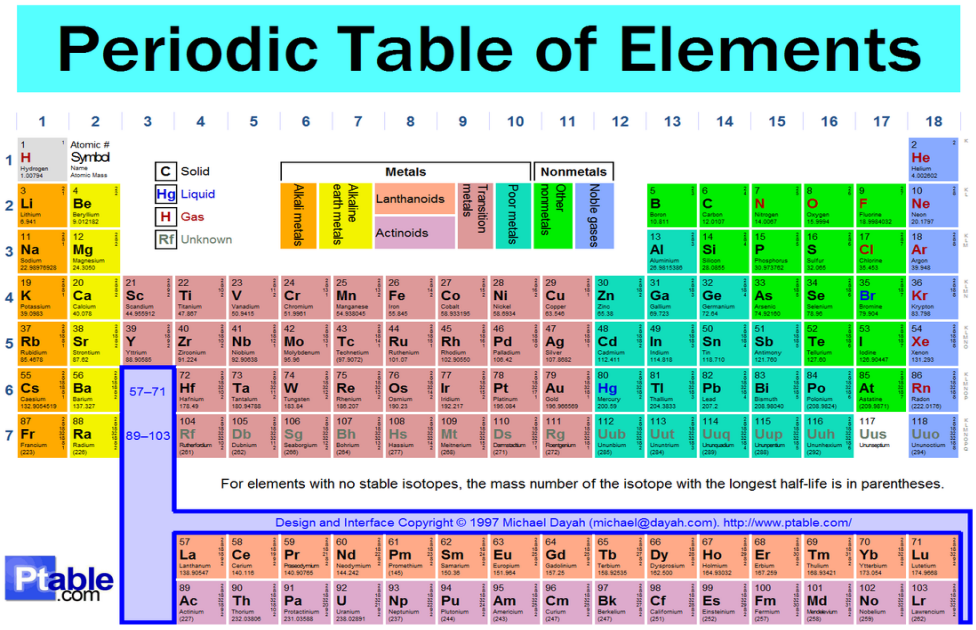
halogens

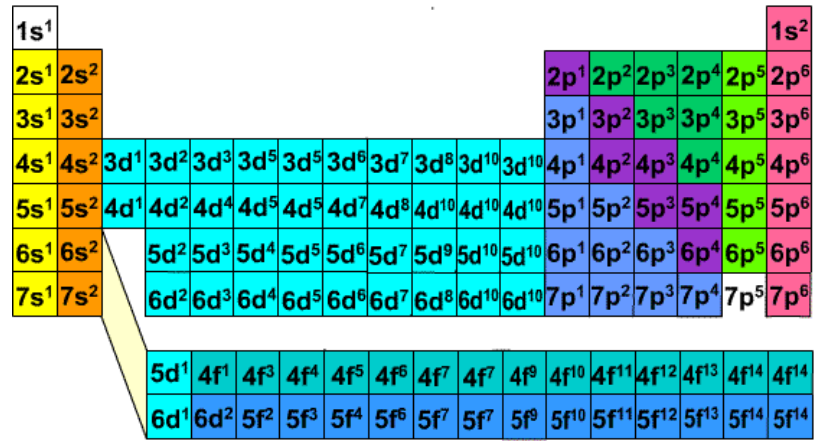
noble gases

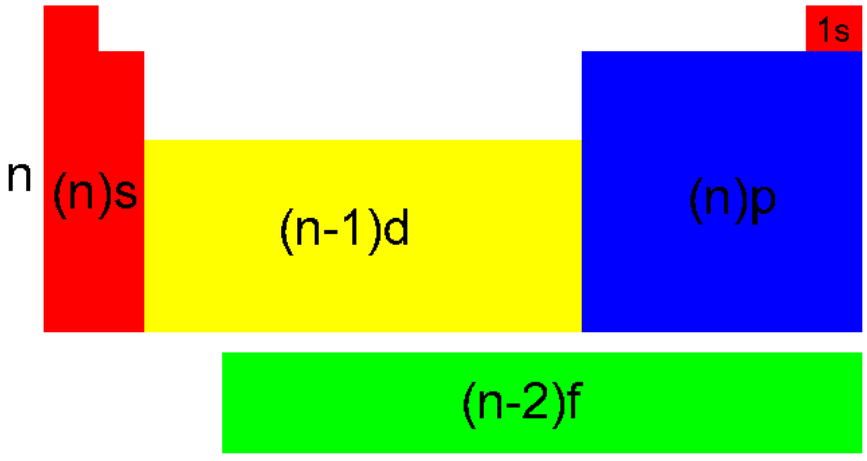
Jul 18-11:47 AM

How many "levels" are on the PT?

How many







Oct 27-7:46 AM

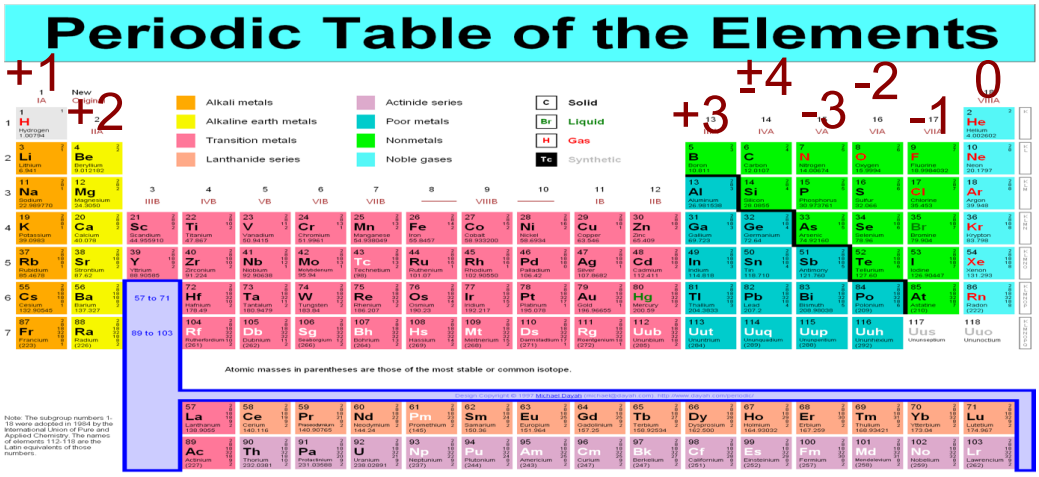
Full valence shell= stability (lower energy state)
(outer)

Octet Rule - atoms gain or lose e^- to achieve 8 e^- in the valence shell for stability

-stability of noble gases (except He stable at $2e^-$)

lose e^- → gain e^-

common charges



5 val. electron or more
gain to make full shell of 8

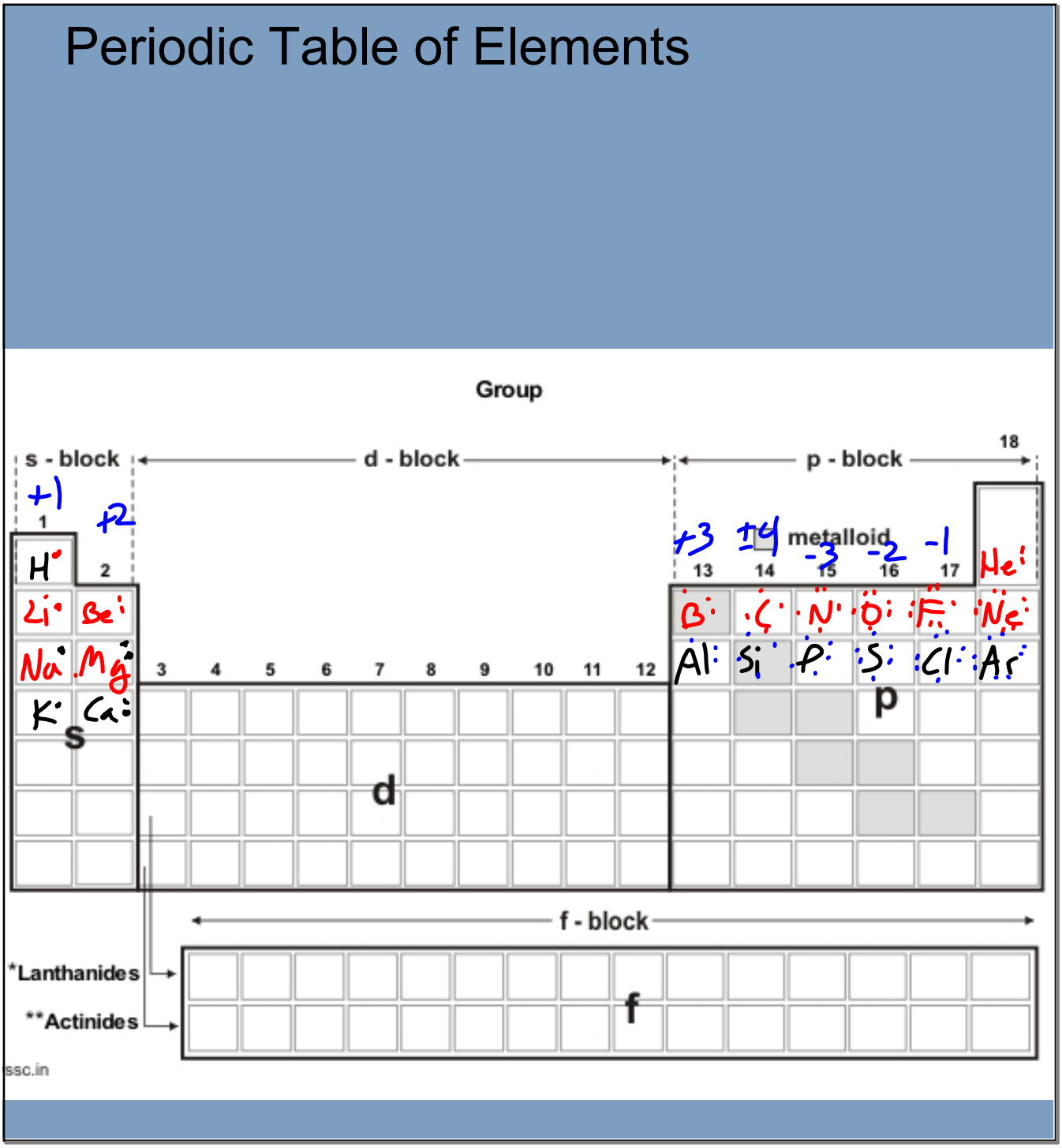
3 val. electrons or less
lose **all** val electrons
to eliminate shell and have next shell full

4 val. electron
(could gain or lose 4 electrons, or share electrons)

electron configurations
show last noble gas and electrons added since that noble gas

find outer shell electron (s and p orbitals), add electrons

Periodic Table of Elements

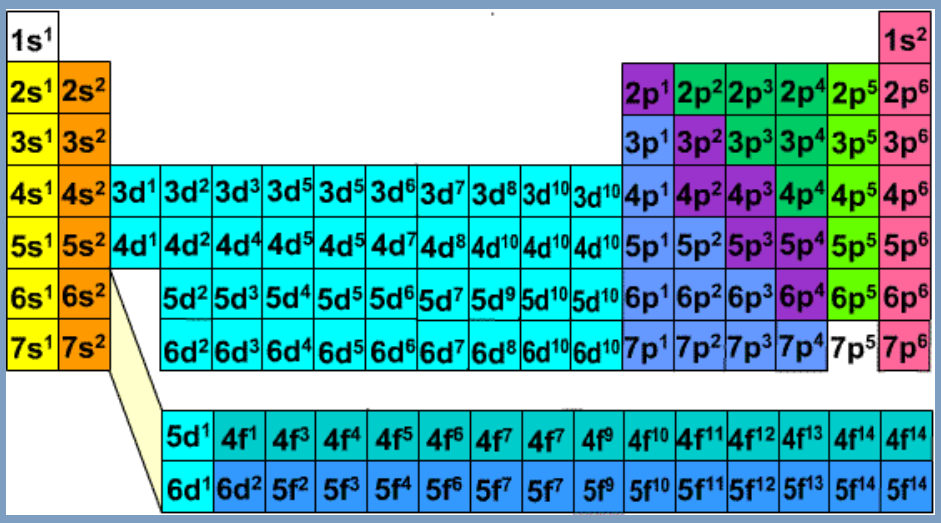


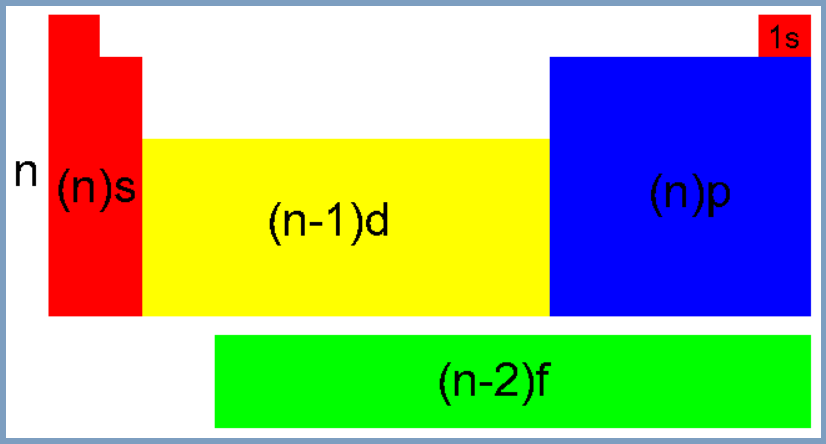
Electron Configurations

Objective: to create a model with predictive power

What is the shape of an orbital?

How are electrons "layered" onto the nucleus?





Objectives:

Investigate the current model of electron structure through the following objectives:

I can determine electron configurations, orbital diagrams and quantum numbers for electrons in an atom

I can apply the Aufbau principle, Hund's rule and the Pauli Exclusion Principle to electron configurations

Jul 15-2:50 PM

Quantum Theory

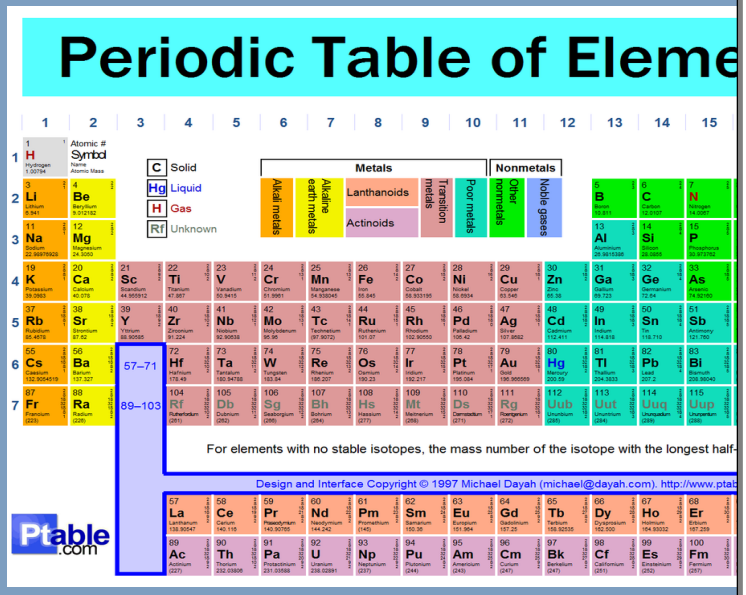
uses 4 numbers to describe each electron
(e- configuration)

principal, n

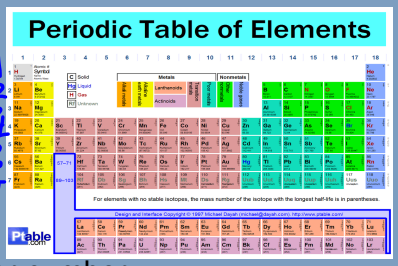
angular momemtum, ℓ

magnetic, m

spin, s



e⁻ Configurations



principal, n

n= main energy level of e⁻

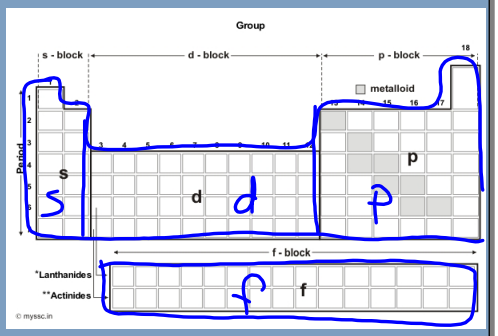
n =1,2,3,4,5,6,7

energy increases with higher number

angular momentum, ℓ

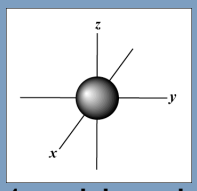
ℓ = shape of orbit, (s,p,d,f)

letter	ℓ
s	0
p	1
d	2
f	3



s orbital

ℓ =0

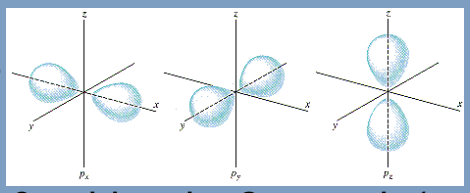


1 sublevel, 2 e⁻ each (2 total e⁻)

---

p orbitals

ℓ =1

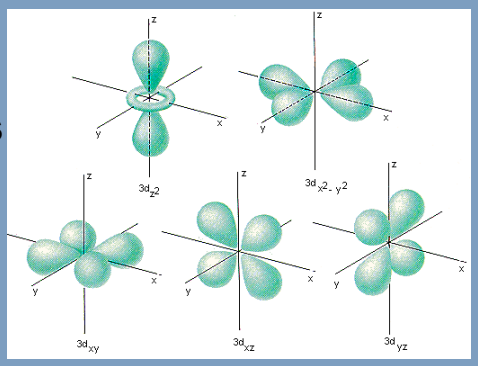


3 sublevels, 2 e⁻ each (___ total e⁻)

---

d orbitals

ℓ =2

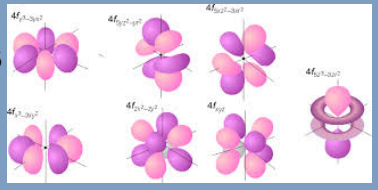


5 sublevels, __ e⁻ each (___ total e⁻)

---

f orbitals

ℓ =3



7 sublevels, __ e⁻ each (___ total e⁻)

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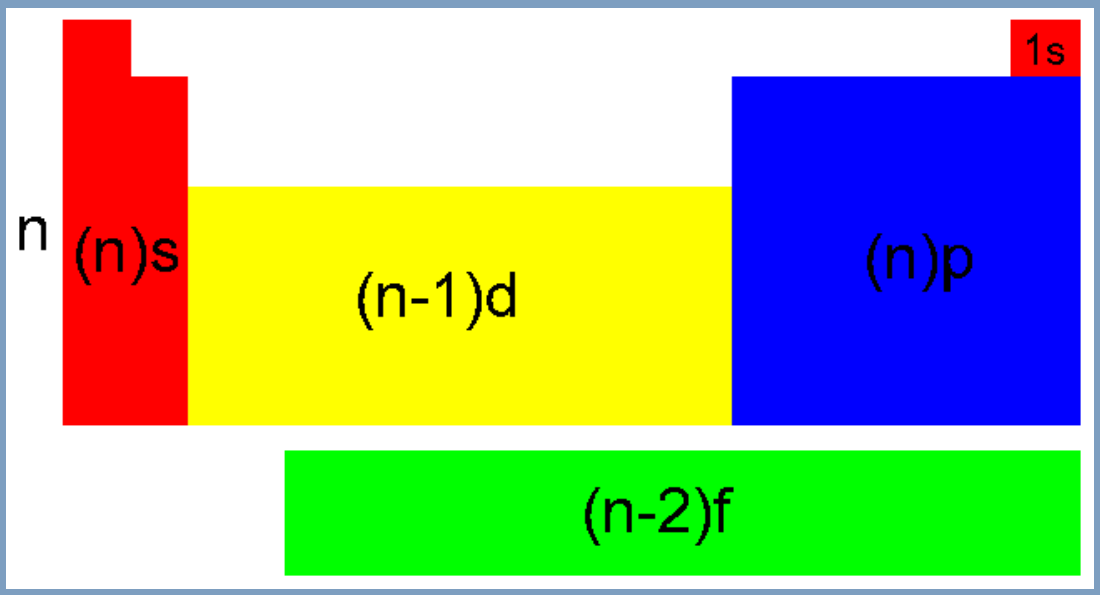
n and l:



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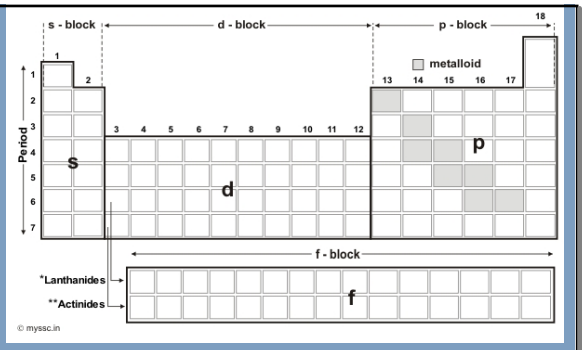
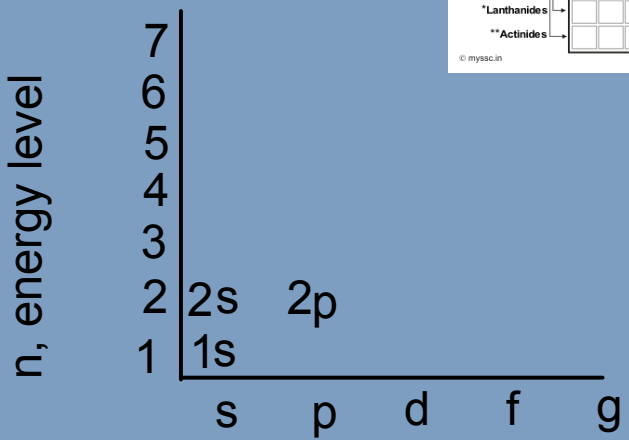
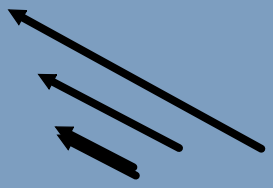
Order of e-



Aufbau Chart

show order that electrons are added





e-configurations

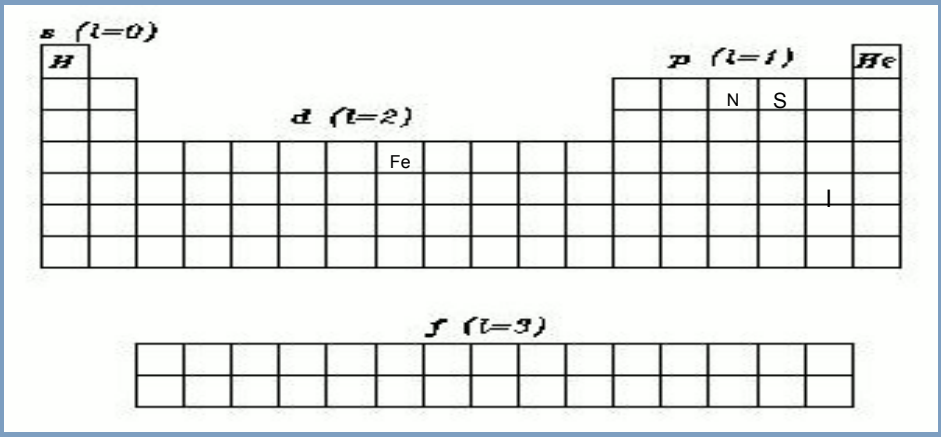
H :

N :

He :

S:

Li :



Fe:

shorthand - use previous noble gas

Fe:

I :

I^{-1} :

I^{-1} is isoelectric with ____

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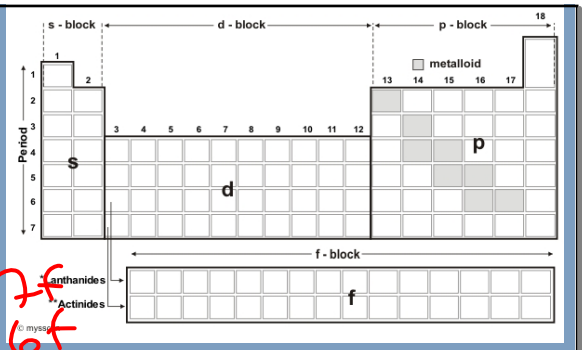
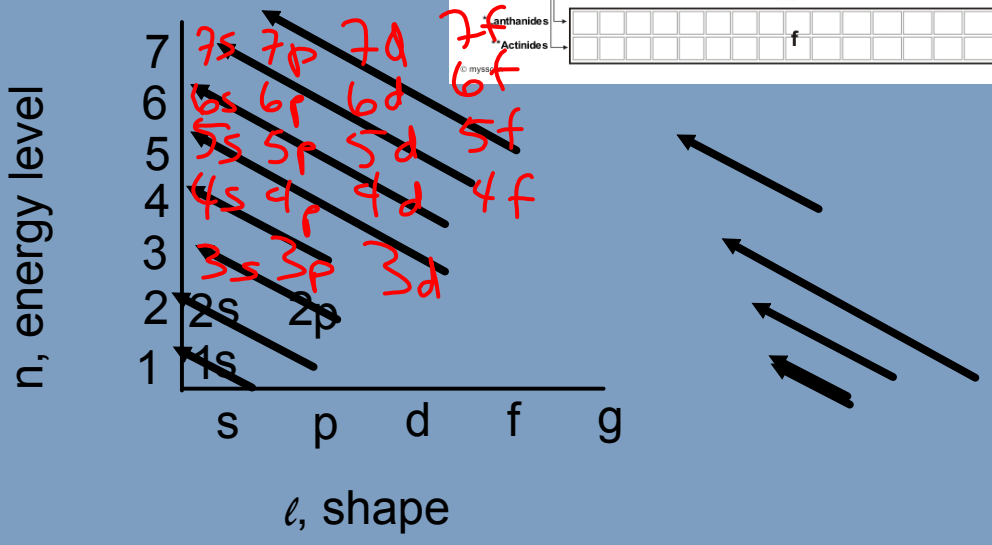
Order of e-



Aufbau Chart



e-configurations

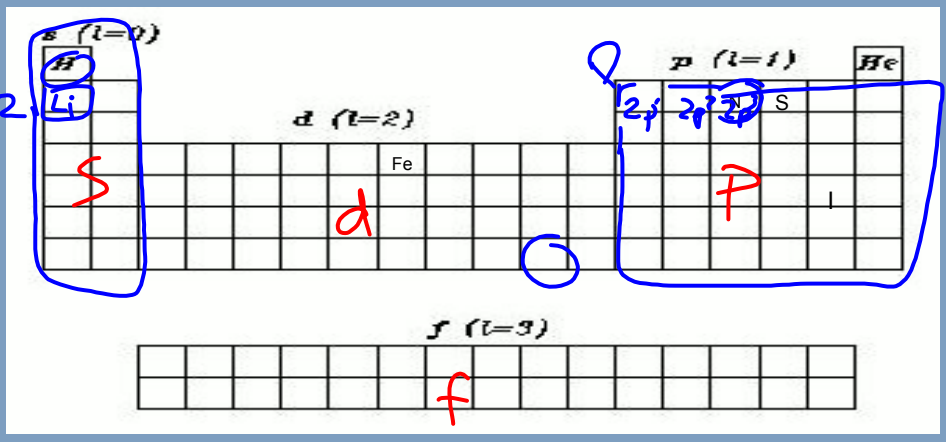
H : $1s^1$

He : $1s^2$

Li : $1s^2 2s^1$

N : $1s^2 2s^2 2p^3$

S: $1s^2 2s^2 2p^4$



Fe:

shorthand - use previous noble gas

Fe:

I :

I^{-1} :

I^{-1} is isoelectric with ____

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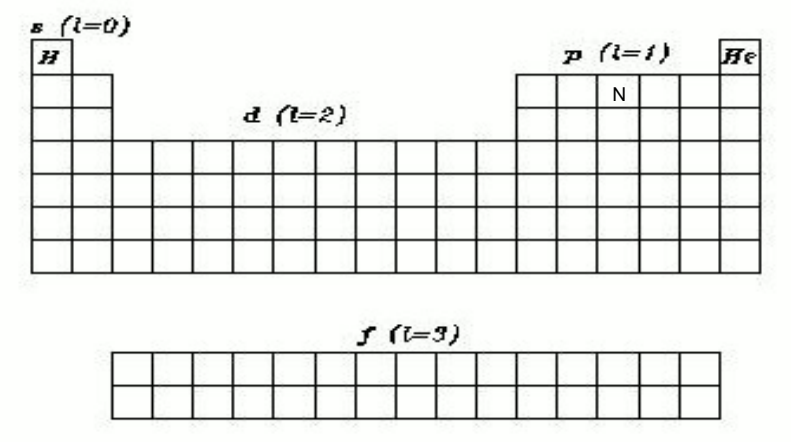
Orbital Diagrams



N has 7 p^+ and 7 e^-

N :

4 quantum numbers

principal
main energy level
n

n=1,2,3,4,5,6,7

angular momentum
shape of orbital
ℓ

s, ℓ =0
p, ℓ =1
d, ℓ =2
f, ℓ =3

magnetic
suborbital
m

s has 1 sublevel
m=0

p has 3 sublevels
m=+1,0,-1

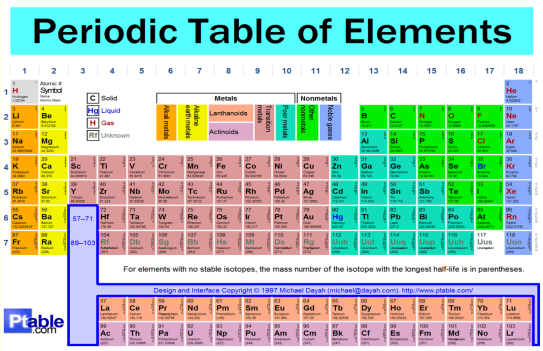
d has 5 sublevels
m=+2,+1,0,-1,-1

f has ___ sublevels
m=

spin
direction
s

s= +1/2, -1/2

each sublevel has 2 e^-, one in each direction



N : $1s^2\ 2s^2\ 2p^3$

Hund's rule: fill each sublevel separately first

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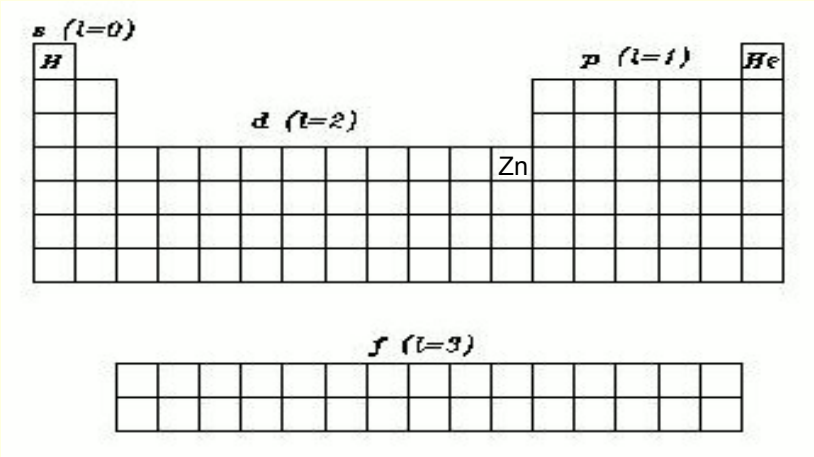

Zn has 30 protons

Zn^{+2} has ___ e^-

orbital diagram

Zn^{+2}:

shorthand

Zn^{+2}:

quantum number for an electron

Pauli Exclusion Principle:
no 2 e^- can have the same set of quantum numbers