

## Writing Electron Configuration for Neutral Atoms

2 simple rules;

1. As atomic number increases, electrons are added to the orbitals having the lowest energy first ... this is to ensure the **LOWEST POSSIBLE ENERGY**.
2. A maximum of 2 electrons can be placed in each orbital.

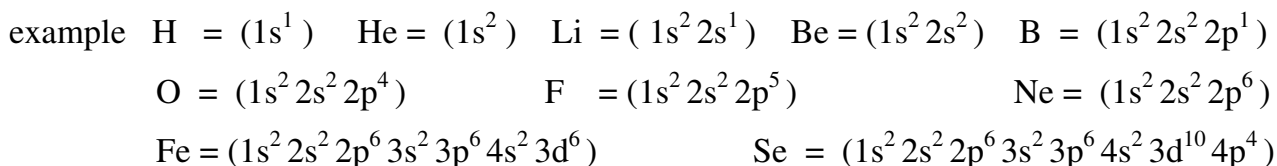
**Electron Configuration:** is a description of which orbitals in an atom contain electrons and how many electrons are in each orbital.

2 e <sup>-</sup>	10 e <sup>-</sup>	6 e <sup>-</sup>
1s		
2s		2p
3s		3p
4s	3d	4p
5s	4d	5p
6s	5d	6p
7s	6d	7p
	4f	
	5f	

## Full Notation

Fill the electron from the lowest energy level first then continue filling until all electrons have been placed. If unsure refer to the above orbital version of the periodic table and simply fill electrons.

*Notice that 4s fills before 3d, which fills before 4p orbital – refer to the periodic table above.*



## Core Notation

The set of electrons belonging to a given atom can be divided into two subsets: the **CORE** electrons and the **OUTER** electrons.

**core:** of an atom is the set of electrons having the configuration of the nearest noble gas (He, Ne, Ar, Kr, etc.) having an atomic number less than that of the atom being considered.

Rules:

1. Locate atom and note the noble gas at the end of row above the element.
2. Place noble gas into square brackets [ ] and write the rest of the electron configuration.
3. **Exception:** If you asked to write the core notation for a noble gas such as Kr, you must show the electron configuration as Kr ([Ar] 4s<sup>2</sup>3d<sup>10</sup>4p<sup>6</sup>) Do **not** write Kr ([Kr])

## Electron Configuration Exceptions

There are two exceptions to the configuration of elements up to Kr.

Expect Cr ([Ar] 4s<sup>2</sup>3d<sup>4</sup>)

Right WAY Cr ([Ar] 4s<sup>1</sup>3d<sup>5</sup>)

Expect Cu ([Ar] 4s<sup>2</sup>3d<sup>9</sup>)

Right WAY Cu ([Ar] 4s<sup>1</sup>3d<sup>10</sup>)

*Filled or exactly half-filled d-subshell is especially stable.*

## Writing Electron Configurations for Ions

1. Negative Ions: To write the electron configuration, add electrons to the last unfilled subshell, starting where the neutral atom left off.
2. Positive Ions: Two Rules
  - a. Electrons in outermost shell (largest n-value) are removed first.
  - b. If there are electrons in both the s- and p-orbitals of the outermost shell, the electrons in the p-orbitals are removed first.
  - c. Remove electrons in the order of p before s before d.

## Questions:

On a separate sheet of paper make a 3 column table and label

Element	Full Notation	Core Notation
P		
Ti		

Then write out the notation for the following elements;

P, Ti, Co, Br, Sr, Ar, K, Cd, Ca, Xe, Cs, Pb, Ga, Mn, Zr

P	$(1s^2 2s^2 2p^6 3s^2 3p^3)$	P	$([\text{Ne}] 3s^2 3p^3)$
Ti	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^2)$	Ti	$([\text{Ar}] 4s^2 3d^2)$
Co	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^7)$	Co	$([\text{Ar}] 4s^2 3d^7)$
Br	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5)$	Br	$([\text{Ar}] 4s^2 3d^{10} 4p^5)$
Sr	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2)$	Sr	$([\text{Kr}] 5s^2)$
Ar	$(1s^2 2s^2 2p^6 3s^2 3p^6)$	Ar	$([\text{Ne}] 3s^2 3p^6)$
K	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^1)$	K	$([\text{Ar}] 4s^1)$
Cd	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10})$	Cd	$([\text{Kr}] 5s^2 4d^{10})$
Ca	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2)$		
Xe	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6)$		
Cs	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^1)$		
Pb	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^2 4f^{14} 5d^{10} 6p^2)$		
Ga	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^1)$		
Mn	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5)$		
Zr	$(1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^2)$		