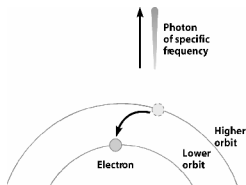


## Bohr's theory

Three rules:

- Electrons only exist in certain allowed orbits
- Within an orbit, the electron does not radiate
- Radiation is emitted or absorbed when changing orbits



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## Electron Configuration

- Expressing the electron configuration of an atom or ion at the atomic level is the universal language of chemistry.
- The configuration is described by 4 quantum numbers. Just like a point can be described by the (x,y) coordinates, an electron can be described by 4 quantum numbers.

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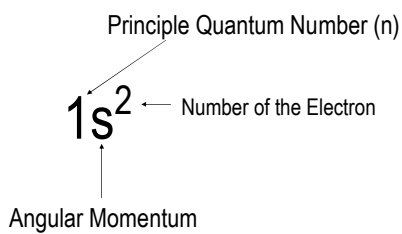
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## Notation for Quantum Numbers



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**In other words**



This would describe the second electron in the s sublevel of the 1<sup>st</sup> energy level

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**Hund's Rule**

When electrons occupy orbitals of equal energy, one electron enters each orbital until all the orbitals contain one electron. Only after all the orbitals are filled will electrons pair-up.

This applies to the p, d and f sublevels.

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**What does that mean?**

Look at your periodic table.  
Along the left side you will see numbers from 1 to 7.  
These represent the energy levels of electrons for that row of atoms.  $n=1, n=2, n=3 \dots$

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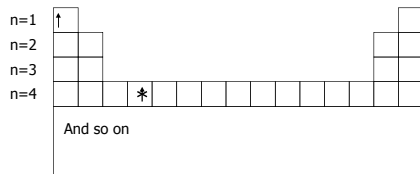
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## Electrons enter orbitals of lowest energy first.




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## An atomic orbital may at most describe two electrons.

s can hold 2 electrons – it has 1 orbital  
 p can hold 6 electrons – each of the 3 orbitals can hold 2 electrons  
 d can hold 10 electrons – each of the 5 orbitals can hold 2 electrons  
 f can hold 14 electrons – each of the 7 orbitals can hold 2 electrons

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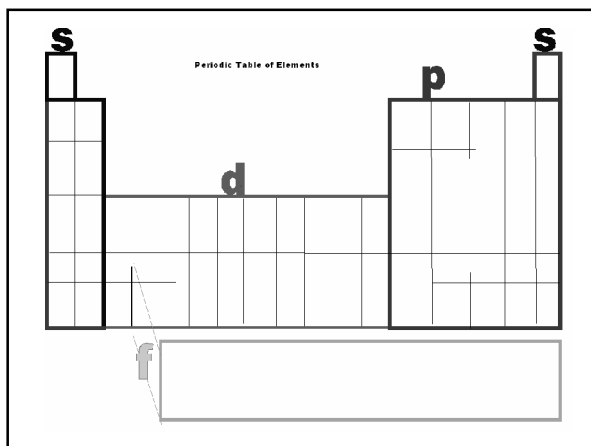
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electron enters each orbital one at a time until all the orbitals contain one electron.

Only after all the orbitals are filled will electrons pair-up.

FOR EXAMPLE

Carbon has 6 electron so it's configuration is:  $1s^2 \quad 2s^2 p^2$

and it fills in this order  $\rightarrow$

n=1  $\uparrow\downarrow$

n=2  $\uparrow\downarrow \quad \uparrow \quad \uparrow \quad \square$

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### Let's Practice

H	$1s^1$	
He	$1s^2$	
Li	$1s^2$	$2s^1$
Be	$1s^2$	$2s^2$
B	$1s^2$	$2s^2 p^1$
C	$1s^2$	$2s^2 p^2$

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### Electron Configurations

N	$1s^2$	$2s^2 2p^3$
O	$1s^2$	$2s^2 2p^4$
F	$1s^2$	$2s^2 p^5$
Ne	$1s^2$	$2s^2 p^6$
Na	$1s^2$	$2s^2 2p^6 3s^1$
Mg	$1s^2$	$2s^2 2p^6 3s^2$

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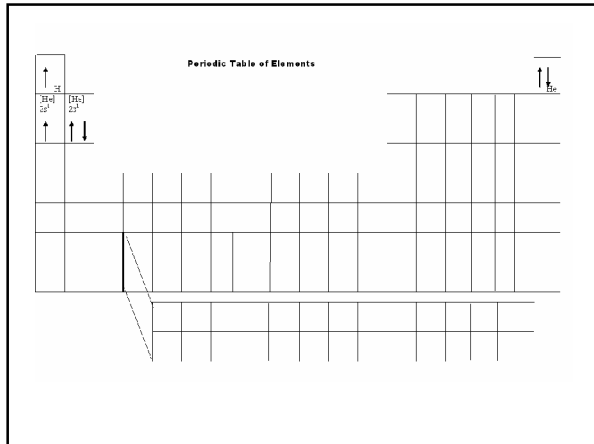
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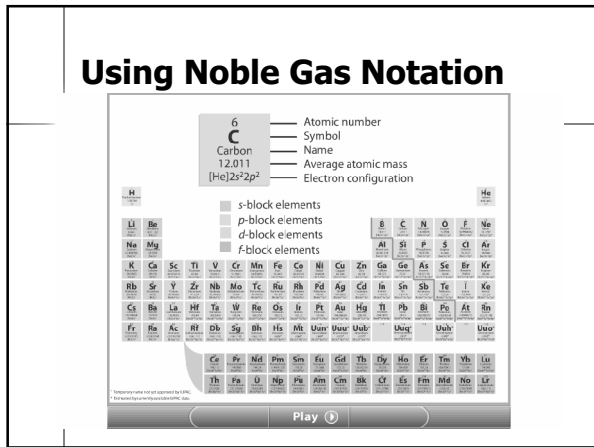
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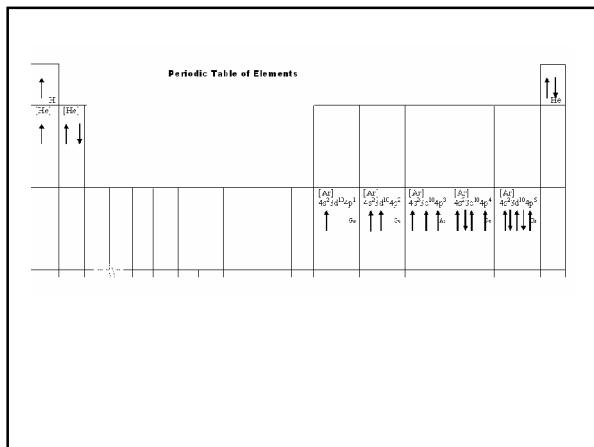
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<b>Electron Configurations</b>			
Al	1s <sup>2</sup>	2s <sup>2</sup> p <sup>6</sup>	3s <sup>2</sup> p <sup>1</sup>
Si	1s <sup>2</sup>	2s <sup>2</sup> p <sup>6</sup>	3s <sup>2</sup> p <sup>2</sup>
P	1s <sup>2</sup>	2s <sup>2</sup> p <sup>6</sup>	3s <sup>2</sup> p <sup>3</sup>
S	1s <sup>2</sup>	2s <sup>2</sup> p <sup>6</sup>	3s <sup>2</sup> p <sup>4</sup>
Cl	1s <sup>2</sup>	2s <sup>2</sup> p <sup>6</sup>	3s <sup>2</sup> p <sup>5</sup>
Ar	1s <sup>2</sup>	2s <sup>2</sup> p <sup>6</sup>	3s <sup>2</sup> p <sup>6</sup>

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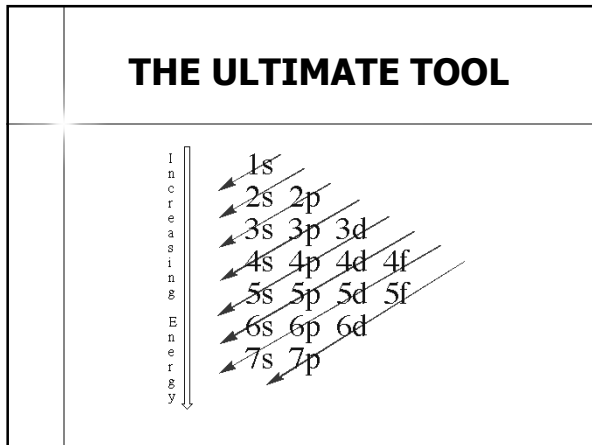
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<b>THE TOOL</b>	
<ul style="list-style-type: none"> <li>Remember to start at the beginning of each arrow, and then follow it all of the way to the end, filling in the sublevels that it passes through. In other words, the order for filling in the sublevels becomes; 1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s, 5f, 6d,7p.</li> </ul>	

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