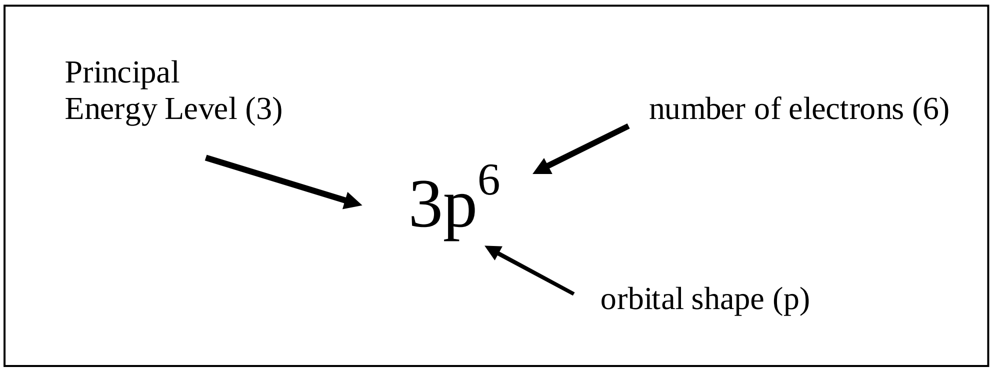
<u>Chapter 5.3 – Electron Configurations, Quantum Atom, & Wave Mechanical View of H</u> Std 1 & 2

1. Electron Configuration and Orbital Configuration are the same thing (see **Ch 5.3**). The electron configuration is written for each element to fill in how many electrons it has.
   Example: Phosphorous Z = 15 (the atomic number)

   Electron configuration is $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$

   In this kind of configuration here's what it all means:



2. We can abbreviate electron configurations. When you get to energy levels 4 –7, the electron configuration is very long. For instance:
   The electron configuration for Cs (z = 55) can be written 2 ways:

   $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6\ 6s^1$
   or simply write [Xe] $6s^1$

   Xe accounts for the first 54 electrons and their configuration:
   $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^6\ 5s^2\ 4d^{10}\ 5p^6$
   By writing Xe we get all this for free! What we did was take the Nobel gas in the row above Cs as the starting point for the configuration and just added what comes after the $5p^6$ electron part of the configuration.
3. Atoms like full sublevels. They fill in the order given on your orbital filling chart.
4. **<u>Valence Electrons</u>** – only the electrons in the highest energy level. These will always be s and p electrons in the **<u>highest energy level only</u>**.
   Example:
   Question: How many valence electrons for Sn (z = 50)?
   Solution
   Sn is on row 5 of the chart in column 14. The valence electrons are the 5s and 5p electrons. There are 2 5s electrons and 2 5p electrons for a total of **<u>4 valence electrons</u>**.
5. **<u>Core Electrons</u>** – all of the atom's electrons except the valence shell electrons.
   Core electrons = total electrons - valence electrons
   Example:
   Question: How many core electrons for Sn (z = 50)?
   Solution: We just figured the valence electrons for Sn in the last example.
   Using the formula above: Core electrons = total electrons – valence electrons

50 - 4 = **<u>46 core electrons</u>**

6. **Ionization energy** – energy required to remove an electron from an atom. We always measure this energy when the element is a gas.
   Example - For potassium (K)
   $K_{(g)}$ ---> K^{+1} + e^{-} (the energy to do this, take away the electron)
7. Metals
   a. lustrous (shiny)
   b. can change their shape (bend, pound etc) without breaking
   c. conduct heat and electricity
   d. metals tend to **lose** electrons easily
8. Non-Metals
   a. non-metals tend to **take** electrons easily (grabby)
   b. don't have the physical properties of metals
9. Metalloids – Act like metals and non-metals.
10. Names for different groups on the chart

Group 1 (column 1)	**Alkali Metals**
Group 2 (column 2)	**Alkali Earth Metals**
Group 7 (column 7) or 17	**Halogens**
Group 8 (column 8) or 18	**Nobel Gases**

Wave Mechanical Model – Summary – Ch 5.2

1. maximum number of electrons in any orbital = 2 (Pauli exclusion principle)
2. The same types of orbitals recur as you go from n = 1 to n = 7 (n is the **principal energy level**). All elements in a vertical column are filling electrons in the same sublevels.
3. **Valence electrons** are the number of electrons in the outermost energy level that has electrons in it. All elements that have the same number of valence electrons in their outer shell will be in the same column (also call a **group** or **family**). All elements in the same column will react similarly chemically. See Figure 10.30 (p. 318). Notice that the numbers of s and p electrons (the only sublevels that will ever have valence electrons in them) are always the same in a column. The only difference is the **n** number.