Electron Configuration

Here is one way to determine the configuration of electrons in an atom. If you know the number of electrons in the atom, you can write the electron configuration and determine the identity of the element.

For example, consider the element silicon, Si. By looking at the periodic table, you can see that the atomic number of silicon is 14, so there are 14 protons and 14 electrons in silicon. I can place the 14 electrons in orbitals around the nucleus of the atom. Two electrons fill each orbital.

2 e- go in the 1s orbital with a remainder of 12 electrons \((14 - 2 = 12)\)

\[
\begin{array}{cccccc}
1s & 2s & 2p & 3s & 3p \\
\end{array}
\]

2 e- go in the 2s orbital with a remainder of 10 electrons \((12 - 2 = 10)\)

\[
\begin{array}{cccccc}
1s & 2s & 2p & 3s & 3p \\
\end{array}
\]

2 e- go into each of the three 2p orbitals with a remainder of four electrons \((10 - 6 = 4)\)

\[
\begin{array}{cccccc}
1s & 2s & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & 3s & 3p \\
\end{array}
\]

2 e- go in the 3s orbital with a remainder of two electrons \((4 - 2 = 2)\)

\[
\begin{array}{cccccc}
1s & 2s & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & 3s & 3p \\
\end{array}
\]

The last 2 e- go in the 3p orbitals \((2 - 2 = 0)\)

\[
\begin{array}{cccccc}
1s & 2s & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & \uparrow\downarrow & 3p \\
\end{array}
\]

The full electron configuration is \(1s^22s^22p^63s^23p^2\)

The noble gas core notation is \([Ne]3s^23p^2\) because \(1s^22s^22p^6\) is the configuration of neon, Ne.

However, if you only had the electron configuration, you could count the superscripts to get 14 as the total number of electrons. Then you could look at the periodic table and see that the element with 14 electrons was silicon, Si.