SNC 2D
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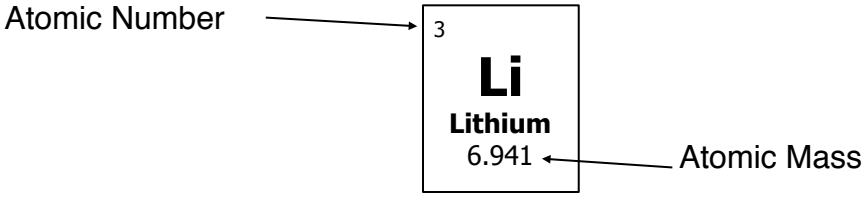
Drawing the Atom

Bohr-Rutherford Diagrams

Bohr-Rutherford diagrams are one model that describes the arrangement of subatomic particles in the atom. It shows the location and number of electrons, protons, and neutrons.

Reminder: # protons = atomic number
neutrons = n = mass number – atomic number
electrons = # protons



To draw Bohr-Rutherford diagrams

1. Using the periodic table, calculate the number of protons, neutrons and electrons.
2. Draw the nucleus by first writing the symbol of the element and indicating the number of protons (p) and neutrons (n).
3. Draw the electrons in their orbits. Only a certain number of electrons can be held in each orbit:
   - fill the lower orbits (or energy levels) first
   - the first orbit will hold up to two electrons.
   - the other orbits can hold up to eight electrons.
   - these rules hold up to calcium (element 20)

Draw a Bohr-Rutherford diagram for helium	Draw a Bohr-Rutherford diagram for nitrogen	Draw a Bohr-Rutherford diagram for boron

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Lewis Diagrams

When atoms combine, only electrons in the outer (valence) shell are involved. We can represent these valence electrons with Lewis diagrams (electron dot diagrams). Lewis diagrams are a simple way to understands how electrons are involved in the formation of chemical compounds.

To draw Lewis diagrams:

1. Write the element symbol. Instead of having plus signs represent positive charges, the element symbol represents the nucleus.
2. Around this draw dots – one for each valence electron.
3. The dots should be spread over four sides. Dots are not paired until all sides have at least one dot.
4. The number of valence electrons is equal to the group number. For example, hydrogen is in Column 1 and it has one valence electron. Neon is in Column 18 and it has 8 valence electrons. The only exception is He which has 2 valence electrons.

Drawing Lewis diagrams help us to identify **electron pairs** (two electrons interacting) which are less likely to participate in a single bond than **unpaired electron** (electron in an outer shell that is not part of a pair.

Example:

Draw a Lewis diagram for oxygen	Draw a Lewis diagram for neon	Draw a Lewis diagram for sodium